RFID Logistics Pilot ²
Testing RFID for improvement of retail operations and On Shelf Availability

Antonio Rizzi, Prof., Ph.D.

Full Professor,
Industrial Logistics and Supply Chain Management
Founder and Head, RFID Lab
Global RF Lab Alliance Network, President
Department of Industrial Engineering
University of Parma
ITALY

Charter member of:

Powered by:

Scientific coordinator of:
Agenda

RFID Logistics Pilot ²

✓ Backgrounds
✓ Objectives
✓ the project
✓ Results
✓ Future developments
RFID Lab
www.rfidlab.unipr.it

<table>
<thead>
<tr>
<th>Research centre mission</th>
<th>how to create value through RFID and EPC Network deployments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research fields</td>
<td>RFID and EPC network Implementation, BPR, business value and ROI, software and hardware integration</td>
</tr>
<tr>
<td>Business processes</td>
<td>Operations, Industrial Logistics and supply chain management, track and trace</td>
</tr>
<tr>
<td>Industries</td>
<td>Food, FMCG, Fashion &amp; Apparel, Pharmaceutical and Healthcare</td>
</tr>
<tr>
<td>Technology transfer models</td>
<td>Technology partners</td>
</tr>
<tr>
<td></td>
<td>Media partners</td>
</tr>
<tr>
<td></td>
<td>Board of Advisors</td>
</tr>
<tr>
<td>Facility &amp; equipments</td>
<td>RFID Lab: 2,000 sq.ft. Closed loop high speed roller and belt conveyor, sorter (cases), roller conveyor (pallet), wrapping machine, FLT, drive in storage shelf, full scale dock door</td>
</tr>
<tr>
<td></td>
<td>RFID fashion store</td>
</tr>
</tbody>
</table>

RFID Logistics Pilot
Testing RFID for improvement of retail operations and On Shelf Availability

Prof. Ing. Antonio Rizzi
Industrial Engineering Department
University of Parma
RFID Lab
www.rfidlab.unipr.it

RFID Logistics Pilot
Testing RFID for improvement of retail operations and On Shelf Availability

Prof. Ing. Antonio Rizzi
Industrial Engineering Department
University of Parma
RFID Logistics Pilot
Testing RFID for improvement of retail operations and On Shelf Availability

Prof. Ing. Antonio Rizzi
Industrial Engineering Department
University of Parma
## RFID Lab

**Research & technology transfer: From lab to field**

<table>
<thead>
<tr>
<th>Period</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003 - 2005</td>
<td>Track &amp; trace projects in the food industry</td>
</tr>
<tr>
<td>2006 - 2007</td>
<td>GS1 EPC Global – University of Parma</td>
</tr>
</tbody>
</table>

  “the impact of RFID and EPC Network in FMCG SC research project”

  **RFID Lab – first research centre in Italy**  

  **Lab research:** Technology tests, impact on business processes, yard management, RFID Warehouse, Assets Tracking

<table>
<thead>
<tr>
<th>Period</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007 - 2008</td>
<td>RFID Logistics pilot</td>
</tr>
</tbody>
</table>

  First Italian SC deployment in the FMGC

<table>
<thead>
<tr>
<th>Period</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008 - 2009</td>
<td>Research project: OOS audit and the impact of RFID</td>
</tr>
<tr>
<td>2009 - 2011</td>
<td>RFID Logistic pilot²: Testing RFID for improvement of retail operations and On Shelf Availability (<a href="http://www.rfidlogisticspilot.com">www.rfidlogisticspilot.com</a>)</td>
</tr>
</tbody>
</table>
RFID Logistics Pilot

Project objectives

✓ Technology objectives
  ✓ Feasibility of backroom and shop floor inventory management
  ✓ Integration of RFID and resident processes, EPCISs and legacy systems (WMS, retail);

✓ Supply Chain Collaboration objectives
  ✓ Real time monitoring and sharing of on shelf availability
  ✓ Shrinkage reduction;
  ✓ Optimization of store shelf inventory levels
RFID Logistics Pilot²: the project

