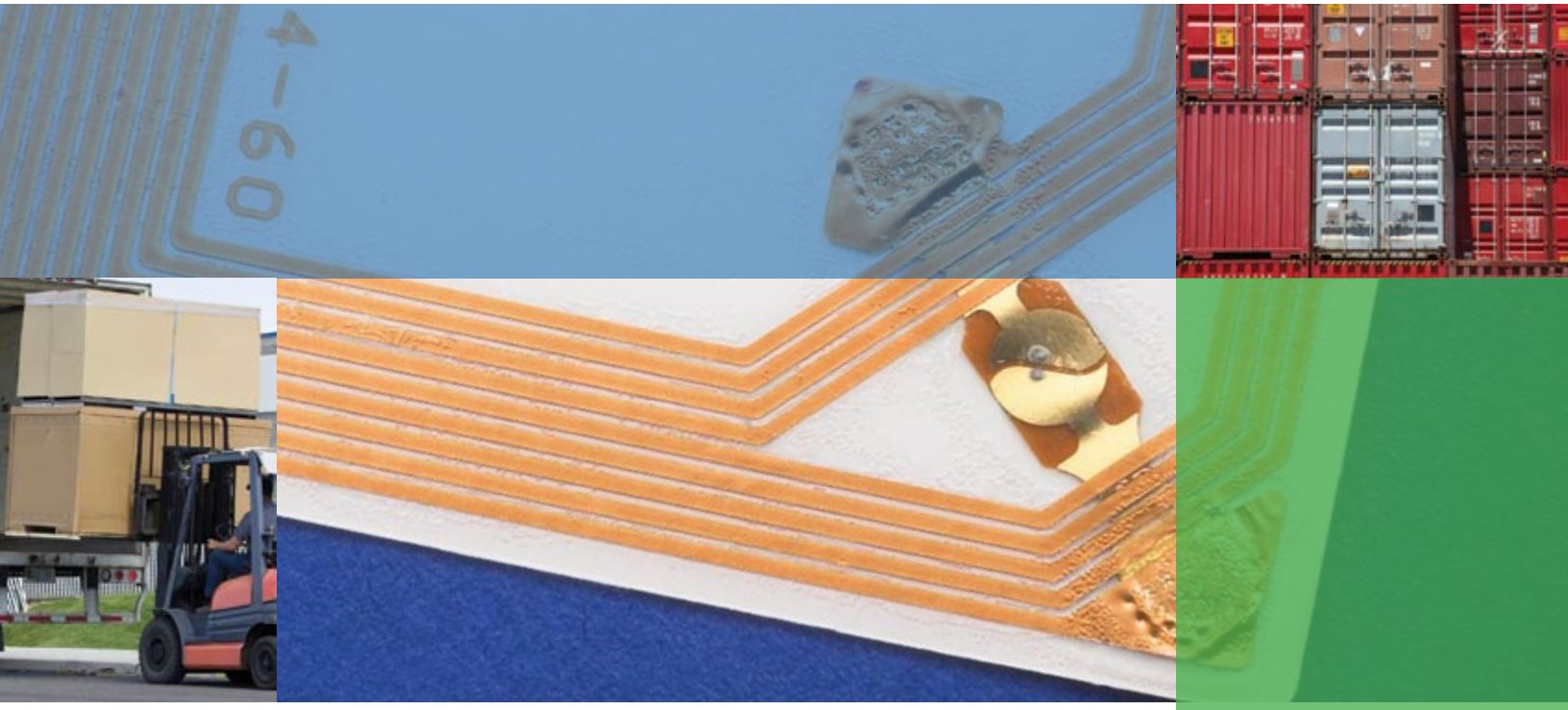
APRIL 2006

EPC/RFID: Proposed Industry Adoption Framework

Manufacturer Survey and Pilot Learnings to Date



GMA
The Association of Food, Beverage and Consumer Products Companies

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The Association of Food, Beverage and Consumer Products Companies

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EXECUTIVE SUMMARY

The Electronic Product Code (EPC) and its complementary radio frequency identification (RFID) technology have generated a significant amount of interest and activity in the consumer goods and retail industries over the last few years. Retailers and manufacturers alike have been piloting the technology within stores, distribution centers (DCs) and internal operations, and sharing product movement data across company boundaries. To gain a current perspective on the state of adoption, the Grocery Manufacturers Association commissioned a survey of North American manufacturers, and this report summarizes progress around case- and pallet-level adoption to date.

Findings

Most manufacturers believe EPC/RFID will present long-term value for the industry, and they plan to continue retailer pilot programs. Still, many of these manufacturers are reluctant to embark on significant expansion programs until ongoing technology, data, business process, and business case challenges are more fully addressed.

While manufacturers indicate that technology read rates have improved through pilot trials, they also express little confidence in the integrity of data for use in making business decisions. Survey participants cite promotion execution, out-of-stock management, and electronic proof of delivery as promising benefit areas, but the majority of manufacturers indicate that retailer pilots have not generated tangible business benefits to date. Even strong advocates for the technology believe that a greater focus on testing business process changes is required. While tag costs continue to decline, overall enthusiasm for the technology remains tempered due to the lack of a clearly demonstrated business case.

Surveys and interviews reveal that manufacturers strongly believe that EPC/RFID is not a one-size-fits-all technology since benefits and challenges vary significantly by product and business scenario. Manufacturers express the common view that these differences need to be incorporated into future implementation discussions and that a more strategic industry adoption roadmap should be explored to drive progress.

This report outlines a potential framework to guide EPC/RFID adoption at the case- and pallet-levels. At a high level, this framework incorporates three tiers:

- **EPC Advantaged:** Products or scenarios (e.g., promotional events) with high benefit potential and few readability issues. Additionally, these products can be tagged with minimal disruption to current operations. These products or scenarios provide a logical starting point for retailer pilots and could be used to fully test data capture, data sharing, business process, and benefit realization.

- **EPC Testable:** Products or scenarios where business benefits are less apparent and/or some deployment challenges exist. The logical focus for this tier is continued readability and tag-testing with the goal of migrating to retailer pilots to develop new learnings and demonstrate business benefits over time.

- **EPC Challenged:** Products or scenarios that do not have foreseeable benefit potential in the near term and present significant deployment challenges. This tier requires focused testing and potentially additional research and development efforts by the technology and research community to make EPC/RFID work.

The power of this framework is in its potential to provide a structured approach for EPC/RFID deployment and to better align investment with business value for individual companies and the industry as a whole. Manufacturers can use this framework as a way to segment their own products to develop an initial, prioritized testing and deployment plan. In turn, manufacturers could share this segmentation with trading partners as input to discuss mutually beneficial cross-company pilots.

