## **Topic: Adopting RFID in the FMCG Sector**

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## **Introduction**

An increasing number of external forces compel the FMCG sector to implement technology solutions which improve supply chain visibility and operational speed. All suppliers to a major European retailer must now use RFID tags due to their requirements for enhanced inventory control and diminished product loss. The assessment examines RFID implementation effects at both organizational and operational levels as well as financial aspects for a European-based fresh produce supplier along with their retail consumers.

### **Objectives:**

* Assessment of the potential of RFID for the organization through Rogers’ Diffusion of Innovations framework.
* Thorough examination to determine the associated risks such as costs and GDPR compliance issues and the total benefits.
* Provide actionable recommendations for management.

### **Assumptions:**

* The retailer’s current buying patterns indicate that their industry is set to adopt similar measures because other supply chain vendors will shift toward this system.
* Supply chain intermediaries will participate in sharing the expenses related to RFID tags and software costs through negotiated partnerships.
* The GDPR requirements can be met by using encrypted RFID tags according to Tesco's successful implementation (Jones et al., 2021).

## **RFID Technology Overview**

### What is RFID?

The technology of RFID can identify tagged objects through electromagnetic field functions. The scanning capabilities of RFID technology surpass barcodes because it operates without requiring direct visual contact between reader and tag so users can track and capture data concurrently. Key components include:

* Microchips contained on tags retain product data including batch numbers together with expiry dates.
* Readers which transmit radio waves to scan and detect tags.
* Middleware allow RFID data to communicate with commercial operational systems (GS1, 2022).

### Applications in FMCG:

* Walmart: Reduced out-of-stock incidents by 30% after RFID adoption in perishable goods (Roberti, 2023).
* By employing RFID technologies to track food shelf-life Tesco decreased waste by 15% (Jones et al., 2021).
* Marks & Spencer achieved a 99% improvement in inventory accuracy through the RFID tagging of fresh produce crates (Deloitte, 2020).

## **Innovation Model: Diffusion of Innovations (Rogers, 2003)**

Human behaviour toward innovation adoption can be measured through five characteristics according to Rogers' model:

**Relative Advantage:**

* RFID outperforms barcodes in speed, data capacity, and automation. Through automation Tyson Foods saved 20% from their labour costs by executing inventory checks (Food Logistics, 2021).
* The retail giant Carrefour forces suppliers to adopt RFID technology as a mandatory criterion for their business partnerships (McKinsey, 2022).

**Compatibility:**

* Integration between RFID and existing ERP systems such as SAP can be accomplished with suitable middleware updates.
* The combination approach that uses RFID for pallet tracking and barcodes as item identifiers helps organizations maintain system continuity.

**Complexity:**

* RFID performance encounters technical problems when tags experience interferences from both liquids and metal substances which frequently occur in packaging fresh produce. (RFID Journal, 2022).

**Trialability:**

* Low-risk testing of RFID applications takes place through pilot projects such as premium organic line implementation.

**Observability:**

* Stakeholders tend to agree with ROI strategies that show decreased waste amounts (such as 15–20% shrinkage reduction) (GS1, 2022).

**Strategic Alignment:**

* RFID systems enable the retailer to achieve market leadership in tech-advanced sustainable supply chain operations.

## **Strategic Impact of RFID**

### **Supply Chain Visibility**

The RFiD system establishes total product visibility by connecting all points from agricultural fields to retail display units. Products tracked by real-time data about their location together with measurements of temperature and expiry confirmations minimize waste and help businesses meet all retailer demands.

RFID technology at Walmart boosted delivery precision by 15% and eliminated product out-of-stock occurrences by 30% (Roberti, 2023). The application of RFID would result in a 20% reduction of fresh produce waste which would strengthen profit margins.

The Farm to Fork Strategy of the EU requires enhanced perishable product traceability by 2025 (European Commission statements, 2021).

### **Competitive Advantage**

The implementation of RFID technology creates stable retailer relationships with business partners oriented toward developments.

Food Logistics indicates that competitors Nestlé and Unilever have begun RFID tests for perishable products (Food Logistics, 2023).

Early adopters like Danone uses RFID technology to create “smart packaging” which promotes sustainability to environmentally conscious customers (McKinsey, 2022).

