

# Hospital Bar Coding Technology

An Independent Review of Bar Code Technology Usage & Experience



*Sponsored by Zebra Technologies*



A Healthcare Market Intelligence Provider

## Executive Summary

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Goal 1 of The Joint Commission's National Patient Safety Goals for Hospital Programs is to "improve the accuracy of patient identification." The rationale for this requirement is stated as: "Wrong- [patient] errors occur in virtually all aspects of diagnosis and treatment. The intent for this goal is two-fold: first, to reliably identify the individual as the person for whom the service or treatment is intended; second, to match the service or treatment to that individual." Furthermore, implementation expectations are that these two patient identifiers are used when administering medications or blood products, collecting blood samples or other specimens for clinical testing, and when providing other treatments or procedures.<sup>1</sup>

Although bar coding is not a required mandate for hospitals to improve accuracy of patient identification, it is the route many hospitals have taken to address this critical issue. Zebra Technologies wanted to better understand the usage of and experience with thermal and competing-printer technologies for the purpose of bar coding. They contracted Porter Research, an independent healthcare IT research and consulting firm, to conduct primary market research with various stakeholders representing hospital pharmacy, laboratory, and information technology departments. All respondents were randomly recruited from hospitals with no less than 100 beds.

In general, respondents reported high rates of bar code usage for patient wristbands and labeling applications in the laboratory and pharmacy. Of the 217 hospitals interviewed, 91.2% indicated they were using bar codes for at least one of the applications measured in the research:

- Specimen labels for tracking and management in the lab (i.e., vials, slides, etc.) had the highest incidence of use at 83.7%.
- Bar coded patient wristbands had the second highest incidence of use, at 73.2%.
- 81.6% indicated they had begun to print bar codes on-demand - or at the point of application - in at least one of the areas queried.

The research also wanted to understand the specific type of printer technology that these facilities utilized (i.e., thermal, laser, inkjet, dot matrix, etc.) and the satisfaction with those print technologies.

- Thermal printers were most used for laboratory and pharmacy applications, at 81% and 73%, respectively. Zebra was the most used brand of printer.
- For patient wristbands, laser was the most cited type of printer at 71.2%; however, thermal technology received a higher average satisfaction rating than did laser.
- Across all applications, Zebra-brand printers received higher average satisfaction ratings than all other brands combined.

Key decision criteria driving printer selection and preference were also explored. When it comes to printing bar code labels and wristbands, respondents felt image quality and durability of the printed image were the most important considerations:

- When compared to other metrics benchmarked as key decision criteria driving printer selection, "Crispness/ Durability of the Printed Bar Code Image" was rated highest on average, with 81% rating it a "5" - the highest possible rating.

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<sup>1</sup> "2008 National Patient Safety Goals: Hospital." The Joint Commission  
10 July 2007 <[http://www.jointcommission.org/NR/rdonlyres/82B717D8-B16A-4442-AD00-CE3188C2F00A/0/08\\_HAP\\_NPSGs\\_Master.pdf](http://www.jointcommission.org/NR/rdonlyres/82B717D8-B16A-4442-AD00-CE3188C2F00A/0/08_HAP_NPSGs_Master.pdf)>

Asked what type of printer they believe is best for printing bar code labels and patient wristbands, a majority of the sample selected thermal printers.

- 51.2% selected thermal, compared to 30.9% for laser.
- The primary advantage cited for thermal printers was related to “Image Quality,” mentioned by 38.5% of the sample.

Given the emphasis on quality of the printed image, a surprising finding was the number of respondents that were unable to provide any specific information about the type or brand of labels and wristbands they use with their printer. Across all applications, nearly 55.2% of participants were unsure as to which vendor provides these supplies. Nonetheless, this research summary will show that bar coding is top-of-mind in today’s hospital and that hospitals are heavily investing in this technology to reduce patient, medication, and sample identification errors.

## Overview of Research Goals & Methodology

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Zebra Technologies wanted to better understand the usage of and experience with thermal and competing-printer technologies for the purpose of bar coding. Secondary goals of the research included:

- Benchmarking the importance of common decision criteria for choosing a bar code printer.
- Identifying which type of printer (i.e., thermal, laser, inkjet, dot matrix) respondents believe is best for printing bar code labels/wristbands and why.