The industry as a whole could also use the framework as input to discuss and prioritize future piloting and adoption activities. For example, EPC Advantaged products could be aggregated across companies and piloted in structured ways to test new business processes and demonstrate business benefits. EPC Testable products could be tested by third parties, industry organizations or individual companies with the goal of sharing readability learnings and migrating these products to trading partner pilots over time. Similarly, EPC Challenged products and their related issues could be defined, categorized, and prioritized to create an industrywide action plan for the technology and research and development community. The industry and individual companies could then use the framework to develop specific actions to migrate products from EPC Challenged to EPC Testable to EPC Advantaged over time.

Specifically, this report outlines the following recommendations for individual companies and the CPG industry:

Manufacturer Recommendations

- Leverage the framework outlined in this report to define a strategy to prioritize and manage your EPC/RFID activity
- Define an approach for how your company can harvest learnings from EPC Advantaged products to migrate EPC Challenged and EPC Testable products to EPC Advantaged over time
- Use the framework as a basis for dialogue with trading partners on future piloting and deployment activities, including pilot measures and success criteria
- Share your framework with your suppliers, technology partners and other key vendors to help define priority actions

Industry Recommendations

- GMA will explore working with other industry organizations, such as FMI, AIM, GCI, GS1, EPCglobal and others, to leverage and apply the framework to accelerate learnings, remove barriers, and drive progress
- Industry organizations could work jointly to facilitate the following:
  - Aggregate pilot results across companies to drive knowledge sharing
  - Create a prioritized list of issues and actions related to EPC Challenged and EPC Testable products and share with the technology and research and development communities
  - Develop a more holistic industry action plan that outlines piloting and deployment priorities; specifies pilot success criteria; and tests business process changes, data sharing and overall benefit realization

Manufacturers continue to endorse EPC/RFID as a potential enabler of value chain benefits, but most are struggling with near-term adoption. If individual companies and the industry as a whole were to adopt this framework as a starting point to develop an overall industry roadmap, we believe it will accelerate industry progress and help bridge the gap between the near-term challenges and the long-term potential for EPC/RFID.

BACKGROUND AND OBJECTIVES

Background

In recent years, Electronic Product Code (EPC)/radio frequency identification (RFID) technology has emerged as a major initiative in the consumer goods and retail industries. Both retailers and manufacturers have actively engaged in internal and cross-company pilots, and a number of major retailers have launched large-scale deployment plans with their suppliers. Overall, the technology has been widely considered to represent the next cycle of innovation beyond the ubiquitous bar code, although its specific applications, business benefits, and operational impacts are still being explored.

The GMA Industry Affairs Council (IAC) established the Electronic Product Code Implementation Task Force in April 2004 to report on the industry outlook and progress around adopting EPC/RFID. One of its first steps was to investigate and report on initial business case opportunities and challenges surrounding the technology. Their findings, which summarized actual business case data from manufacturers, were presented in a report entitled "A Balanced Perspective: EPC/RFID Implementation in the CPG Industry." The report was published in the Fall of 2004 with the goal of stimulating industry dialogue around adoption.

Today, the industry has greatly expanded its real-life experience with EPC/RFID technology. Both manufacturers and retailers are well engaged in pilot programs, and, in some instances, large roll-out programs. Pilot participants and spectators alike are eager to discuss initial results, share learnings, and make informed decisions on next steps for adoption.

To continue information-sharing across the industry, GMA enlisted the assistance of IBM Business Consulting Services to help provide a current view around the state of adoption. This time, GMA wanted to gain a better perspective on several fundamental EPC/RFID-related questions:

- What is the current view around the short- and long-term potential for the technology?
- What are the key learnings and perspectives from pilot programs and collaboration with trading partners?
- What is the current state of technology performance?
- What have we learned that could enable future adoption and drive progress?

The process began in December 2005 with the issuance of a brief survey to CPG manufacturers in North America that are actively piloting or are familiar with EPC/RFID technology. The survey was complemented by a series of in-depth interviews with participating manufacturers. Overall, 31 surveys were completed, and 18 companies participated in the interview portion of the study (see Sidebar 1 for a complete list of participants).

The major findings from the surveys and interviews are summarized in this report. Detailed results from the survey can be found in Appendix 1, which is available at www.gmabrands.com.

Objectives

The primary objective of this report is to share learnings and emerging themes from early adopters within the CPG community. In addition, during the interviewing process, manufacturers expressed a strong need to develop a new approach to help guide individual company and overall industry adoption. This report outlines and discusses how a new framework could be used by individual companies and the industry to accelerate overall industry progress.

Ultimately, we hope manufacturers, retailers, and EPC/RFID technology providers will find this report factual, constructive, and forward-looking.

SIDEBAR 1: Companies That Participated

- ACH Food Companies
- Alberto-Culver Company
- Bayer Consumer Healthcare
- Bush Brothers & Company
- Campbell Soup Company
- Cargill, Inc.
- Clorox Company
- The Coca-Cola Company
- Coca-Cola Enterprises, Inc.
- ConAgra Foods, Inc.
- Del Monte Foods
- General Mills, Inc.
- Georgia-Pacific
- The Hershey Company
- The J.M. Smucker Company
- Kellogg Company
- Kimberly-Clark Corporation
- Kraft Foods
- L'Oreal USA, Inc.
- McCormick & Company, Inc.
- Nestle USA
- Nestle Purina
- The Pepsi Bottling Group
- PepsiCo – DSD Systems
- PepsiCo – Warehouse Systems
- Pfizer Consumer Care
- The Procter & Gamble Company
- Reckitt Benckiser
- S.C. Johnson & Son, Inc.
- Tyson Foods
- Unilever
- Welch Foods, Inc.

SUMMARY FINDINGS

This summary highlights results from 31 surveys and includes direct quotes and commentary gathered during the interview process. The quotes have been selected to provide a representative sample of the views expressed by the manufacturers that participated in the process.

The results cited below are based on responses from companies who indicated that they are involved in EPC/RFID pilots (27 of the 31 responders), unless otherwise noted in the text. Respondents who indicated they were not involved with a pilot were asked to answer only the questions relating to the long-term value and importance of EPC/RFID in the industry.

