BRAND PROTECTION AND PRODUCT TRACEABILITY

MARKET RESEARCH REPORT

Identification
Serialization
Coding
Marking
Smart Technology
Verification
Authentication

Donna Ritson
President

March 10, 2017
“The war against trafficking of fraudulent products is being fought in the field of technology”

- Director, Quality Control

Integration • Robotics • Inspection • Data Interpretation

Recalls
Counterfeiting
Fraud
Tampering
Diversion
Grey Market
Headlines In the News

Theft, Recalls, Impurities, Contamination, Mislabling

Goods Tracking Technologies Battle Cargo Theft
As thieves become more sophisticated, tracking devices that can be stored covertly in packages can help recover stolen products, such as pharmaceuticals.

600,000 Bottles of Generic Adderall Recalled - failed impurity tests
A Texas company recalling approximately 5,677 pounds of frozen shrimp scampi and meat lasagna products.

Chicken products recalled due to misbranding

Non-intact beef products recall due to possible E. coli contamination

E. coli-tainted flour spurs recall of 44,000 pounds of meat & poultry products

Modernization of FDA's regulatory framework for preventing foodborne illness is one of the most challenging initiatives in the agency’s history.
Know Where Your Products Are

Impact on the Global Economy

How is counterfeiting, fraud and product diversion affecting the world’s economy? What is the cost of a recall?

Technology Advancements

What technologies are emerging in tracking and locating products throughout the entire supply chain and which ones will endure?

Brand Protection Equipment Needs

What equipment attributes are most important as companies look for solutions to protect and track their brands?

Counterfeiting has become a worldwide epidemic and threatens public health through the production of inferior foods, beverages and medicines.

Tracking and verifying every transaction both upstream and downstream in the supply chain is a substantial undertaking.
The Global Packaging Market for Product Tracking will Grow
Two to Three Times the Rate of
Food, Beverage and Pharmaceutical Product Markets

3% - 7%
The total world trade
that is counterfeit

$1.5 trillion
The global value of
counterfeit goods annually

12.8% to 16.1% CAGR
Growth in the value of the global
anti-counterfeiting market over
the next five years

The anti-counterfeiting
packaging market is predicted
to witness
significant growth in
the next 5 years

Counterfeitors are diversifying
beyond traditional targets of
designer products and are
producing fake foods, beverages
and pharmaceuticals – even to
the point of counterfeit packaging
complete with serialized
packages

North America accounted for 50%
of the total growth in the global
anti-counterfeiting food packaging
market in 2014
Global Look at Food and Beverage

The Number and Cost of Recalls are Rising

While perhaps not intuitive, counterfeiting is actually an enormous problem with certain foods in the industry - Olive oil, honey, fish, vinegars, vanilla, coffee

7%
Percentage of products in grocery stores nationwide that contain fraudulent ingredients

$10 - $15 bn
The cost to the global food industry caused by food fraud

Food & Beverage is the Largest Victim of Cargo Theft*

Food & Beverage
Electronics
Home & Garden
Other
24%

Product Recalls
Food recalls in the U.S. have grown 4-fold in the past 5 years

72%
3 of 4 recalls are related to food

The Cost of Food Recalls
The average cost of a recall for a food company is $10M

58%
Percentage of companies participating that were affected by a product recall

Global Look at Pharma

Counterfeiting and Diversion is Rampant

“We are always dealing with theft so the need for anti-tampering and anti-counterfeiting solutions is our focus to protect the brand and consumer from all forms of fraud.”
- Sr. Packaging Engineer, Pharma

40%  
Drugs Americans take that are imported

80%  
Active ingredients in the drugs on the American market that come from overseas sources

$5 bn  
The sale of fraudulent medicines from East Africa and the Pacific to South-East Asia

$75 bn  
Revenue derived from the global counterfeit drug market

By late 2018, 75% of the world’s prescription medications will be regulated as they travel through the supply chain.
Global Driver
Deliver Products That Are Trackable, Verifiable and Safe

Globalization Creates An
Increasingly Complex Supply Chain

FSMA Is Driving Food & Beverage
Toward More Track and Trace

• 2 of 3 companies report 100% compliance with FSMA (Food Safety Modernization Act).

2017 PMMI Trends in Food Processing

Serialization is a Global Solution
and will become more uniform across the global supply chain

• Half of companies are >50% compliant-ready to meet serialization regulations.

2016 PMMI Pharmaceutical and Medical Devices
VOICE OF THE SUPPLY CHAIN

Suppliers
Ingredients
Materials
Machines

Processing
Packaging
Transport
Warehousing
Retailer

SIZE OF END USERS

48% Large $500+ million
25% Medium $100-$400 million
27% Small Under $100 million

INDUSTRIES

24%
46%
30%

Food
Beverage
Pharma
The Entire Supply Chain Requires Checks-and-Balances to Close the Gaps When Tracking, Authenticating and Locating Products

“A layered approach to brand protection is needed and each design solution could be unique”

- CEO
Brand Protection

92%

The Majority of Companies Interviewed are Performing Mock Recalls

A fully integrated track and trace solution consists of:

- A layered suite of solutions
- Infrastructure that is fully integrated
  – inks, vision, data collection, print technologies
- Flexible solutions adaptable to changing needs
- A centralized, universal system to track product movement
- Data that is easily readable at every stage of the supply chain
- Immediate data retrieval in the event of a recall
Opportunity for Improvement in Supply Chain Tracking, as Products Enter and are Transported Through the Supply Chain

• Significant growth in 2D barcodes
• QR codes and smart labeling growing
• Temperature sensors to monitor the cold chain