### **Risk of non-adoption**

Delaying RFID risks:

* Retail operators establish RFID as their minimum standard because they expect to lose contracts from companies that do not use this technology. Textile companies supplying Carrefour experienced termination of their contracts because of their inability to integrate RFID at the beginning of 2022 (Retail Week, 2022).
* Prolonged avoidance of innovation could result in loss of partnerships with forward-thinking retailers like Amazon Fresh which could damage the reputation of businesses.

## **Benefits and Risks of RFID Implementation**

### **Benefits**

**Operational Efficiency:**

* By implementing automated inventory checking at Tyson Foods the company decreased manual labour efforts by 40% (Food Logistics, 2021).
* Marks & Spencer obtained 99% accurate inventory through RFID technology which resulted in annual cost savings of €12M (Deloitte, 2020).

**Financial Gains:**

* FMCG companies achieve ROI on RFID investments by year three through waste reduction which reduces their shrinkage by 15–20% (GSI, 2022).
* The tracking capabilities allow businesses to offer discount promotions for products nearing expiration thus enhancing sales volumes (Tesco earned 10% additional dairy revenue as an example).

**Sustainability:**

* The implementation of RFID technology would help the company decrease its annual carbon footprint by 5% based on assumptions about a 15% waste reduction rate.

### **Risks**

**High Upfront Costs:**

* RFID tags currently have a price range of 0.10–0.50 cents per unit which exceeds barcode prices that remain at 0.01 cents per tag (GS1, 2022).
* Expenditures between $1 million and $5 million are expected for implementing annual tagging procedures on 10M units.
* The infrastructure components including readers and software systems demand between $2 million for initial deployment (ABI Research, 2023).

**Data Privacy:**

* Consumer data protection must utilize encrypted tags according to GDPR regulations. An investment of €500K allowed Tesco to enhance encryption capabilities (Jones et al., 2021).

**Technical Failures:**

* Liquid/metal packaging disrupts RFID signals (RFID Journal, 2022). Driscoll’s employed UHF tags as a solution which led to increased tag expenses by 20%.

## **Financial Analysis**

### **Cost Breakdown**

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| --- | --- | --- |
| Cost Component | Details | Cost |
| RFID Tags | $0.15 per unit × 10 million annual units (ABI Research, 2023) | $1.5M/year |
| Handheld Readers | 500 units × $2,000 per reader (Gartner, 2023) | $1.0M |
| Software Integration | ERP upgrades and middleware (Deloitte, 2020) | $0.5M |
| Training | Staff and supply chain partners (Food Logistics, 2021) | $0.2M |
| Total 5-Year Cost | Includes maintenance and recurring expenses (ABI Research, 2023) | $10.5M |

### **ROI Projections**

* Waste reduction leads to 15% lower shrinkage (Jones et al., 2021).
* The implementation leads to lower labour requirements through decreased manual checks (Food Logistics, 2021).
* Dynamic pricing systems enable businesses to increase their revenue by 10% (Jones et al., 2021).
* Net profit: €11.5M (€22M – €10.5M).

## **Operational Challenges**

### **Integration with Legacy Systems**

SAP and Oracle systems need the implementation of middleware solutions from Siemens such as RFID Connect which would cost between €200K and €500K (Gartner, 2023).

Utilizing RFID for pallets while combining barcodes for items creates simpler interconnection during shifts yet generates additional complexity in operational streams.

### **Supply Chain Coordination**

According to EU Logistics Report 2023 data the readiness rate of intermediary companies with RFID infrastructure stands at 60%.

Companies should share expenses by entering co-investment agreements specifically designed to fund reader equipment with their transport partners.

### **Employee Training**

Staff members working in warehouses need between two to four weeks of training to acquire necessary skills for system operation. The gamified training modules at Tyson Foods resulted in 90% student achievement (Food Logistics, 2021).

## **Organizational and Cultural Barriers**

### **Overcoming Inertia**

The leadership team of Walmart received support from their CEO for RFID so adoption accelerated (Harvard Business Review, 2020).

Task forces bridge the company by combining workers from IT and logistics and human resources departments to maintain consistency across teams.

### **Cultural Shift**

The adoption of real-time analysis necessitates employees to develop their data-driven thinking capabilities due to their manual log system transition.