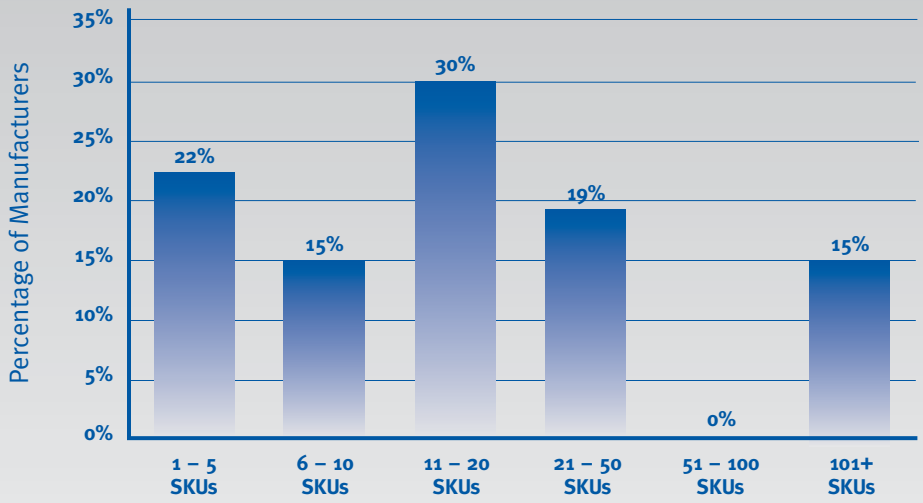
Survey responses and interview commentary were based on North American manufacturer operations and case- and pallet-level tagging only.

Findings

Manufacturers are actively piloting the technology and intend to continue pilot programs, but broad expansion is not a top priority

- 47 percent of manufacturers indicate that they are involved in pilots with three or more retail partners
- Nearly one-third (30 percent) are tagging 11-20 SKUs as part of retailer pilot programs, but tagging levels vary significantly (see fig. 1)
- Overall, the majority of companies (55 percent) reported tagging less than 1 percent of their total U.S. shipment volumes as part of current retailer pilot programs

FIGURE 1: Number of Pilot SKUs



Source: IBM Business Consulting Services

Surveys indicate that manufacturers intend to continue investing in and experimenting with the technology, but significant expansion is not a top priority for most.

- 58 percent indicate that they will increase the number of tagged SKUs or expand into new regions
- However, 84 percent indicate that they do not intend to participate in any new retailer pilot programs in 2006
- Nearly half (48 percent) intend to invest less than $500,000 on EPC/RFID in 2006

The views of manufacturers can be summarized by the following interview comments:

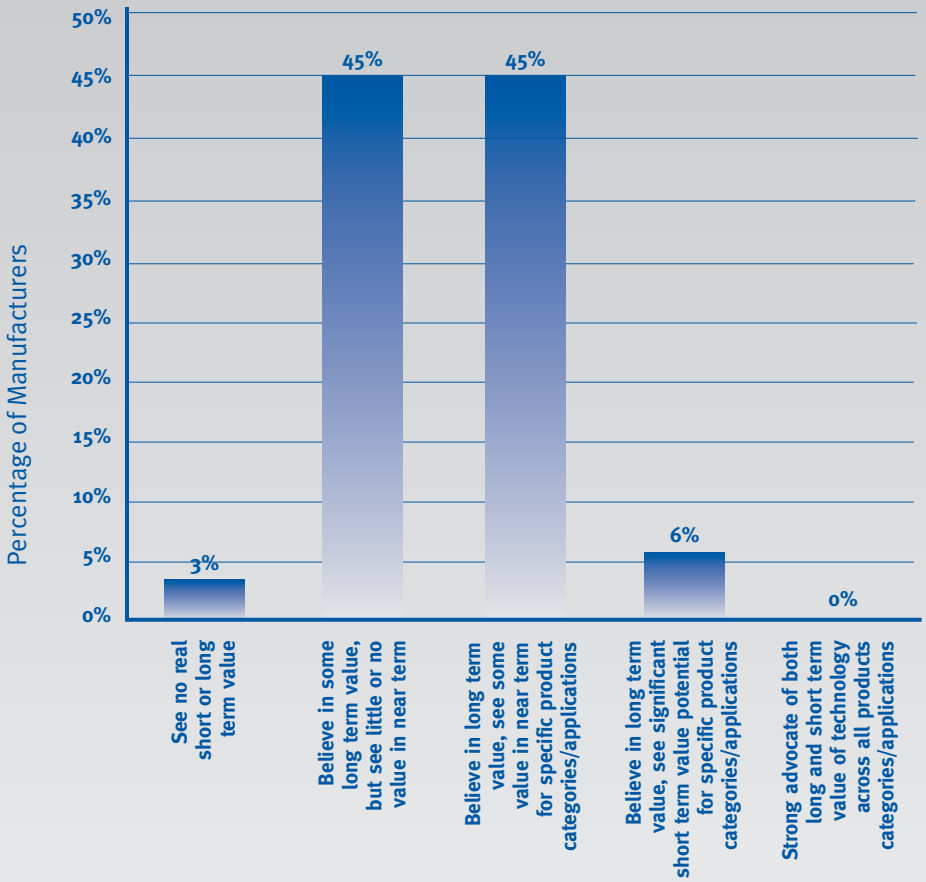
"We would prefer to focus on the pilots that we have underway already in order to address readability and process change challenges and see some tangible benefits."

"We've gone from an uninformed optimism to an informed spectrum of benefits. We saw enough three years ago to get us going and see enough now to keep us going."

Manufacturers believe EPC/RFID will be important for the industry long-term, but many still struggle to see the near-term value

- Nearly all manufacturers surveyed (97 percent) believe EPC/RFID has long-term value potential for the industry (see fig. 2)
- 94 percent also indicate that they believe EPC/RFID will be "somewhat" or "very" important to the CPG industry
- While most manufacturers believe broad adoption will occur eventually, 48 percent said that they see little or no short-term value in the technology

FIGURE 2: Manufacturers' Views of the Value Potential of EPC/RFID



Source: IBM Business Consulting Services

While the potential for long-term value is not in dispute for the majority of manufacturers surveyed, there is a wide spectrum of views around how EPC/RFID will be applied in the industry:

> *"This technology is the first and only technology I've seen that can help enable automation of what is today a very manual process – retail backrooms and the last mile of the supply chain."*

> *"EPC will be widespread at some point, but we are not yet convinced that it makes financial sense for all of our [products] – specifically, we cannot financially justify tagging many of our low margin, high-volume products at this point, or in the near future."*

Tag readability in the manufacturer environment is improving and tag costs are dropping

- 62 percent of surveyed manufacturers indicate that tag readability has improved within their own operations
- Overall, manufacturers report an average readability rate of 95 percent at point of tag encoding and 93 percent at point of validation

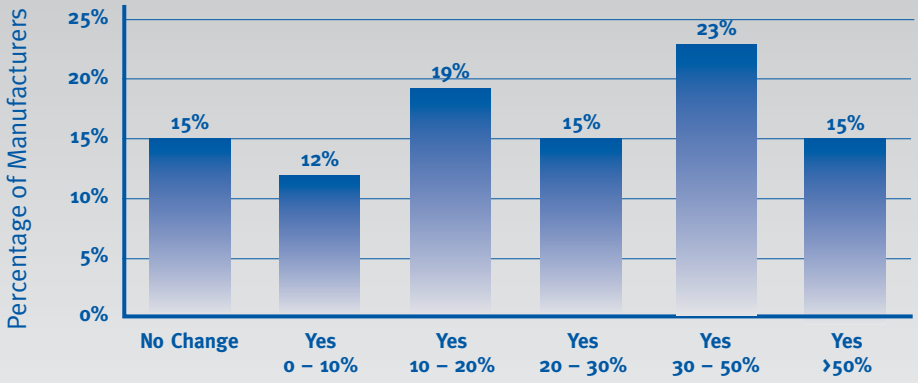
Survey participants state that some products that were once thought to be problematic from a readability standpoint – primarily due to metal and liquid contents – have been successfully addressed with continued trials and testing. Others still report significant challenges with tag readability and automated encoding devices. In general, manufacturers that have been piloting longer tend to believe that readability within their own environment is not as significant an issue compared to companies that are in the earlier stages of their pilot programs.

