Benefits of Connected Packaging for Retailers

From private brands to store operations, the Digimarc Platform provides value across the store and beyond

The Digimarc Platform provides retailers with shopper and store associate benefits, as well as promoting the larger operational benefits of connected packaging. Adding Digimarc Barcode to packaging and fresh product labels makes checkout faster and more efficient, it contributes to store associate wellness and productivity, and improves the shopper experience.

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Intro: Maximizing Efficiencies Across the Store

More Efficient Checkout is Crucial, But Cashier Wellness, Improved Price Auditing and Less Hand Keys Improves Store Operations

Shopper polling consistently reveals that lengthy lines at checkout are one of the principle frustrations shoppers have with the retail experience. A 2018 Forrester Survey of 1,000 consumers sponsored by Digimarc made it clear "the time to address poor checkout and long lines is now." Thirty-nine percent of shoppers admitted to having left a store empty handed due to a long line. Well over half of shoppers (58 percent) reported they are likely to change stores if the primary difference was better checkout. These responses make it clear that slow checkout impacts the bottom line—unhappy shoppers will leave and spend their money at another store.

In a 2018 Harris Poll survey of 500 cashiers, conducted on behalf of Digimarc, cashiers reported widespread problems scanning fresh food labels. The results revealed that 90 percent of cashiers scanning printed labels believed that reducing the number of hard-to-scan perishable and store perimeter labels would help improve their productivity. Thirty-two percent had items that did not read when scanned and that these label issues led some customers to not purchase the item.

Beyond Checkout

Slow checkout has to be addressed, but maximizing store efficiency also means improving cashier health and wellness to retain experienced stores associates—an important way of staying competitive in a tight labor market. It also means making sure time-consuming activities like price auditing and inventory management activities are faster, freeing up associates to help customers.

Connected Packaging with the Digimarc Platform results in improvements in:

- Store Efficiency
- Associate Productivity
- Shopper Experience
- Data Quality
- Associate Health & Wellness
- Packaging Aesthetics

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More Efficient

Studies & Retailer Data Conclude Digimarc Barcode is More Efficient than Traditional Barcodes

Two studies of Digimarc Barcode at checkout and data from Digimarc retail customers demonstrate how Digimarc Barcode increases Items Per Minute (IPM) and is less taxing on cashier muscle movements when compared to scanning packaging with the traditional UPC barcode.

I. CASHIER STUDIES
DIGIMARC BARCODE INCREASES ITEMS SCANNED PER MINUTE (IPM)

In collaboration with three large-format retailers, Digimarc conducted scan performance evaluations of Digimarc Barcode and traditional barcodes. The assessment was done in store with real cashiers. The focus was on dual-plane scanners, which typically address the majority of items for these merchants. The shopper basket contained products with either 100 percent Digimarc Barcode or 100 percent UPC barcode.

The size of each basket was intended to approximate an average basket size for the stores in which the measurements were made. The tests were peak-performance, speed-scanning tests and not intended to reproduce the exact conditions of a live store with customers (see Methodology section).

The results reveal that Digimarc Barcode significantly increases IPM when compared to the traditional barcode. Across all three studies, Digimarc Barcode was shown to speed up the scanning process by four seconds resulting in an 11.6 IPM increase on average.

Average performance metrics for the three tests are shown below.

	Traditional Only		Digimarc Barcode	
Average	Time: 16.55	IPM: 50.37	Time: 12.55	IPM: 61.98

	Overall Results Using Digimarc Barcode
Average Time Decrease	A decrease of 3.99 seconds (-24.1%)
Average IPM Increase	An increase of 11.6 IPM (+23.1%)

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Methodology

- A test environment without actual customers conducted on dual-plane, in-counter scanners enabled to read Digimarc Barcode

- Did not take in account "tender time"

- Shopper baskets contained products with either 100 percent Digimarc Barcode or 100 percent UPC barcode; baskets contained only boxes and cans

- Two cashiers employed by the retailer were brought in for the experiment

- The cashiers were not previously trained on Digimarc Barcode and received a brief explanation of the technology as well as five-to-ten warmup rounds

- Cashiers were instructed to complete their scans as quickly as possible, resulting in IPM rates much faster than those typically measured in a live store environment

- Tests used the average basket size for that retailer's store, between 11 and 20 items

- Each test was repeated for at least five scanning rounds

Results

The three charts below highlight important details of the comparative scanning tests.