Participants

Scientific coordination

Endorsement

Technology partners

RFID Logistics Pilot²
Testing RFID for improvement of retail operations and On Shelf Availability

Prof. Ing. Antonio Rizzi
Industrial Engineering Department
University of Parma
RFID Logistics Pilot²: the project

RLP 2 – a shared approach

- **Engineering**
  All companies bring their contribution and point of view to the project
  General value of the implementation

- **Implementation**
  One company deploys
  Project costs can be lowered being shared “pro quota” between participants

- **Results**
  Competitive companies share results and know how

- **Benchmarking**
  Both between supply chain partners and competitors – an industry approach
The supply chain

Retailer: **Auchan**

**D.C. – Calcinate (BG)**

**Stores** – Curno (BG) and Roncadelle (BS)
As Is supply chain - DC

Inbound logistics from manufacturers
Receiving
  Dry products: storage
  Fresh products staging

Store orders fulfillment
  Dry products - order picking
  Fresh products - sorting

Outbound logistics to stores
Packaging and marking
Shipments

RFID Logistics Pilot
Testing RFID for improvement of retail operations and On Shelf Availability

Prof. Ing. Antonio Rizzi
Industrial Engineering Department
University of Parma
«As Is» supply chain - stores

**Inbound logistics**: truck unloading and goods receiving

Items are moved to the shop floor for **replenishment**

Once shelves have been filled in, Inventories are moved back to the backroom

Empty cases are **trashed**
To be engineering
Products

Fresh products
(67 items)

- Buitoni
- Parmacotto

Dry products
(14 items)

- Lavazza
- Purina

- PASTRY AND SAUCES (24 ITEMS)
- FRESH PASTA (27 ITEMS)
- CHEESE AND SLICED HAMS (16 ITEMS)
- COFFE (6 ITEMS)
- PURINA PET FOOD (8 ITEMS)
**RLP² subway & tracking points**

<table>
<thead>
<tr>
<th>Process</th>
<th>Position</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slap&amp;Ship</td>
<td>DC</td>
<td>Case level tagging and SSCC aggregation</td>
</tr>
<tr>
<td>Shipping</td>
<td>DC</td>
<td>Tracking shipments</td>
</tr>
<tr>
<td></td>
<td>2 dock doors; fresh products</td>
<td></td>
</tr>
<tr>
<td>Receiving</td>
<td>Store – backroom</td>
<td>Backroom stock updating</td>
</tr>
<tr>
<td></td>
<td>Receiving dock doors</td>
<td></td>
</tr>
<tr>
<td>Trash</td>
<td>Store – backroom</td>
<td>Backroom and shopfloor inventory updating</td>
</tr>
<tr>
<td></td>
<td>Fixed readers</td>
<td></td>
</tr>
<tr>
<td>Check out &amp; demarque</td>
<td>Store – shopfloor Non RFID</td>
<td>Shopfloor inventory updating</td>
</tr>
</tbody>
</table>

**Process Diagram**

- **Calcinate**
- **Curno**
- **Roncadelle**
- **PV Retailer**
## EPC Network: tracing

<table>
<thead>
<tr>
<th>Event Time</th>
<th>Id Actor</th>
<th>Event</th>
<th>Action</th>
<th>Biz Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-JUNE-2011 16:05</td>
<td>Auchan Ce.Di.</td>
<td>object</td>
<td>ADD</td>
<td>slapship</td>
</tr>
<tr>
<td>24-JUNE-2011 16:05</td>
<td>Auchan Ce.Di.</td>
<td>aggregation</td>
<td>ADD</td>
<td>slapship</td>
</tr>
<tr>
<td>24-JUNE-2011 21:32</td>
<td>Auchan Ce.Di.</td>
<td>Object</td>
<td>OBSERVE</td>
<td>shipping</td>
</tr>
<tr>
<td>25-JUNE-2011 05:15</td>
<td>Auchan PV</td>
<td>object ; quantity</td>
<td>OBSERVE</td>
<td>receiving</td>
</tr>
<tr>
<td>25-JUNE-2011 09:25</td>
<td>Auchan PV</td>
<td>object ; quantity</td>
<td>OBSERVE</td>
<td>trash</td>
</tr>
</tbody>
</table>