The readability numbers cited above should be treated with some caution, however, since many manufacturers have specifically opted to pilot products that are more EPC/RFID-friendly in terms of physical characteristics and tagging environment.

From a cost perspective:

- All but four manufacturers surveyed indicate a drop in tag costs over the last 12 months
- The range of reported price reductions vary significantly, with the highest concentration being in the 30-to-50 percent range (see fig. 3)

FIGURE 3: Tag Cost Reductions Over the Last Twelve Months As Reported By Manufacturers



Source: IBM Business Consulting Services

Many manufacturers also express uncertainty around future tag cost reductions, given the new arrival of Gen2 tags and products. Nearly all participants indicate that tag costs must continue to decrease to help address ongoing return on investment challenges.

Read reliability and data quality from the retail environment still pose key challenges today

Interviews revealed that one of the main challenges for manufacturers is the inability to track cases reliably and consistently through retail operations. These downstream read reliability concerns are causing some to question the likelihood of realizing projected business benefits (e.g., out-of-stock reduction) that are dependent on data visibility and data-driven process changes.

The general manufacturer view on read reliability and data quality can be characterized by the following interview comments:

> *"We're finding it extremely difficult to make sense out of the data we're receiving from the retailers. We're getting lots of data, but it has missing reads. We see EPC numbers in the DC and then do not see reads further downstream at the store. We see movement of tags back and forth between the back room and the retail floor. Sometimes, we're seeing reads after reads at the trash compactor. What are we suppose to do with this data?"*

> *"It's the data quality that makes us less optimistic… how do you design a business process around data if you can't trust the data?"*

> *"We spend too much time on read rates. We should be focusing more on designing and testing business processes to leverage the read data that we have."*

Some manufacturers indicate that they do not believe read rates will ever be—or even necessitate being—perfect to achieve value. Instead, they insist on greater focus on designing and testing new business processes to mitigate the lack of perfect read rates and to achieve operational improvements to drive benefits.

Manufacturers also stress the importance of sharing clean data across company boundaries to improve visibility and enable new business processes to drive value. Visibility can improve promotional execution, help reduce inventory safety stock levels and enable more efficient product replenishment. Responding to what EPCglobal should focus on in 2006, many manufacturers stated that EPCglobal should develop and demonstrate how its network will drive value.

Pilot results to date are mixed in terms of generating tangible business benefits

- 73 percent of manufacturers indicate they have not seen tangible business benefits as a result of pilot activities
- Moreover, interviews revealed that some of the affirmative responses were not necessarily based on realized financial benefits but on improvements in qualitative areas, such as "improving collaboration, communication, and interaction with key customers which has generated business benefits in many ways"
- "Lack of clear business benefit justification," along with "total cost of EPC/RFID deployment," are cited as the most challenging aspects of EPC/RFID technology adoption by survey respondents

Data quality issues and the lack of business process changes were cited as the main reasons for the lack of realized benefits. However, many manufacturers are encouraged by the potential benefits related to promotions compliance, proof of delivery, out-of-stocks, and other revenue-related areas.

Sample interview comments from companies that said pilot programs HAVE generated tangible business benefits:

"Out-of-stocks, merchandising event execution, and ePOD (electronic proof of delivery) have shown benefits and have allowed us to show that certain products are advantaged based on specific benefit drivers."

"We estimated out-of-stocks was the biggest expected benefit for us. What we have learned in the pilots is that we understated that benefit [which was a surprise]."

Sample interview comments from companies that said pilot programs have NOT generated tangible business benefits:

"We see no value proposition for this technology until the data quality improves significantly, and retailers change their business processes to act on the new data. Both happening could take quite a while."

"Our business case estimate didn't show a positive case on investment. It did predict that there was some benefit to eliminating out-of-stocks, but what we're seeing in the data isn't showing us a real advantage here."

"Redefined business processes were part of the justifying business case… but the reality that you're seeing is that the benefits are not really materializing."

Moving forward

In the near term, data reliability issues and a perceived lack of progress on testing real business process and operational changes continue to hinder the realization of business benefits and overall enthusiasm for the technology. Many manufacturers state that until tangible business benefits are demonstrated, they prefer not to expand their pilot programs. Instead, manufacturers would prefer to focus on learning from and improving pilots already underway.

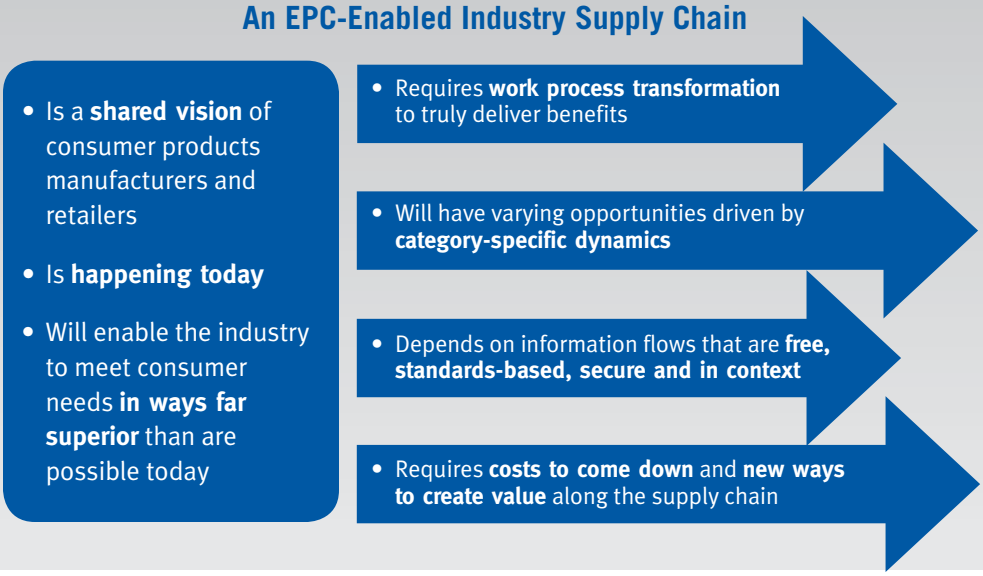
"We believe EPC is the future, and we want to be part of making it happen. Technology advances will continue, and we want to stay engaged and learn. The future potential in many ways is unknown. We hope to create opportunities that today cannot be predicated or quantified... just like what happened with the bar code."