"The entire supply chain requires checks-and-balances to close the gaps when tracking products . . . As the custody of products changes hands during multiple deliveries – from airports to boats and leaving the mainland – opportunities are created for theft, diversion and product replacement”

- Sr. Director of Product & Applications Development Brand Protection

1D Barcodes

• Wearable scanning devices
• Automated picking
Barcodes Will Continue to Anchor Track and Trace Technology in the Future

Smart Technology Growing in the Next Five Years

**Smartphones**
Product authentication and interaction will increasingly be through the use of Apps

**Encrypted symbologies will be around for a long time for track and trace**
- 1D barcode used most frequently
- 2D barcode growing
- 3D is emerging
- Smaller or even invisible barcode technology

**Smart labels/tags growing**
- Perishable goods growing at the highest rate

**Use of RFID is growing for internal tracking and cold chain monitoring**
- General use is growing throughout all manufacturing

2015 - 2020
4.88% CAGR

2016 - 2021
17.65% CAGR
Inkjet and Laser Are The Most Common Methods for Applying Codes and Marks

Increasing Competition Between Laser and Thermal

### Application Methods for All 3 Industries

<table>
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<th>Secondary Package</th>
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Human readable dates and codes will prevail
Demand for Even Stronger Tracking and Authentication Solutions is Driving Unique Innovation and New Technology

“Lots of new technologies are coming for global product tracking but the prices are high right now”

- Manufacturing Manager
Cheese & Dairy
The IIoT and the Demand for Tracking Improvements Will Drive an Increase for Sensors, Indicators, Optics and Smart Label Technology

Companies Using Vision Systems to Verify Printed Codes or Markings

- 4 of 5 pharma companies

- 50% of food and beverage companies

What's Ahead for Systems Integration

- Integrate vision and print systems in one unit?
- Smaller coding equipment integrated into a machine?
- Mobility – robotic?

More Accurate and Reliable Vision Systems are Assuring Product Markings are Readable and Labels Affixed Correctly

Only a few brand manufacturers are using covert or smart technology and the majority are pharmaceutical companies

1 of 3 participating companies are using temperature sensing technology at the pallet level
Track and Trace Identifiers Require a Centralized, Dual Redundancy Database

What’s Ahead for Data Integration
Open architecture is needed for data exchange with other systems and flexibility for more exception-based data analysis

“Enhanced traceability goes beyond documentation, we also need analytical methods from the data we collect”
- Executive VP of Operations, Food

While all companies interviewed are capturing and tracking data in a software system, only a handful of companies are using the Cloud

“Increased data storage is needed throughout the entire supply chain as brand manufacturers are held accountable”
- VP Marketing, Food
2 of 3 Brand Manufacturers Will Continue to Spend on Brand Protection Equipment in the Next 12 - 24 Months

1 of 3 Companies Predicts Spending More

- Increase in product demand
- Improving production rates
- Smaller lot runs (pharma)

2 of 3 Companies Interviewed Source the Majority of Their Brand Protection Equipment in the U.S.
Brand Manufacturers Look for Print Quality, Reliable Reads and Speed in New Systems

“We look for an established, reliable tracking system that can be validated and a solution where the data cannot be compromised”

- Sr. Principle Packaging Engineer  
  Rx Drugs Manufacturer

Most Important Attributes Brand Manufacturers Look For When Purchasing Brand Protection and Traceability Equipment

- Repeatable Quality and Reliability
- Speed
- Data Exchange
- Read Accuracy
- Print Clarity
Outlook for OEMs and Suppliers

Opportunities with Brand Manufacturers

“More rapid high tech solutions will evolve and most are likely customized for a particular supply chain”

- Vice President Industry Association

Customer Collaboration

Simpler Solutions

Integration

Direct Link

Data Standardization

International Database

Stricter Regulations

Social Media

Work closely with brand manufacturers to find solutions

Simple to operate and easier connectivity

Layered solutions, integrated into one retrievable system

Explore the possibilities of QR codes

Methodology of how data is documented, assigned, maintained and retrieved

Accessible globally to capture the chain of information

Stricter regulations on seafood using GS1 US

The blazing speed of social media!
“Staying aware and informed is the biggest challenge”
- VP Operations Food

What You’ll Learn in the Full Report

What new technologies and automated solutions are being developed to deliver the next generation of inspection, validation, counterfeit detection, marking and tracking equipment?

Explore the development of covert and overt ink markings, embedded patterns in packaging materials, invisible but machine readable chemical or physical taggants and environment sensors.

How are ingredient suppliers being challenged to track their processes to meet the demands of brand manufacturers?

What technologies are brand manufacturers adopting to detect product fraud and which tracking solutions are they using to quickly locate products in the event of a recall?

Explore customized and interactive packaging codes that bring a whole new experience to the consumer.

How are transportation companies and warehouses being challenged to embrace a diverse set of customers and comply with each of their brand protection methods?

What solutions are needed at this stage in the supply chain to ensure there is accurate accountability for the massive shipments that pass through from one system to another?

Both traditional and online retailers are moving towards requiring brands to assign a GS1 Global Trade Item Number® (GTIN®) to identify every product.

How are consumers interacting with packaging codes to verify, authenticate and retrieve information about a product?
Headlines In the News

E-Commerce, Consolidation, Drones

Retailers are adjusting as customers shop online
Flat import activity reported by the port authorities is a sign of altered supply chains

Container Shipping Slashes Capacity, Supply Chain Could Suffer
Industry Consolidation

Feds brace for new drone rules to take flight

Drones in Distribution Centers
- Inspect labels and inventory
- A process that now takes a month with handheld scanners

Online Walmart grocery business added 30 new markets, bringing the total to 60