---

**RFID Logistics Pilot**
Testing RFID for improvement of retail operations and On Shelf Availability

Prof. Ing. Antonio Rizzi
Industrial Engineering Department
University of Parma
RFID Logistics Pilot

Shop floor & backroom real time inventory
RFID Logistics Pilot

Shop floor & backroom real time inventory

Trash

Trash compactor

Product #1
Product #2
Product #3

Replenishment

Inventory

Prof. Ing. Antonio Rizzi
Industrial Engineering Department
University of Parma
RFID Logistics Pilot²

Shop floor & backroom real time inventory

Product #1
Product #2
Product #3

Demarque

Cassa
Cassa
Cassa
Cassa
Cassa
Cassa
Cassa

Area Vendita

Inventory

Retro negozio
Area vendita

RFID Logistics Pilot²
Testing RFID for improvement of retail operations and On Shelf Availability

Prof. Ing. Antonio Rizzi
Industrial Engineering Department
University of Parma
RFID Logistics Pilot²

Shop floor & backroom real time inventory

Replenishment
Product #1 is near OOS:
Please replenish
RFID Logistics Pilot

Shop floor & backroom real time inventory

Trash

Replenishment

Product #1 is near OOS: Please replenish

Vendita

Cassa

Cassa

Cassa

Cassa

Area Vendita

Compattatore

Trash

Retro negozio

Area vendita

Prof. Ing. Antonio Rizzi
Industrial Engineering Department
University of Parma

RFID Logistics Pilot
Testing RFID for improvement of retail operations and On Shelf Availability
IS - EPC Network

RFID Logistics Pilot
Testing RFID for improvement of retail operations and On Shelf Availability

Prof. Ing. Antonio Rizzi
Industrial Engineering Department
University of Parma
Testing RFID for improvement of retail operations and On Shelf Availability

deployment
RFID Logistics Pilot

Testing RFID for improvement of retail operations and On Shelf Availability
Value added information
RFID Logistics Pilot
Testing RFID for improvement of retail operations and On Shelf Availability

Prof. Ing. Antonio Rizzi
Industrial Engineering Department
University of Parma

Value added information

EPCIS data
- Raw data
- No value added information

Business Intelligence
- Value added information for
  - Store managers
  - Manufacturers

Data Warehouse

Calcinate
- Slap & Ship
- Shipping

Receiving

Trash

Curno

Roncadelle

Receiving

Trash
Value added information

RLP II Business Intelligence Dashboard

- Real time inventory levels (Shop floor & back room)
  - Alert & statistics about OOS and Near OOS