In an effort to remain unbiased in the data collection process, Zebra Technologies contracted Porter Research to conduct primary market research within the population. Two hundred and seventeen respondents were randomly recruited from a population of 2,479 hospitals with no less than 100 beds. Three unique stakeholders were targeted, with 85.2% being at a director-level or higher:

Sample Distribution by Department		
Department	# of Respondents	% Of Sample
Pharmacy	76	35.0%
IT	71	32.7%
Lab	70	32.3%

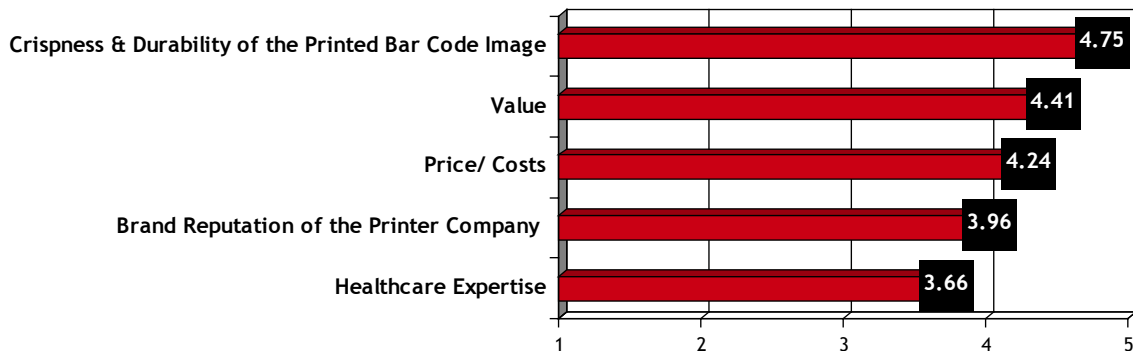
The research was fielded from January 17<sup>th</sup> to April 12<sup>th</sup>, 2007. All respondents participated in a 15-20 minute telephone interview developed by Porter Research and Zebra Technologies. A core set of questions was asked of all respondents, though a few questions were specific to that respondent's area of expertise (i.e., pharmacy respondents were probed on bar coding for unit dose labels in the pharmacy).

The purpose of this white paper is to present an independent summary review of the high-level findings of the research program. Porter Research was contracted to author the document to maintain objectivity.

## Decision Criteria for Bar Code Printer Selection

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To better understand what criteria the hospitals use to assess the performance of their printers for bar code labels and patient wristbands, respondents were asked to rate a series of attributes identified as common decision criteria for selecting a bar code printer on a scale from 1 (Not at all Important) to 5 (Totally Important). The highest-rated purchase attribute was “Crispness & Durability of the Printed Bar Code Image,” 4.75 overall. Eighty-one percent of respondents rated this metric a “5,” the highest possible rating. The following chart displays the average rating for each of the top five identified metrics.



“Value,” the second-most-important metric based on an average rating of 4.41, was defined to respondents as the return on investment based on the true cost of ownership for a printer (i.e., including supplies, maintenance, etc.). Just over 53% of respondents rated “Value” a 5. A subset of value, “Price/Costs” was simply defined as the price to purchase the printer itself and was rated 4.24 overall.

The last two metrics were specific to the manufacturer of the printer. “Brand Reputation of the Printer Company” was rated at a 3.96 on average, while specific “Healthcare Expertise” came in at 3.66.

These findings imply that printers are primarily judged based on the quality and longevity of the printed bar code image. If this is deemed acceptable, cost attributes will help choose between competing printers, followed by intangibles related to the experience of the printer manufacturer.