RETAILER #1
Basket Size of 14

	Traditional Only		Digimarc Barcode	
High	Time: 11.75	IPM: 66.4	Time: 9.20	IPM: 84.8
Average	Time: 14.16	IPM: 55.1	Time: 11.35	IPM: 59.64
Low	Time: 17.79	IPM: 43.8	Time: 14.75	IPM: 52.9

	Overall Results Using Digimarc Barcode
Average Time Decrease	A decrease of 2.81 seconds (-19.8per)
Average IPM Increase	An increase of 4.54 IPM (+8.2%)

RETAILER #2
Basket Size of 20

	Traditional Only		Digimarc Barcode	
High	Time: 15.70	IPM: 68.8	Time: 12.30	IPM: 92.7
Average	Time: 19.59	IPM: 58.2	Time: 13.77	IPM: 78.4
Low	Time: 22.66	IPM: 47.7	Time: 16.74	IPM: 64.5

	Overall Results Using Digimarc Barcode
Average Time Decrease	A decrease of 5.82 seconds (-29.7%)
Average IPM Increase	An increase of 20.2 IPM (+34.7%)

RETAILER #3

Basket Size of 11 (included one oversized item at the bottom of the basket which was scanned using a handheld device enabled to detect Digimarc Barcode)

	Traditional Only		Digimarc Barcode	
High	Time: 14.87	IPM: 40.3	Time: 10.30	IPM: 58.3
Average	Time: 15.89	IPM: 37.8	Time: 12.53	IPM: 47.9
Low	Time: 22.77	IPM: 26.4	Time: 13.72	IPM: 43.7

	Overall Results Using Digimarc Barcode
Average Time Decrease	A decrease of 3.36 seconds (-21.1%)
Average IPM Increase	An increase of 10.1 IPM (+26.7%)

Conclusion

The data from the evaluations clearly indicates product packaging with Digimarc Barcode leads to more scans per minute and more efficient checkout. We expect that, over time, as the percentage of products enhanced with Digimarc Barcode in shoppers' baskets increases, the IPM will trend positively toward the results reported here. We also believe that more training and experience will also have beneficial effects.

II. MORE EFFICIENT CHECKOUT RESULTS FROM INTERNATIONAL RETAILERS
REPORTED DATA FROM DIGIMARC'S RETAIL CUSTOMERS

A number of international grocery retailers have added Digimarc Barcode to private label packaging; they have done in-house IPM measurement tests and reported the data to Digimarc:

- Mid-size format retailer #1: **66 percent increase in IPM**

- Mid-size format retailer #2: **65 percent increase in IPM**

- Large format retailer: **12 percent increase in IPM**

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III. GREATER SCANNING PERFORMANCE DEMONSTRATED BY ZEBRA
REPORTED DATA FROM DIGIMARC'S RETAIL CUSTOMERS

In this test, retail barcode scanner manufacturer Zebra Technologies used three different cashiers who scanned a basket of 21 items. Each cashier scanned the items multiple times. In some instances, the items were scanned using traditional barcodes only. In others, a basket of items with Digimarc Barcode was used.

Zebra then calculated the average time it took to scan all items and complete checkout for the variants (i.e. with and without Digimarc enablement). Traditional barcode scanning only achieved 48 items per minute (IPM) compared to a 74 IPM for Digimarc Barcode scanning. The bottom line:

* Digimarc Barcode showed a **59.2 percent increase in IPM**

Find out more and watch a video.

IV. ACADEMIC STUDY DETAILS HOW DIGIMARC BARCODE IMPROVES SCANNING TIME

A cashier ergonomic study by The Exercise Science Research Center at the University of Arkansas compared the UPC/EAN barcode vs. Digimarc Barcode. The results were published in the International Journal of Industrial Ergonomics.

Key findings:

* Digimarc Barcode shows a **31 percent increase in IPM** compared to the UPC

* Even cashiers scanning packaging with Digimarc Barcode for the first time, were able to register a quicker scanning time in comparison to the UPC

For more information, click here.

*See page 8 for more detailed information on **Associate Health & Wellness** results of the University of Arkansas study.*

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Associate Health & Wellness

Digimarc Barcode is More Efficient & Less Taxing on Cashiers Compared to UPC Barcode

Executive Summary

The work environment of grocery cashiers has long been a focus of ergonomic investigations and interventions when it comes to the scanning and bagging of groceries. And now the issue of retail associate wellness is front-and-center, as recent labor shortages in the U.S. have made associate retention a top priority. With this industry backdrop, the University of Arkansas Exercise Research Center wanted to determine to what extent Digimarc Barcode—because it is an imperceptible barcode and covers much of the packaging—alters cashier arm muscle activity and posture compared to the UPC barcode. A secondary purpose was to determine differences in efficiency and participant satisfaction ratings.

Methodology

- Study participants: 16 cashiers with greater than 1,000 hours of experience in each of the two years preceding the study

- Two tasks were examined: (1) individual scanning of items that represented an array of product types, and (2) scanning of an entire grocery cart

- For the individual items, the researchers compared packages with Digimarc Barcode to packages with the traditional UPC

- With the entire grocery cart, there were two comparisons: (1) a cart with Digimarc Barcode packaging compared to the traditional UPC, and (2) multi-sided UPC packaging (at least two for cans and bottles, and five for boxes) compared to the same cart with traditional UPC packaging

Results

Below are some of the key results from the study. We have included the actual language from the study and a brief statement on what it means to retailers.

Abbreviations

- IB - Imperceptible Barcode (a.k.a. Digimarc Barcode)

- MB - Multi-sided Barcode (i.e., multiple UPC barcodes repeated across the package)

- tUPC - Traditional Universal Product Code

- UPC - Universal Product Code

- EMG - Electromyography

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On Speed & Efficiency:

"There was a significant difference between the time required to scan packages with IB and MB packages in comparison to tUPC. The IB and MB carts were scanned 6.6 seconds and 4.2 seconds faster than their tUPC counterparts, respectively."