---

**RFID Logistics Pilot 2 — Dashboard**

**Reportato**: Referenza

<table>
<thead>
<tr>
<th>Referenza</th>
<th>Prodotto</th>
<th>Reforta banco</th>
<th>Reforta banco Roncadale</th>
</tr>
</thead>
<tbody>
<tr>
<td>00402532</td>
<td>RAVOLI FUGHI PORCINI BUTTONI</td>
<td>17</td>
<td>0.00%</td>
</tr>
<tr>
<td>00054416</td>
<td>SALSA 4 FORMAGGI BUTTONI</td>
<td>15</td>
<td>0.00%</td>
</tr>
<tr>
<td>0040281</td>
<td>BASE TORTA LIMONE BUTTONI</td>
<td>14</td>
<td>5.94%</td>
</tr>
<tr>
<td>00402543</td>
<td>TORTELLONI RICOTTONI BUTTONI</td>
<td>13</td>
<td>11.43%</td>
</tr>
<tr>
<td>00402642</td>
<td>CAPRELETTI IN OVIDO BUTTONI</td>
<td>12</td>
<td>0.00%</td>
</tr>
<tr>
<td>00112205</td>
<td>CAFFE' ORO 1X LAVAZZA</td>
<td>12</td>
<td>0.00%</td>
</tr>
<tr>
<td>00409003</td>
<td>BASE PER FOCACCI BUTTONI</td>
<td>10</td>
<td>2.38%</td>
</tr>
<tr>
<td>00402534</td>
<td>RAVOLI 4L BIANCETTI</td>
<td>9</td>
<td>61.12%</td>
</tr>
<tr>
<td>00402534</td>
<td>RAVOLI CARROF BUTTONI</td>
<td>8</td>
<td>0.00%</td>
</tr>
<tr>
<td>00402644</td>
<td>TORTELLONI CARNE BUTTONI</td>
<td>8</td>
<td>0.00%</td>
</tr>
<tr>
<td>00280776</td>
<td>PESE DI NOCI BUTTONI</td>
<td>8</td>
<td>0.00%</td>
</tr>
<tr>
<td>00402582</td>
<td>BASE TORTA STRACCIO. BUTTONI</td>
<td>7</td>
<td>0.00%</td>
</tr>
<tr>
<td>00402523</td>
<td>TORTELLONI VERDURE RISOLTE</td>
<td>7</td>
<td>0.00%</td>
</tr>
<tr>
<td>00402579</td>
<td>BASE TORTA MARGHERITA BUTTONI</td>
<td>6</td>
<td>0.00%</td>
</tr>
<tr>
<td>00280776</td>
<td>PESE GIOLANO BUTTONI</td>
<td>6</td>
<td>0.00%</td>
</tr>
<tr>
<td>00409008</td>
<td>PASTA SFOGLIA ROTONDA BUTTONI</td>
<td>5</td>
<td>0.00%</td>
</tr>
<tr>
<td>00513308</td>
<td>MORTADELLA BOLOGNA CIP</td>
<td>4</td>
<td>0.00%</td>
</tr>
<tr>
<td>00402643</td>
<td>PASTA BIRCHE BUTTONI</td>
<td>2</td>
<td>0.00%</td>
</tr>
<tr>
<td>00402776</td>
<td>BASE TORTA MARGHERITA BUTTONI</td>
<td>2</td>
<td>31.7%</td>
</tr>
<tr>
<td>00402643</td>
<td>RAVOLI 4 FORMAGGIO BUTTONI</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>00402464</td>
<td>CONCH CARBONARA BUTTONI</td>
<td>0</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

---

**RFID Logistics Pilot 2**

Testing RFID for improvement of retail operations and On Shelf Availability

Prof. Ing. Antonio Rizzi
Industrial Engineering Department
University of Parma
Value added information

RLP II Business Intelligence Dashboard

✓ Track & trace

supply chain RFID reads
Value added information

RLP II Business Intelligence Dashboard

- **Inventory**
  - inventory history in the backroom and in the shopfloor
  - Alert on OOS and Near OOS;

---

**Inventario**

<table>
<thead>
<tr>
<th>Data</th>
<th>Referencia</th>
<th>Prodotto</th>
<th>Area Esp</th>
<th>Vendite</th>
<th>Area Esp</th>
<th>Vendite</th>
</tr>
</thead>
<tbody>
<tr>
<td>15/06/2011</td>
<td>00293977</td>
<td>PESTO GENOVESE BUTFONI</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>16/06/2011</td>
<td>00293977</td>
<td>PESTO GENOVESE BUTFONI</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>17/06/2011</td>
<td>00293977</td>
<td>PESTO GENOVESE BUTFONI</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>18/06/2011</td>
<td>00293977</td>
<td>PESTO GENOVESE BUTFONI</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>19/06/2011</td>
<td>00293977</td>
<td>PESTO GENOVESE BUTFONI</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20/06/2011</td>
<td>00293977</td>
<td>PESTO GENOVESE BUTFONI</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>21/06/2011</td>
<td>00293977</td>
<td>PESTO GENOVESE BUTFONI</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>22/06/2011</td>
<td>00293977</td>
<td>PESTO GENOVESE BUTFONI</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>23/06/2011</td>
<td>00293977</td>
<td>PESTO GENOVESE BUTFONI</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>24/06/2011</td>
<td>00293977</td>
<td>PESTO GENOVESE BUTFONI</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