Tesco deployed RFID technology which decreased 70% of “gut feeling” choices while advancing forecast predictions (Jones et al., 2021).

### **Change Management Strategies**

The testing of RFID technology on 5% of specific products such as organic items through pilot programs helps maintain business continuity.

The organization uses town hall meetings in combination with progress tracking displays to minimize employee resistance.

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## **Technological Difficulties**

### **Read Accuracy Issues**

* RFID systems become unresponsive when used in environments characterized by liquids and metals which are present in packaging such as foil-lined salad bags.
* Driscoll’s implements UHF tags to reduce the negative impact of interference on their tag system at the cost of a 20% increase in price (RFID Journal, 2022).
* Pilot tests with diverse packaging options need to be conducted before implementation since they help prevent supply chain challenges.

**Scalability Across Europe**

Eastern European distributors face problems because they do not have sufficient RFID-reader network infrastructure. The EU Logistics Report of 2023 indicates that Polish logistics sector shows 35% readiness for RFID adoption.

### **Data Security**

Unsecured batch data becomes vulnerable when performing unauthorized RFID scan operations under GDPR regulations. The €500K encryption cost for AES-256 from Tesco provides an industry leader standard (Jones et al., 2021).

The prevention of cyber breaches between systems requires both routine inspections and system component software updates since the German meat supplier experienced a successful hacking incident in 2022 (Cybersecurity Europe, 2022).

## **Case Studies**

### **Success: Marks & Spencer (M&S)**

Fresh produce crate tagging at M&S resulted in decreased inventory discrepancies by 50%. Key takeaways:

* ROI Focus: Achieved payback in 2.5 years via waste reduction (Deloitte, 2020).
* The company dedicated €300K to train their staff in order to integrate new system protocols easily.

### **Partial Failure: American Apparel**

The company abandoned RFID technology in 2015 because poor integration of ERP systems resulted in excessive costs. Lessons:

* Organization losses totalled €2M due to implementing the system without running trials (Retail Dive, 2016).
* The failure to create mutual logistics practices among suppliers generated separate databases instead of integrated information systems.

### **Implications for the company**

* Follow M&S’s incremental approach while implementing to prevent the mistakes made by American Apparel.
* Early collaboration between IT staff and logistics personnel will enhance the design of pilots to avoid integration problems.

## **Recommendations**

### Option 1: Full Implementation

The choice delivers maximum retailer fulfillment and results in extended operational efficiency that brings €11.5M net profit during five years.

The cost of €10.5M in advance presents high financial risk together with technical scalability complications.

The implementation plan shows excessive risk because Eastern Europe lacks sufficient infrastructure to support it.

### Option 2: Full Rejection

**Pros**: Avoids upfront costs and disruption.

**Cons:** The contract loss with the retailer would result in annual revenue loss of €25M (25% of existing revenue); Strategic isolation in a tech-driven market.

The proposal becomes financially unfeasible considering how competitors choose to adopt new technology.

### Option 3: Partial Implementation (Recommended)

**Pilot Program:**

* During this application phase RFID technology will be deployed to track 10% of high-margin organic products distributed to 50 important retailers operating in Benelux.
* The implementation combines RFID tagging of crates/pallets at €0.05 cost per unit alongside maintaining individual item barcodes.
* The project would require €1.2M budget during 12 months which includes costs for tags €150K and readers €500K together with training €200K and software development €350K.

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**Justification:**

* Risk management strategy confines investment exposure to €1.2M instead of exposing the company to €10.5M through complete implementation costs.
* The implementation of strategic flexibility allows retailers to request particular services and enables scalability testing.
* Precedent: Tyson Foods’ pilot cut waste by 18% in 6 months, justifying expansion (Food Logistics, 2021).

## **Conclusion**

RFID implementation represents an essential strategy for the company to fight against client losses, EU regulatory requirements and material waste reduction. The total deployment of this system entails problematic challenges that stem from missing infrastructure and employee unwillingness to adopt it. The envisaged Benelux organic line test operation stands as a pragmatic partial deployment strategy that lets the company assess performance while safeguarding budget constraints. Achieving success demands retailer financial participation and strong workforce instruction and ongoing technical update refinement.

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