"We want to get things right with the pilots we have in place. We believe everyone knows EPC is where things are going, but we have to do it in a way that is financially sound."

EPC/RFID IS NOT A ONE-SIZE-FITS-ALL TECHNOLOGY

One of the key themes emerging from the survey and interviews is that the opportunities and challenges related to deployment of EPC/RFID vary considerably by product and product category as well as the unique situation of each manufacturer. In other words, EPC/RFID is not a one-size–fits-all technology. In fact, nearly all companies surveyed (93 percent) indicate that, in their experience, the challenges and benefits of EPC/RFID vary by product category or by products within product categories. This notion is consistent with the top-line conclusion that category specific dynamics play a large role in the type and magnitude of benefits that can be realized via EPC/RFID, as highlighted in the white paper "EPC: A Shared Vision for Transforming Business Processes" (see fig. 4).

FIGURE 4: Top-Level Conclusions of "*EPC: A Shared Vision for Transforming Business Processes*"



Source: Global Commerce Initiative

The survey identified eight distinct drivers of EPC/RFID attractiveness. Each of these drivers may have a significant impact on the value proposition of EPC/RFID, and, equally as important, their relative impact on EPC/RFID attractiveness will vary based on each product's unique characteristics and each company's specific situation. Please refer to Sidebar 2 for a more detailed discussion around the following drivers:

- Benefit potential
- Readability
- Product margin
- Operational considerations
- Strategic considerations
- Shipment and handling configuration
- Primary distribution channel
- Route to market

In addition, manufacturers identified the opportunity to drive new learning via pilot programs as an additional criterion to help drive progress.

The survey results and interviews show that benefit potential and readability are clearly the two characteristics that are believed to have the most impact on EPC/RFID attractiveness (see fig. 5).

SIDEBAR 2: Definitions of Drivers of EPC/RFID Attractiveness

BENEFIT POTENTIAL relates to the ability of EPC/RFID to enable operational improvements in the value chain that drive measurable financial results for the manufacturer. Based on IBM's experience working with leading CPG companies, targeted benefit areas include:

- Increased Revenue
  - Reduced out-of-stocks at the retail shelf
  - Improved promotion execution and planning
  - Improved new product introduction execution and planning
  - Reduced losses due to shrink (malicious and non-malicious)
  - Reduced counterfeiting and diversion
- Reduced Operating Costs
  - Reduced retailer claims from electronic proof of delivery (ePOD) (overages, shortages)
  - Improved DC labor efficiency and effectiveness
- Reduced Working Capital
  - Reduced safety stock inventory
  - Reduced returns/unsaleables

The reports below offer additional discussion and analysis around the benefit potential associated with EPC/RFID:

"A Balanced Perspective: EPC/RFID Implementation in the CPG Industry," prepared by IBM & A.T. Kearney for the GMA, provides an overview of the business case challenges for EPC/RFID from a manufacturer's perspective. It includes discussion around the benefits identified in manufacturer business cases.

"EPC: A Shared Vision for Transforming Business Processes," published by the Global Commerce Initiative in association with IBM, discusses the transformation scenarios and business process changes required to achieve the potential benefits from EPC/RFID. This paper was a joint effort between leading retailers and manufacturers.

READABILITY corresponds to the propensity of a product's associated EPC/RFID label to be successfully read and/or encoded in a real-world, industrial environment. Both physical product characteristics and environmental factors may negatively impact a product's readability. Physical characteristics include the existence of metals and conducting liquids in either the product itself or its packaging materials (e.g., foil packaging). Environmental factors may include the speed of the read/encoding environment (e.g., high-speed packaging lines, conveyors) and the existence of other wireless technology that could contribute to EPC/RFID interference issues.

PRODUCT MARGIN is often cited as an important factor when comparing the EPC/RFID attractiveness of various SKUs. In reality, most manufacturers indicate that benefit potential should be the primary financial driver for EPC/RFID. If benefit potential and all other variables are equal in terms of attractiveness, then products with higher margins may be considered as more attractive candidates for adoption. These higher margin products may provide a financial "cushion" to offset the variable costs of tags.

OPERATIONAL CONSIDERATIONS refer to the implications different tagging strategies will have on manufacturing and distribution operations. The operational impact varies considerably across SKUs and also may be dependent upon whether the product is manufactured "in-house" or via third-party/offshore providers, whether the product moves via full pallet from case-packing thru shipping, and whether or not a company's distribution operations are managed via an outsourced logistics provider. For example, in the short term, while EPC/RFID shipment volumes may not justify upstream tagging, applying tags on cases post-order in the DC often requires manual or other intervention to DC processes—particularly for products that are typically moved via full pallet from case-packing through shipping. On the other hand, a customer-specific product or SKU may be more cost-effective to tag upstream in manufacturing or packaging operations. This characteristic is particularly relevant in the short-term, while tagging in the DC is still the predominant option for many manufacturers due to the relatively low volume of tagged cases.

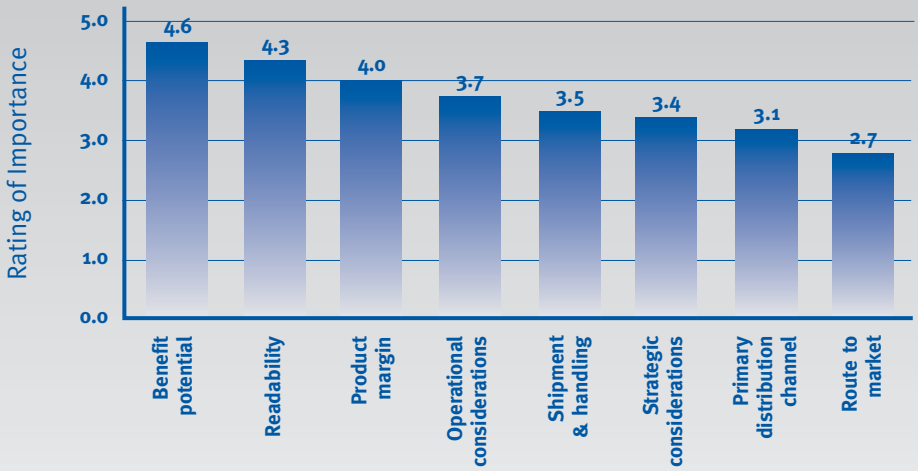
STRATEGIC CONSIDERATIONS include factors that are either not directly related to EPC/RFID-enabled operational improvements or are qualitative in nature. The simplest example could include the qualitative benefit of strengthening relationships with key retailers via close collaboration on EPC/RFID pilots. In addition, the competitive environment may also be an important factor. For example, a product in a highly competitive category, which includes competitors that are early adopters of EPC/RFID, may become more attractive relative to other SKUs if the company believes EPC/RFID would help protect existing share or mitigate competitors' efforts to strengthen retailer relationships via EPC/RFID collaboration.