---

**RFID Logistics Pilot**

Testing RFID for improvement of retail operations
and On Shelf Availability

Prof. Ing. Antonio Rizzi
Industrial Engineering Department
University of Parma
Value added information

RLP II Business Intelligence Dashboard

✓ Sales & demarque (shrinkage)
Results
Inventories: a short blanket

▲ shelf display
▼ shelf display

▼ Out of stock
▼ Out of stock

▲ Demarque
▲ invested capitals
▼ product freshness
▼ product freshness
Results – RFID impact on the blanket
Results - Out Of Stock

How to value OOS?

Sumproduct of:
- product average sales per hour/day
- OOS time interval
Results - Out Of Stock
Some examples

<table>
<thead>
<tr>
<th>PRODOTTO</th>
<th>DALLE</th>
<th>ALLE</th>
<th>DURATA [h]</th>
<th>VALORE OOS</th>
<th>TIPO OOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASE PER FOCACCIA BUITONI</td>
<td>25/06/2011 21,55</td>
<td>25/06/2011 22,55</td>
<td>2</td>
<td>€ 2,34</td>
<td>RFID - missed replenishment</td>
</tr>
<tr>
<td>BASE TORTA MARGHERITA BUITONI 1</td>
<td>17/05/2011 20,55</td>
<td>17/05/2011 22,55</td>
<td>3</td>
<td>€ 8,47</td>
<td>RFID - oos</td>
</tr>
<tr>
<td>BASE TORTA MARGHERITA BUITONI 2</td>
<td>20/05/2011 20,55</td>
<td>20/05/2011 22,55</td>
<td>3</td>
<td>RFID - missed replenishment</td>
<td></td>
</tr>
<tr>
<td>BASE TORTA MARGHERITA BUITONI 3</td>
<td>25/06/2011 17,55</td>
<td>25/06/2011 22,55</td>
<td>6</td>
<td>RFID - missed replenishment</td>
<td></td>
</tr>
<tr>
<td>BASE TORTA MARGHERITA BUITONI 4</td>
<td>29/06/2011 14,55</td>
<td>29/06/2011 22,55</td>
<td>8</td>
<td>RFID - missed replenishment</td>
<td></td>
</tr>
<tr>
<td>CUORICINI PR.COTTO BUITONI 1</td>
<td>09/06/2011 17,55</td>
<td>09/06/2011 22,55</td>
<td>6</td>
<td>€ 8,43</td>
<td>RFID - oos</td>
</tr>
<tr>
<td>CUORICINI PR.COTTO BUITONI 2</td>
<td>12/07/2011 12,55</td>
<td>12/07/2011 22,55</td>
<td>10</td>
<td>RFID - oos</td>
<td></td>
</tr>
<tr>
<td>MORTADELLA BOLOGNA IGP</td>
<td>30/06/2011 17,55</td>
<td>30/06/2011 22,55</td>
<td>6</td>
<td>€ 1,41</td>
<td>RFID - missed replenishment</td>
</tr>
<tr>
<td>PASTA SFOGLIA RUSTICA BUITONI</td>
<td>04/06/2011 19,55</td>
<td>05/06/2011 9,55</td>
<td>6</td>
<td>€ 6,54</td>
<td>RFID - missed replenishment</td>
</tr>
<tr>
<td>PESTO DI NOCI BUITONI</td>
<td>04/07/2011 21,55</td>
<td>05/07/2011 22,55</td>
<td>17</td>
<td>€ 9,42</td>
<td>RFID - missed replenishment</td>
</tr>
<tr>
<td>RAVIOLI AL BRASATO</td>
<td>10/05/2011 11,55</td>
<td>25/05/2011 22,55</td>
<td>203</td>
<td>€ 46,57</td>
<td>uscita</td>
</tr>
<tr>
<td>RAVIOLI AL BRASATO BUITONI 1</td>
<td>30/05/2011 17,55</td>
<td>30/05/2011 22,55</td>
<td>6</td>
<td>€ 24,11</td>
<td>RFID - missed replenishment</td>
</tr>
<tr>
<td>RAVIOLI AL BRASATO BUITONI 2</td>
<td>23/06/2011 16,55</td>
<td>23/06/2011 22,55</td>
<td>7</td>
<td>RFID - missed replenishment</td>
<td></td>
</tr>
<tr>
<td>RAVIOLI CARCIOFI BUITONI</td>
<td>14/06/2011 15,55</td>
<td>15/06/2011 22,55</td>
<td>23</td>
<td>€ 3,33</td>
<td>RFID - oos</td>
</tr>
<tr>
<td>RAVIOLI FUNGHI PORCINI BUITONI</td>
<td>03/06/2011 19,55</td>
<td>03/06/2011 22,55</td>
<td>4</td>
<td>€ 0,77</td>
<td>RFID - oos</td>
</tr>
<tr>
<td>SALSA FUNGHI BUITONI</td>
<td>18/07/2011 19,55</td>
<td>18/07/2011 22,55</td>
<td>4</td>
<td>€ 5,36</td>
<td>RFID - missed replenishment</td>
</tr>
<tr>
<td>STELLINE RIC/SPIN.BUITONI 1</td>
<td>14/06/2011 20,55</td>
<td>15/06/2011 22,55</td>
<td>18</td>
<td>€ 22,43</td>
<td>RFID - oos</td>
</tr>
<tr>
<td>STELLINE RIC/SPIN.BUITONI 3</td>
<td>13/07/2011 18,55</td>
<td>13/07/2011 22,55</td>
<td>5</td>
<td>RFID - oos</td>
<td></td>
</tr>
<tr>
<td>TORTELLINI CARNE BUITONI</td>
<td>11/06/2011 19,55</td>
<td>20/06/2011 22,55</td>
<td>109</td>
<td>€ 14,91</td>
<td>uscita</td>
</tr>
<tr>
<td>TORTELLONI RIC/SPINACI BUITONI</td>
<td>07/07/2011 12,55</td>
<td>09/07/2011 22,55</td>
<td>39</td>
<td>€ 9,22</td>
<td>RFID - oos</td>
</tr>
</tbody>
</table>