## Specific Usage of and Experience with Printers for Bar Coding

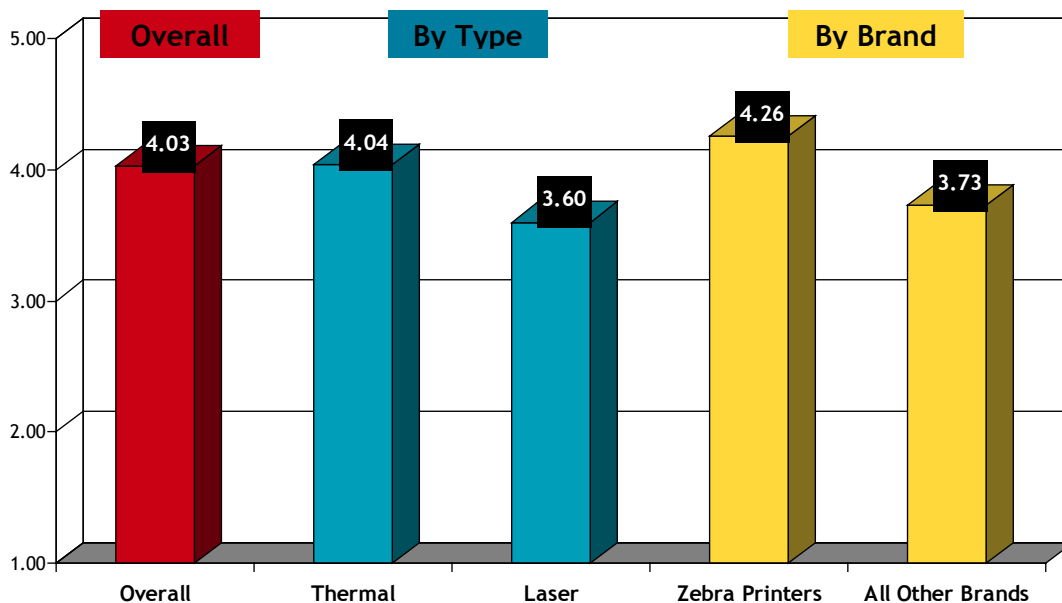
The research objective was to better understand the usage of bar coding and experience with specific print technologies within the sample. Respondents were probed on areas most relevant to their department.

### Pharmacy

61.9% of pharmacy and IT respondents indicated they're using bar codes for unit dose labeling in the pharmacy. Of that overall percentage, 85.9% believed they're printing at least some portion of those bar codes on demand. On-demand printing of bar codes was defined as printing within the hospital at the point of application.

The large majority of respondents - 80.8% - indicated they were using thermal printers for bar code labeling in the pharmacy. Laser was the next most utilized type of printer at 34.2%<sup>2</sup>. Zebra was the most cited brand at 53.4% usage.

Respondents were then asked to rate their overall satisfaction with their printers for bar code labeling in the pharmacy using a scale from 1 (Not at all Satisfied) to 5 (Most Satisfied). The following chart displays the average rating overall, by type of printer, and by brand of printer:



Overall, ratings reflected high rates of satisfaction across the board with a mean rating of 4.03. However, thermal users were more satisfied than other users of other types of printers, while Zebra users were also considerably more satisfied than users of all other brands.

Respondents were also asked to comment on which vendor primarily supplies their labels for bar code printing in the pharmacy. Although there was high satisfaction with an average rating of 4.29, most respondents (46.6%) were unable to name their vendor.

<sup>2</sup> Note respondents could be using multiple types/ brands of printers.