SHIPMENT AND HANDLING CONFIGURATION is interrelated with benefit potential and correlates with the unit of measure in which a product is moved or handled at any point within the value chain. For example, products that are transported in less than full case quantities (e.g., inner packs) from retailer DCs to retailer stores have less potential to drive benefits related to improved visibility and store-level processing simply because they will no longer have case-level tags (unless re-applied by the retailer). The importance of maintaining case integrity as a product moves through the value chain is the key element to this driver of EPC/RFID attractiveness.

PRIMARY DISTRIBUTION CHANNEL is associated with the channel-specific nuances related to store operations that may impact benefit realization. For example, if reduction of out-of-stocks via improved retailer back room inventory management and replenishment is a targeted benefit area, then deploying EPC/RFID in stores or channels that have small or no back room operations will negatively generate less value in this area. This specific scenario may apply to some convenience and drug store channels.

ROUTE-TO-MARKET refers to whether a product is distributed via a warehouse or direct store delivery (DSD) model. The distribution method has a significant impact on both potential benefits and costs. For DSD, companies believe there is more opportunity around route labor and picking/shipping accuracy benefits for case-level tagging. Some benefits around out-of-stock reduction may require item-level tagging, given store merchandising and product handling processes. Moreover, DSD implementations may incur a higher total cost of deployment due to more supply chain nodes (e.g., depots, bin locations) and significant use of hand-held technology. Therefore, all other factors being equal, the same product distributed via different distribution methods may have significantly different EPC/RFID attractiveness profiles.

FIGURE 5: Drivers of EPC/RFID Attractiveness



Source: IBM Business Consulting Services

(Note: Drivers of EPC/RFID Attractiveness were rated on a scale of 1 to 5: 1 = Least Important, 2 = Not Very Important, 3 = Somewhat Important, 4 = Very Important, 5 = Most Important)

Interviewees indicate that if it were up to manufacturers, future adoption would be driven primarily by benefit potential for specific products and business applications. This focus on the ability for EPC/RFID to generate economic value is reflective of the challenging financial realities of EPC/RFID deployment faced by manufacturers in the near term. (Please refer to "A Balanced Perspective: EPC/RFID Implementation in the CPG Industry" for a more detailed discussion on this topic). By focusing on high potential products and scenarios and addressing business process changes required to realize benefits, manufacturers believe that the industry may be able to accelerate progress and more effectively drive value for all industry participants.

> *"EPC/RFID is here to stay, but the original vision of EPC/RFID tagging at the case- and pallet-level on all products from the get-go is not cost effective...one of our key learnings over the past 12-18 months is that EPC/RFID has turned into a product-category- and business-application-specific story."*

A NEW FRAMEWORK FOR ADOPTION

The majority of CPG companies believe in the long-term value proposition of EPC/RFID and its potential to enable the type of process and operational improvements that will generate substantial – if not transformational – value to manufacturers and retailers. However, many manufacturers are struggling with the current mode of adoption that does not strongly recognize and account for the wide variability among products with regard to their relative EPC/RFID attractiveness. Three sobering data points referred to earlier underscore that activities to date have not spurred widespread adoption and that the current mode of adoption should be revisited:

- 67 percent of respondents are piloting with 20 or fewer SKUs
- 84 percent of respondents do not intend to participate in any new retail trading partner pilots in 2006
- 73 percent of respondents have not generated tangible business benefits from their pilot activities

The vast majority of manufacturers interviewed – including all of the companies that manufacture products across three or more product categories – referenced the desire to evolve toward a category- or product-oriented adoption strategy that prioritizes scarce testing and deployment resources based on areas with a higher propensity to drive value. Focusing efforts on the intersection of EPC attractive SKUs and business processes (or "use cases") may be the most cost effective path to value creation and progress.

We recommend companies consider a new framework that calls for the segmentation of SKUs into three tiers:

EPC Advantaged **EPC Testable** **EPC Challenged**

The purpose of the framework is to provide a guide for individual companies and the industry as a whole to prioritize piloting and deployment efforts over time.

EPC Advantaged SKUs are those that have a high propensity to generate value from EPC/RFID. At a minimum, these SKUs have high benefit potential, few readability issues, and can be tagged with minimal disruption to current DC and/or manufacturing strategies, processes, and facilities. For example, EPC Advantaged SKUs may be those with high levels of out-of-stock rates that lead to lost sales. These are also likely to be SKUs that are moved in full case quantities through the value chain to shelf-stocking and replenishment. In addition, these SKUs are unlikely to be distributed via the DSD method. EPC Advantaged SKUs are the SKUs that both manufacturers and retailers should consider including in pilots in order to identify tangible business benefits from EPC/RFID deployment.

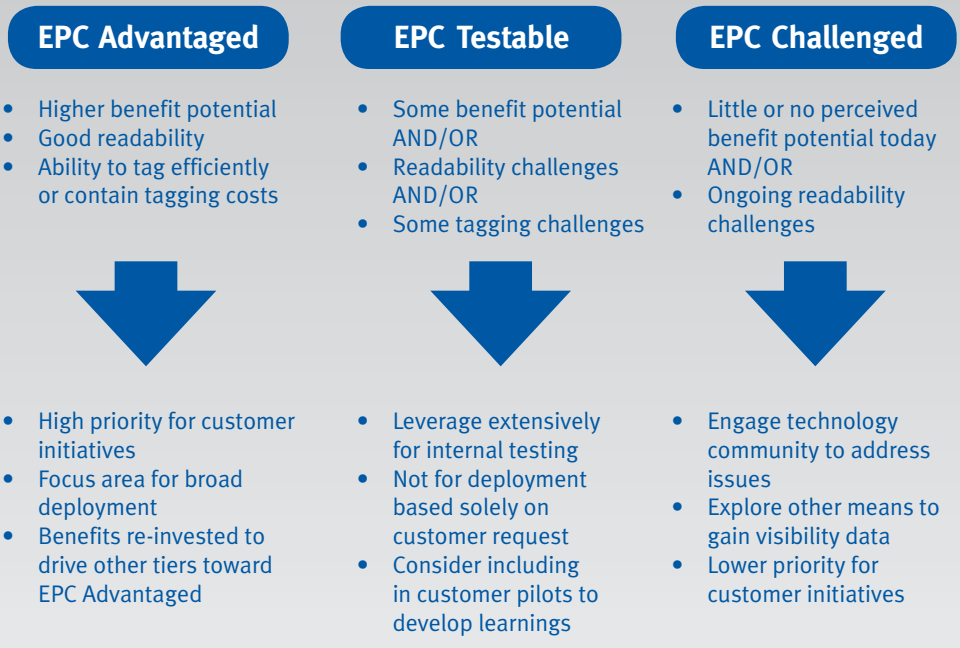
EPC Testable SKUs are those that have some potential to generate value from adoption but also have some significant, yet surmountable, issues with one or more of the drivers of attractiveness discussed above. For example, these SKUs may have readability challenges and/or may be difficult to cost-effectively tag given current technology