RFID Logistics Pilot 2
Testing RFID for improvement of retail operations
and On Shelf Availability

Prof. Ing. Antonio Rizzi
Industrial Engineering Department
University of Parma
Results - Out Of Stock
OOS root causes and the value of RFID*

PERMANENT OOS
- SF INVENTORY = 0
- BR INVENTORY = 0
- Several days of oos

RFID – REORDER ERRORS; INVENTORY INACCURACY
- SF INVENTORY = 0
- BR INVENTORY = 0

RFID – MISSED REPLENISHMENT
- SF INVENTORY = 0
- BR INVENTORY > 0

*% del fatturato
Results – shelf inventory management
Appropriate Shelf Cycle and safety stock management

Cycle stock:
✓ Order quantities proportional to sales and LT
✓ Average inventory Rotation Index: 2.09 days

Safety stocks
✓ Frequently used
✓ Proportional to STD.DEV and LT
✓ Safety stock Rotation index: 1.51 days
Results – shelf inventory management

Unappropriate Shelf Cycle and safety stock

Cycle stock:
- Order quantities are not proportional to sales and LT
- Average inventory Rotation Index: 21.04 days
  (product Shelf Life 40 days)

Safety stocks
- constant
- Not proportional to STD.DEV and LT
- Safety stock Rotation index: 17.41 days
Results – shelf inventory management

RFID value

+0.33% of sales through safety stocks optimization

- Conservative approach: only safety stocks optimization, no impact on cycle stocks;
- Safety stocks as an average of minimum peaks