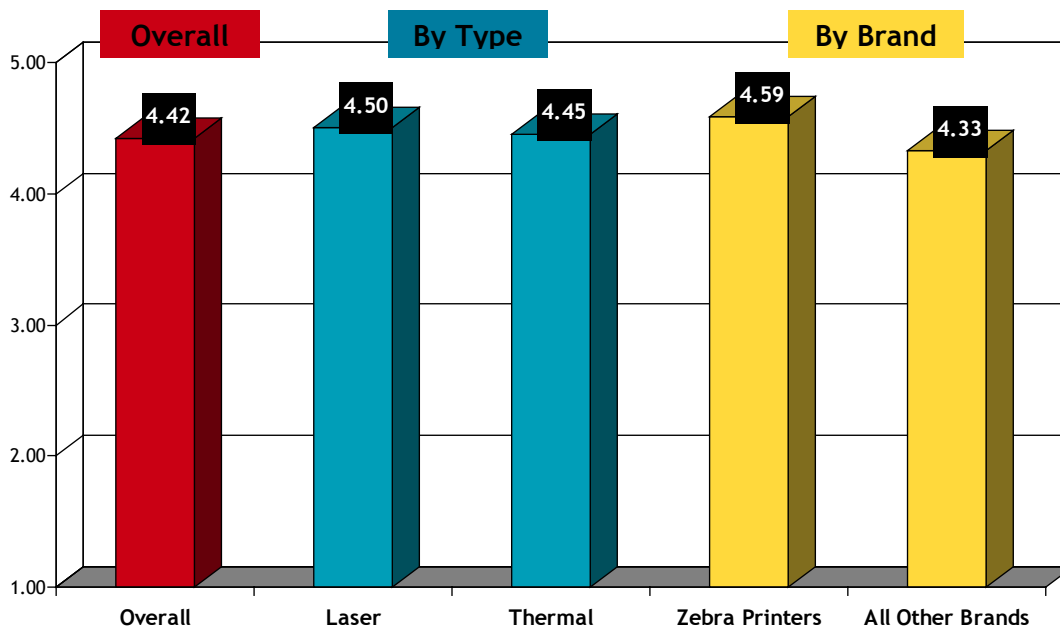
## Lab

Respondents representing laboratory and IT departments were asked whether or not their hospital was using bar coding for three specific applications in the laboratory:

Bar Code Usage in the Lab - By Application		
Department	% Bar Coding	% Bar Coding On-Demand
Specimen Labels for Tracking and Management (i.e., vials, slides, etc.)	83.7%	78.7%
Bedside Specimen Labeling	61.0%	76.8%
Blood Bag Labeling	57.4%	80.0%

Nearly 73% of those respondents utilizing bar coding in at least one of those applications in the lab were using thermal printer technology, compared to only 26.2% using laser. Zebra was the most cited brand at 43.9%.

When asked to rate overall satisfaction with printers for bar code labeling in the laboratory using a scale from 1 (Not at all Satisfied) to 5 (Most Satisfied), the mean rating for the sample was very strong at 4.42:



Although laser users rated .05 points higher than thermal users based on average satisfaction scores, relationally, Zebra was rated much higher than all other brands at 4.59 to 4.33.

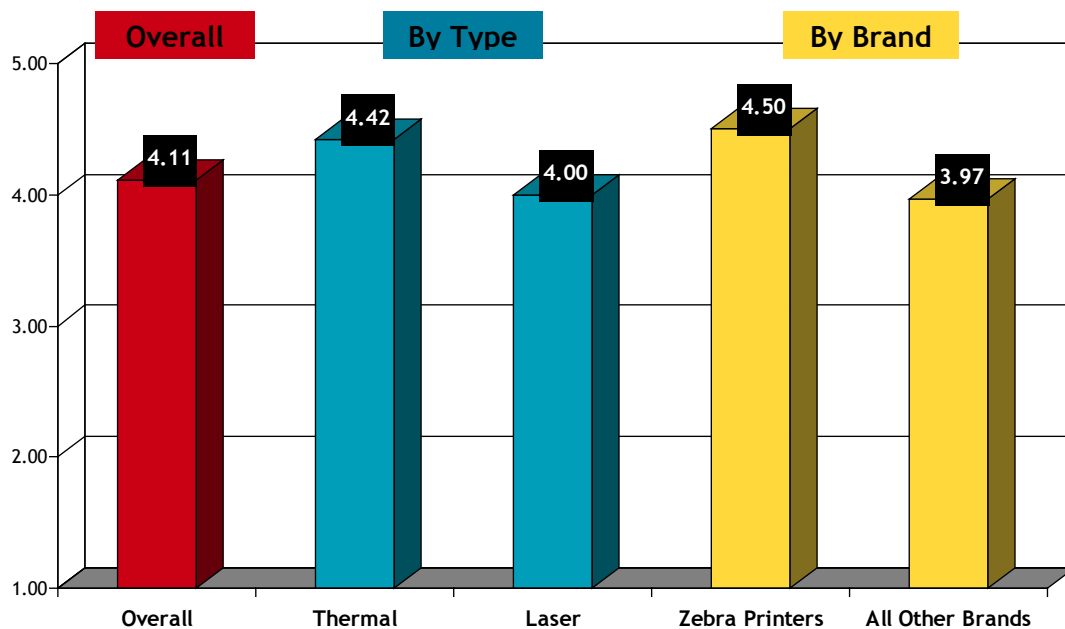
Once again, most respondents were unable to name the vendor that primarily supplies their bar code labels for the lab, with 58.9% responding “unsure.” Still, average satisfaction with labels was quite high at 4.49 on a scale of 1 (Not at all Satisfied) to 5 (Most Satisfied).