and volumes. EPC Testable SKUs are better suited initially for internal pilots but may be included in retailer pilots that are structured to gather new learnings. Companies should actively work both internally and with their technology partners to create solutions to the readability issues associated with these SKUs. Once basic readability and operational challenges are adequately addressed, EPC Testable SKUs should be incorporated into retailer pilots to identify the specific process and operational changes required to realize tangible benefits.

The **EPC Challenged** tier falls at the opposite end of the framework. EPC Challenged SKUs are those that offer little or no benefit potential in the foreseeable future. These SKUs may be handled via inner packs from the retail DC to the store, thereby offering neither store operational improvements in areas such as out-of-stock reduction, nor any incremental inventory location or movement visibility for demand planning purposes of the manufacturer. Typically, EPC Challenged SKUs also have significant ongoing readability issues that may require considerable product and/or product packaging modifications to mitigate. Many manufacturers indicate that readability challenges for EPC Challenged SKUs must be addressed in order to make the technology economically viable at scale.

SKUs that fall into the EPC Challenged tier are the least attractive SKUs with regard to participation in downstream retail customer pilots. SKUs in this tier should be the primary focus of EPC/RFID research and development efforts at individual manufacturer companies, at technology companies, and at EPCglobal. Until basic readability concerns are met, manufacturers and their retail partners may want to investigate alternative ways to gain improvements in inventory location and movement data (e.g., advanced shipping notices where not in use today).

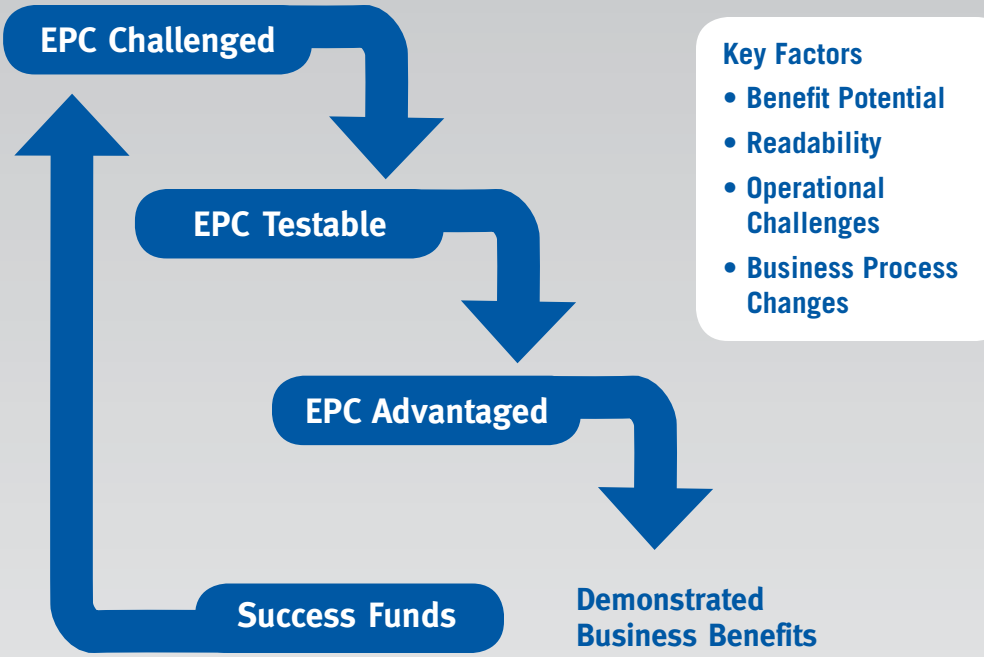
FIGURE 6: Overview of Three-Tiered Prioritization Framework



Source: IBM Business Consulting Services

The vision of the framework includes harvesting benefits and learnings from activities associated with EPC Advantaged SKUs in order to fund the investment in EPC Testable and EPC Challenged. Therefore, SKU allocation among the tiers is intended to be dynamic and not static – that is, the expectation is that a company would reallocate or migrate SKUs from EPC Challenged to EPC Testable and/or EPC Testable to EPC Advantaged based on advances in technology, pilot learnings, and deployment of new processes on an ongoing basis (see fig. 7).

FIGURE 7: Harvesting Pilot Success to Fund Ongoing Adoption



Success with EPC Advantaged SKUs funds R&D, technology and process enhancements to migrate EPC Testable and EPC Challenged SKUs over time

Source: IBM Business Consulting Services

Deploying the framework

Deploying the framework within a company is a four step process:

1. Define tiers
2. Define tier criteria
3. Segment SKUs and business process applications
4. Allocate SKUs to tiers

Step 1: Define Tiers

A company's first step in leveraging the framework is to define the tiers and determine how they will use them. For example, if a product is determined to be EPC Challenged, what actions will you take to address the technology and operational issues?

Step 2: Define Tier Criteria

The next step in the process is to establish the key criteria which will be used to evaluate the EPC/RFID attractiveness of each product. We suggest using the eight drivers of EPC/RFID attractiveness (see fig. 5) as input and selecting the five to six key characteristics that impact the propensity for a product to drive value. While each company must tailor the criteria to meet their own unique situation, surveys and interviews reveal that three criteria are considered to be "foundational":

- Benefit potential
- Readability
- Operational impact

In addition, manufacturers identified the opportunity to drive new learning via pilot programs as an additional criterion to help drive progress.

These learning opportunities refer to the potential of a SKU or business scenario pilot to generate new, valuable learnings. Learning opportunities could include sharing testing data and testing business processes, for example.