- **What it Means:** Digimarc Barcode shows a 30 percent increase in IPM compared to the UPC. Checkout is more efficient when scanning a basket with Digimarc Barcode packaging.

"Our participants were more efficient (hypothesis 1) when scanning with the imperceptible and multi-sided barcode packages compared to the traditional barcode packages."

- **What it Means:** Cashiers are more efficient when scanning packaging with Digimarc Barcode.

"The ability to adopt a quicker scanning time when using packaging enhanced with an imperceptible barcode was found even though it was their first exposure to scanning the packages."

- **What it Means:** Even cashiers scanning packaging with Digimarc Barcode for the first time, are able to register a quicker scanning time in comparison to the UPC.

On Cashier Muscle Activity:

"Scanning individual imperceptible barcode packages (hypothesis) resulted in lower peak muscle activity for the shoulder and elbow flexors."

- **What it Means:** Cashier upper body muscle activity is reduced when scanning package with Digimarc Barcode.

"When extrapolated over a four-hour shift, using the imperceptible barcode resulted in lower cumulative integrated EMG for each collected muscle."

- **What it Means:** It's less taxing on muscles for cashiers to scan products with Digimarc Barcode compared to products with a UPC barcode.

"The ability to adopt a quicker scanning time when using packaging enhanced with an imperceptible barcode was found even though it was their first exposure to scanning the packages."

- **What it Means**: Even cashiers scanning packaging with Digimarc Barcode for the first time are able to register a quicker scanning time in comparison to the UPC.

"The imperceptible barcode demonstrates an increased efficiency and reduction in cumulative muscle activity."

- **What it Means:** Cashiers using Digimarc Barcode are more efficient and experience less muscle strain.

The results were published in July 2019 in the International Journal of Industrial Ergonomics. Click here to download the full study.

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Improved Associate Productivity

It is More Efficient to Scan Packaging with Digimarc Barcode Compared to the UPC Barcode

In a tight labor market, retailers have to get more from fewer store associates. Spending too much time on tasks like scanning individual products to check inventory or confirm price accuracy can impact the bottom line and mean less time assisting shoppers. And, it increases fatigue and the chances for repetitive stress injuries.

Using a store associate device to scan packaging with the UPC barcode in freezer aisles, or when working with spring loaded shelving, is a cumbersome and time-consuming task.

When retailers add Digimarc Barcode to private-label packaging, however, it can make scanning products easier and more efficient. Digimarc Barcode is repeated multiple times across the package, ensuring that associates don't need to twist or manipulate the item to get a scan.

Check out this video comparing scanning times for Digimarc Barcode and the UPC barcode.

Handheld Scan Comparison
Traditional 1D Barcode *vs* Digimarc Barcode

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Potential ROI Benefits

Digimarc Conducted Quantitative Analysis to Detail Link Between ROI & IPM Lift

Digimarc published a white paper: "Digimarc Barcode: A Quantitative Model of Annual Labor Cost Savings and Return on Investment for Retailers," and an associated ROI Calculator that provides the industry a framework for understanding the financial impact of an IPM lift. Key findings of the model included:

- Retailers could realize aggregate labor cost savings in excess of $500 million annually for a single IPM improvement in scanning speed at checkout

- A U.S. retailer with $10 billion in annual sales, assuming full deployment and harvesting of benefits, could realize a five-year ROI over 1200 percent

The perspective from the Digimarc executive team:

"The Model described in this paper indicates that adopting Digimarc Barcode may provide significant hard cost savings to the retail industry, potentially saving high-volume retailers billions of dollars annually through the reduction of cashier labor costs alone. Because Digimarc Barcode can coexist with traditional barcodes, the retail industry can transition smoothly to using the Digimarc barcode with minimal operational impact. The expected upgrading of existing scanners to image-based scanners provides an opportunity for retailers to incorporate Digimarc Barcodes into their processes without additional IT investments. The Model's ROI Calculator demonstrates that such retailers can recoup their investments in adopting the Digimarc Barcode in less than one year. The Model allows readers to enter their own values for its underlying assumptions to obtain customized cost-saving and ROI estimates for different retailers or retail scenarios."

Read the full white paper.

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Conclusion: One Platform, Many Benefits

The Digimarc Platform offers retailers a cost-effective, easy-to-implement solution that makes shopping easier and improves retail operations in all parts of the store. The Platform's retail applications, including for packaging, fresh product labels and apparel hangtags ensures more reliable and efficient scanning for shoppers and associates. Digimarc benefits stores of all sizes and formats: convenience stores, apparel retailers, lawn and garden centers, large warehouse-format retailers and grocery retailers.

The solution to friction in retail starts with the snags at the point-of-sale, but to truly stay competitive, retailers must find efficiencies in every part of the store. The Digimarc Platform is the most direct and easy way for retailers to implement a connected packaging solution and reap the benefits for their shoppers and associates.

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