## Patient Wristbands

Overall, 73.2% of IT-based respondents indicated their hospital was using bar coding for patient wristbands. 100% of respondents indicated that at least some of those wristbands are printed on-demand at the point of application, though 19.2% also indicated some are pre-printed.

Of those bar coding, 71.2% had adopted laser technology to date, versus 38.5% using thermal printers. Although Zebra printers were not the most utilized in the sample, they were the second most at 26.9%.

The average satisfaction rating for bar code patient wristband printers was rated at 4.11 on a scale from 1 (Not at all Satisfied) to 5 (Very Satisfied). The following chart displays the mean rating overall, by type, and by brand of printer:

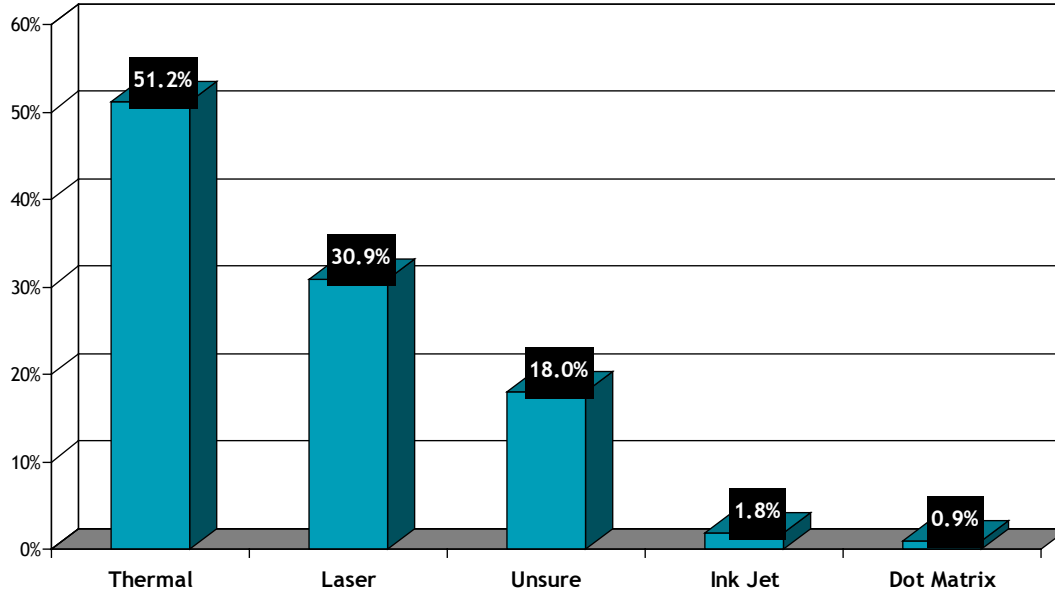


Under these conditions, thermal printers scored higher mean ratings on average (4.42) than laser (4.00). Similarly, Zebra-brand printers once again had a considerably higher average satisfaction rating than all other brands, rated as 4.50 to 3.97.

When asked which vendor primarily provides their wristbands for bar coding, nearly 60% responded “unsure.” Satisfaction with the wristband itself was on par with that of the printer, rated at a mean of 4.04.

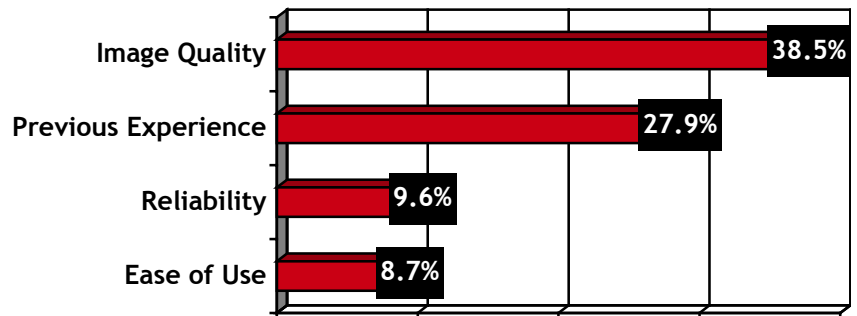
## Preferred Printer Type for Bar Code Labels & Wristbands

Finally, respondents were asked which type of printer they believe is best for printing bar code labels and wristbands. 51.2% responded thermal, followed by laser at 30.9%. The following chart displays the percentage of respondents selecting each type of printer probed:



Respondents were then asked to comment on why they believe their selected type of printer was best suited for printing bar code labels and patient wristbands. The primary advantages cited for thermal printers are displayed in the chart at right.