Step 3: Segment SKUs and Business Process Applications

To fully leverage the power of the framework, we recommend that companies apply the framework in two ways:

1. Segment products based on SKU characteristics alone
2. Segment SKUs based on business process application

This third step sheds light on an important nuance of the framework. SKUs can be segmented according to SKU characteristics alone and also based on specific business process applications. For example, ePOD (electronic proof of delivery) and display compliance are often cited as important business process applications. Therefore, it is possible for a SKU to be EPC Challenged in one context (e.g., in the context of the ePOD use case due to poor case-on-pallet readability) but EPC Advantaged in another situation (e.g., in the context of display compliance since tagging of the display may mitigate any readability issues at the case level).

This aspect of the framework highlights the importance of collaboration between the manufacturer and its retail partner to select the specific business processes or applications for piloting.

Step 4: Allocate SKUs and Business Applications to Tiers

The fourth and final step in the process is for a company to apply its specific criteria to their SKU base in order to develop a map of EPC Advantaged vs. EPC Testable vs. EPC Challenged SKUs or business process applications. Given the "foundational" criteria outlined on the previous page, below is a series of questions that illustrate this step in the process:

- **Benefit potential:** Based on characteristics such as out-of-stock rates, shrink levels, propensity to promote, etc., and the specific business application in question, does the SKU have a high likelihood of generating positive net benefits (i.e., ROI) via EPC/RFID? How confident is the manufacturer that the required EPC/RFID-enabled process changes both internally and at the retail customer are in place, or will be shortly, in order to realize the full benefit potential of EPC/RFID? As mentioned previously, most manufacturers view benefit potential as the single most important criterion.

- **Readability:** Does the product have a propensity for high read rates and/or encoding rates in a realistic commercial environment, both internally as well as throughout the relevant points in the retail supply chain? If not, what is the likelihood that the readability challenges will be mitigated over time via advancements in tag/reader technology capabilities? Or, will readability improvements require significant disruption to current operations due to process changes/workarounds, specifically to mitigate poor readability?

- **Operational impact:** Can EPC/RFID labels be applied to the cases of this product with minimal cost impact and/or disruption to the company's DC or manufacturing processes, facilities and service levels? What is the long-term EPC/RFID tagging strategy for this SKU – at what point will you transition from tagging in the DC to further upstream? How will this transition change your perspective on the potential operational impact of EPC/RFID?

- **Learning opportunity:** Is there something about this particular SKU/use case combination that implies new, valuable learnings could be generated by testing/piloting this SKU?

Using the results

The value of the proposed framework lies largely in its ability to provide the foundation for intra- and inter-company dialogue and decision-making regarding EPC/RFID adoption and priorities. For example, an individual company can use the framework to:

- **Respond to customer requests for participation in EPC/RFID pilot activity** – The framework can provide the structure and insight to foster collaborative dialogue around identifying and sequencing business processes and SKUs for piloting activity
- **Develop and track progress against a company's internal EPC/RFID adoption roadmap** – The three-tiered framework can be used to prioritize internal and external testing and pilot activities and serve as a mechanism to track overall adoption progress over time
- **Engage technology providers to discuss and agree upon an appropriate R&D roadmap** – The framework can be used to identify and categorize a company's product and business process application challenges in order to provide input on prioritization of R&D and testing efforts within the technology community

In addition to being used on a broad basis to structure dialogue around an industry-wide roadmap, the framework can also help focus the industry on driving EPC/RFID adoption in the areas that are more likely to generate significant value. Many manufacturers believe that the overall pace of industry adoption could be accelerated if retailer pilot activities focus on leveraging EPC Advantaged SKUs to demonstrate business process changes and data sharing solutions, while the technology community focuses directly on fundamental product readability and tagging issues associated with the EPC Testable and EPC Advantaged SKUs.

For instance, the framework could enable the broader industry to collaboratively identify and conduct industry-wide pilot opportunities focused on testing – at scale – the value-generating potential of EPC/RFID for a specific, high-value potential business application (e.g., display compliance). The potential focus areas for a pilot include:

- Identifying EPC Advantaged SKUs across the manufacturer participants relevant to a specific, high-value potential business process application
- Documenting and testing the business process changes at both the manufacturer and retailer required to drive benefit for the specific business process application
- Documenting and testing potential solutions to improve the integrity of EPC/RFID product lifecycle data (i.e., the reliability of tracking a case throughout its entire lifecycle at all read points versus at any single read point)
- Testing a standards-based EPC/RFID data-sharing solution
- Leveraging learnings to accelerate progress and structure other pilot and technology activity
- Harvesting financial benefits generated to fund other pilot and technology activity

CONCLUSIONS AND RECOMMENDATIONS

Manufacturers feel positive about the future of EPC/RFID and believe it will be important for the CPG industry in the long term. Survey results indicate that tag readability is improving, tag costs are dropping, and more than one-third of manufacturers expect the technology to be widely adopted both within their companies and across the industry within the next six years.

While they are positive about the future of EPC/RFID technology, many manufacturers see key challenges in the short term, especially with read reliability and data quality from the retail environment. In addition, pilot results to date have been mixed in terms of generating tangible business benefits, and many manufacturers are still struggling with the near-term business case for the technology. These manufacturers want to increase focus on the process and operational changes required of themselves and their retailer partners in order to drive expected benefits.

Adding to the short-term challenge is the growing view that EPC/RFID is not a one-size-fits-all technology. Many manufacturers are beginning to take a more discerning approach to piloting the technology and are interested in understanding how to choose which opportunities are highest priority.

In general, manufacturers indicate a strong desire to explore creating an overall roadmap for industry adoption. The framework outlined in this paper provides a good starting point for both individual company and overall industry actions. Specifically, we recommend the following actions for individual companies and the CPG industry:

Manufacturer Recommendations

- Leverage the framework outlined in this report to define a strategy to prioritize and manage your EPC/RFID activity
- Define an approach for how your company can harvest learnings from EPC Advantaged products to migrate EPC Challenged and EPC Testable products to EPC Advantaged over time
- Use the framework as a basis for dialogue with trading partners on future piloting and deployment activities, including pilot measures and success criteria
- Share your framework with your suppliers, technology partners and other key vendors to help define priority actions

Industry Recommendations

- GMA will explore working with other industry organizations, such as FMI, AIM, GCI, GS1, EPCglobal and others, to leverage and apply the framework to accelerate learnings, remove barriers, and drive progress
- Industry organizations could work jointly to facilitate the following:
  - Aggregate pilot results across companies to drive knowledge sharing
  - Create a prioritized list of issues and actions related to EPC Challenged and EPC Testable products and share with the technology and research and development communities
  - Develop a more holistic industry action plan that outlines piloting and deployment priorities; specifies pilot success criteria; and tests business process changes, data sharing and overall benefit realization

If individual companies and the industry as a whole adopt this framework as a starting point to develop an overall industry roadmap, we believe it will accelerate industry progress and help bridge the gap between the near-term challenges and the long-term potential for EPC/RFID.

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