RFID Logistics Pilot
Testing RFID for improvement of retail operations and On Shelf Availability

Prof. Ing. Antonio Rizzi
Industrial Engineering Department
University of Parma
Results – Demarque (shrinkage)

The value of shrinkage

Demarque - 25 units
(19 SF + 6 BR)

Shrinkage value as a percentage of sales
## Results – Demarque (shrinkage)

### Some examples

<table>
<thead>
<tr>
<th>Product</th>
<th>Date</th>
<th>Q.Ty</th>
<th>Cause</th>
<th>Notes</th>
<th>Unit value</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAPPELLETTI PR.CRUDO BUITONI</td>
<td>07/06/2011</td>
<td>4</td>
<td>RFID - overstock</td>
<td>On shelf from 29/05</td>
<td>€ 3.59</td>
<td>€ 14.36</td>
</tr>
<tr>
<td>MORTADELLA BOLOGNA IGP</td>
<td>10/05/2011</td>
<td>5</td>
<td>RFID - overstock</td>
<td>On shelf from 29/04</td>
<td>€ 2.26</td>
<td>€ 11.30</td>
</tr>
<tr>
<td>PASTA FROLLA BUITONI B</td>
<td>11/07/2011</td>
<td>3</td>
<td>non RFID</td>
<td></td>
<td>€ 2.36</td>
<td>€ 7.08</td>
</tr>
<tr>
<td>PASTA SFOGLIA RUSTICA BUITONI</td>
<td>19/07/2011</td>
<td>4</td>
<td>non RFID</td>
<td></td>
<td>€ 2.49</td>
<td>€ 9.96</td>
</tr>
<tr>
<td>PASTA SFOGLIA RUSTICA BUITONI</td>
<td>24/05/2011</td>
<td>22</td>
<td>RFID - no replenish</td>
<td>1 case S&amp;S 3/5 and trashed 23/5, 1 case 5/5 trashed 25/5</td>
<td>€ 2.49</td>
<td>€ 54.78</td>
</tr>
<tr>
<td>PASTA SFOGLIA RUSTICA BUITONI</td>
<td>25/05/2011</td>
<td>30</td>
<td>RFID –no replenish</td>
<td>4/5 and 23/5, 3 cases 4/5 and 25/5</td>
<td>€ 2.49</td>
<td>€ 74.70</td>
</tr>
<tr>
<td>PESTO DI NOCI BUITONI</td>
<td>04/06/2011</td>
<td>3</td>
<td>RFID - no replenish</td>
<td>1 case S&amp;S 25/5 trashed 1/6</td>
<td>€ 2.80</td>
<td>€ 8.40</td>
</tr>
<tr>
<td>PESTO DI NOCI BUITONI</td>
<td>07/06/2011</td>
<td>3</td>
<td>RFID - no replenish</td>
<td>1 case S&amp;S 25/5 trashed 1/6</td>
<td>€ 2.80</td>
<td>€ 8.40</td>
</tr>
<tr>
<td>PESTO NO AGLIO BUITONI</td>
<td>18/05/2011</td>
<td>4</td>
<td>RFID - no replenish</td>
<td>1 case S&amp;S 12/5 trashed 17/5</td>
<td>€ 2.80</td>
<td>€ 11.20</td>
</tr>
<tr>
<td>PESTO NO AGLIO BUITONI</td>
<td>31/05/2011</td>
<td>4</td>
<td>non RFID</td>
<td></td>
<td>€ 2.80</td>
<td>€ 11.20</td>
</tr>
<tr>
<td>PESTO NO AGLIO BUITONI</td>
<td>20/06/2011</td>
<td>4</td>
<td>non RFID</td>
<td></td>
<td>€ 2.80</td>
<td>€ 11.20</td>
</tr>
<tr>
<td>PESTO SICILIANO BUITONI</td>
<td>16/06/2011</td>
<td>4</td>
<td>RFID – overstock</td>
<td>On shelf from 30 may</td>
<td>€ 2.80</td>
<td>€ 11.20</td>
</tr>
<tr>
<td>PESTO SICILIANO BUITONI</td>
<td>29/06/2011</td>
<td>4</td>