### Primary Advantages of Thermal Printers



“Image Quality” was the greatest perceived advantage for thermal printers, cited by 38.5% of respondents. Respondents typically spoke about the clarity of the image itself and ability to scan/read the printed bar code.

**“I like the legibility of the labels and I don't think for scanning purposes any of the other types of printers will deliver the bar coding necessary.”**  
*Pennsylvania, 500+ Beds, Director of Pharmacy*

**“We haven't had any issues with the labels and the instruments can read the labels.”** *New Jersey, 200-299 Beds, Lab Manager*

Many respondents simply based their opinion on “Previous Experience,” cited by 27.9% who felt their preference is based on past experience using thermal printers.

“Reliability,” cited by 9.6%, referred to equipment reliability and durability.

**“I just think it's better from a technical standpoint. They fail less.”**  
***New York, 300-499 Beds, CIO***

The 8.7% citing “Ease of Use” typically made reference to the ease of use for the operator and basic maintenance requirements.

**“No ribbons to change out, no toner to keep up with. When the print head wears out you just replace it.”** ***Virginia, 100-199 Beds, Director of Lab***

## Conclusions

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Certainly, bar coding for labels and patient wristbands is top-of-mind in today's hospital. Perhaps motivated by The Joint Commission's National Patient Safety Goals to reduce patient identification errors, 91.2% of the sample indicated they have adopted bar codes for use in at least one of the five areas queried through the research. Beyond this number, hospitals still believe there are investments to be made.

The 18<sup>th</sup> Annual HIMSS Leadership Study<sup>3</sup> found that bar coding technology was the top technology that survey respondents intended to implement in the next two years, as indicated by 74% of participants. It continues, noting "this represents a slight increase over the 69 percent of respondents who selected this item in the 2006 survey."

Image quality, durability, and ultimately readability of the printed bar code image will become more important as continued investment drives bar coding to more advanced applications such as bedside medication administration.

The findings of Porter's primary research certainly suggest that overall satisfaction with printers to support current bar coding efforts is high. These satisfaction rates were accentuated at hospitals that had adopted thermal printers and more specifically, Zebra thermal printers.

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<sup>3</sup> 18<sup>th</sup> Annual HIMSS Leadership Study, HIMSS  
10 July 2007 <http://www.himss.org/2007Survey/DOCS/18thAnnualLeadershipSurvey.pdf>

## About the Sponsors

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### About Zebra Technologies

Zebra Technologies is a world leader in bar code, RFID, and ID card printing with an installed base of more than 4 million units, including systems at healthcare facilities for unit-of-use labeling, prescription label printing, patient wristband printing, materials management, security, and employee identification. Together with its partners, Zebra has the experience, industry knowledge, and specialized products needed for successful pharmacy implementations. Zebra is also a leader in standards development that actively participates in the work of life sciences industry associations so that it will be prepared to meet the emerging needs of its customers. Contact Zebra at +1 800 423 0442 or visit [www.lifesciences.zebra.com](http://www.lifesciences.zebra.com) for more information about bar code printing solutions for healthcare.

### About Porter Research

Since 1989, Porter Research has delivered the needed knowledge to the healthcare information technology industry. Senior executives with world-class sales and marketing experience at major healthcare IT companies lead a team of veteran market research specialists to conduct more than 7,000 annual research interviews with decision makers and influencers at all levels of healthcare delivery, from physician offices and hospitals to payers. Our custom B2B market research products enable our customers to develop plans and strategies to take to the market, validate opportunities to improve sales success, and ultimately increase customer satisfaction. For more information, visit [www.porterresearch.com](http://www.porterresearch.com).