<td>RFID – overstock</td>
<td>On shelf from 17/6</td>
<td>€ 2.80</td>
<td>€ 11.20</td>
</tr>
<tr>
<td>PROSC.COTTO A/Q PARMACOTTO</td>
<td>18/07/2011</td>
<td>10</td>
<td>RFID – overstock</td>
<td>On shelf from l 06/07 luglio</td>
<td>€ 3.08</td>
<td>€ 30.80</td>
</tr>
<tr>
<td>PROSC.COTTO A/Q PARMACOTTO</td>
<td>12/07/2011</td>
<td>11</td>
<td>RFID – overstock</td>
<td>On shelf from 29/06</td>
<td>€ 3.08</td>
<td>€ 33.88</td>
</tr>
<tr>
<td>RAVIOLI CARCIOFI BUITONI</td>
<td>07/06/2011</td>
<td>25</td>
<td>RFID – overstock</td>
<td>On shelf from 20/05</td>
<td>€ 2.82</td>
<td>€ 70.50</td>
</tr>
<tr>
<td>TORT.ALLA CARNE BUITONI</td>
<td>13/06/2011</td>
<td>4</td>
<td>RFID - no replenish</td>
<td>1 case S&amp;S 31/05 trashed 07/06</td>
<td>€ 2.30</td>
<td>€ 9.20</td>
</tr>
<tr>
<td>TORTELLINI CARNE BUITONI</td>
<td>13/05/2011</td>
<td>3</td>
<td>non RFID</td>
<td></td>
<td>€ 3.59</td>
<td>€ 10.77</td>
</tr>
<tr>
<td>TORTELLINI CARNE BUITONI</td>
<td>06/06/2011</td>
<td>8</td>
<td>RFID - no replenish</td>
<td>1 case S&amp;S 23/05 trashed 06/06</td>
<td>€ 3.59</td>
<td>€ 28.72</td>
</tr>
<tr>
<td>TORTELLONI VERDURE GRIGLIATE</td>
<td>01/06/2011</td>
<td>4</td>
<td>non RFID</td>
<td></td>
<td>€ 3.05</td>
<td>€ 12.20</td>
</tr>
<tr>
<td>TORTELLONI VERDURE GRIGLIATE</td>
<td>31/05/2011</td>
<td>12</td>
<td>RFID – overstock</td>
<td>On shelf from 20/05</td>
<td>€ 3.05</td>
<td>€ 36.60</td>
</tr>
</tbody>
</table>
Results – Demarque (shrinkage)
Rooth causes of shrinkage and the value of RFID*

RFID REORDER ERRORS
- Inventory SF>>0
- Product on shelf for a long time
- Demarque on the shopfloor area

RFID FEFO MANAGEMENT
- Inventory BR >0
- LEFO instead of FEFO
- Demarque on the backroom

NON RFID
- 1-3 items demarqued
- Theft, damage, other

*% of sales
Results - Fresh Product freshness

Average fresh product Shelf life: **54.5 days**

Shelf life for the end consumer:
- **today:** 34.1 days
- **RFID shelf inventory optimization:** 40.1 days → +18%
Results – RFID impact on stores

- Overall RFID Value: +1.75% sales
- Product freshness: +18%

RFID Impact:
- +0.33% Capital
- +18% Product Freshness
- +1.14% Shrinkage
- +0.28% Out of Stock
RFID Logistics Pilot 2
Testing RFID for improvement of retail operations and On Shelf Availability

Antonio Rizzi, Prof., Ph.D.

Full Professor,
Industrial Logistics and Supply Chain Management
Founder and Head, RFID Lab
Global RF Lab Alliance Network, President
Department of Industrial Engineering
University of Parma
ITALY

Charter member of:
Powered by:
Scientific coordinator of: