Lowering Entry Barriers
in Digital Printing for Packaging

Inkjet Primed for Mainstream

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Nearly three decades after the introduction of digital printing devices for commercial production environments, a combination of forces is promoting the more wide-spread use of digital presses in packaging printing. While digital printing offers great potential to all types of print products, a few barriers halted more mainstream adoption in label and packaging printing applications.

Brand owner requirements, substrate limitations, quality, production workflow, finishing, color matching, and technology investment costs all were among the factors inhibiting widespread growth of digital printing in packaging. Ongoing progress in technology innovation, early adopter successes, process simplification, and brand owner creativity and competitive drive are all forces removing former adoption obstacles, positioning digital printing of packaging for mainstream use.

One technology serving to expand the use of digital printing in packaging is inkjet. The ability to print directly onto various substrates, including corrugated material, folding cartons, and flexible films makes inkjet an attractive and less complex process compared to alternatives.

RESEARCH IDENTIFIES TRENDS BREAKING ENTRY BARRIERS

In an effort to document current market and technology trends that are reducing entry barriers to digital printing of packaging, NAPCO Research (a unit of NAPCO Media LLC, the parent company of *Printing Impressions*, *Packaging Impressions*, and *In-Plant Impressions*) conducted survey research that captured close to 300 responses from organizations that print labels and packaging. The research study and resulting report series on survey findings is sponsored by Memjet.

The survey focused on capturing printers' and converters' experiences with digital printing, factors driving or impeding investment, and customer demands driving the use of digital printing.

Survey Respondent Profiles

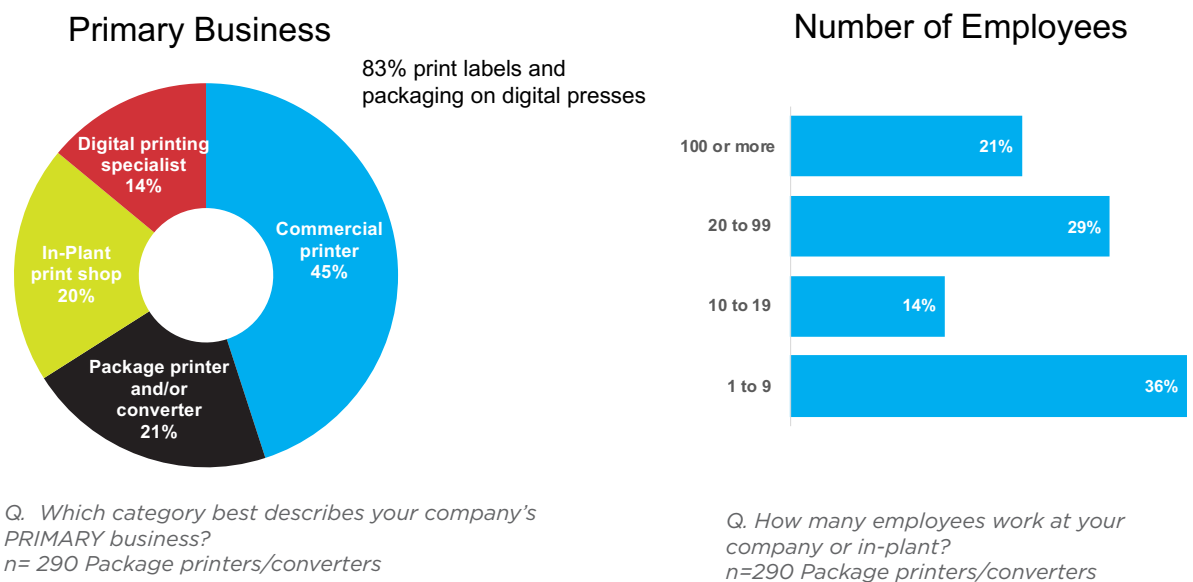Of the 290 survey participants, 45% described their primary business as a commercial printer, 21% a package printer or converter, 20% an in-plant print shop, and 14% a digital printing specialist (Figure 1).

The majority represents commercial printers and reflects an ongoing trend of convergence over the past decade, where these print providers have worked packaging into their product mix. Packaging is

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an attractive adjacent market for many types of printers as product labels and packaging do not have digital media alternatives. Commercial printers' existing customer base often requires some form of package printing. This is most often in the form of cut-and-stack or pressure-sensitive labels, which require little finishing, and folding cartons, both of which can be run on their offset and digital presses.

Survey respondents' companies varied in size with 36% reporting 9 or fewer employees, 14% having 10 to 19 employees, 29% employing 20 to 99, and 21% with more than 100 employees.
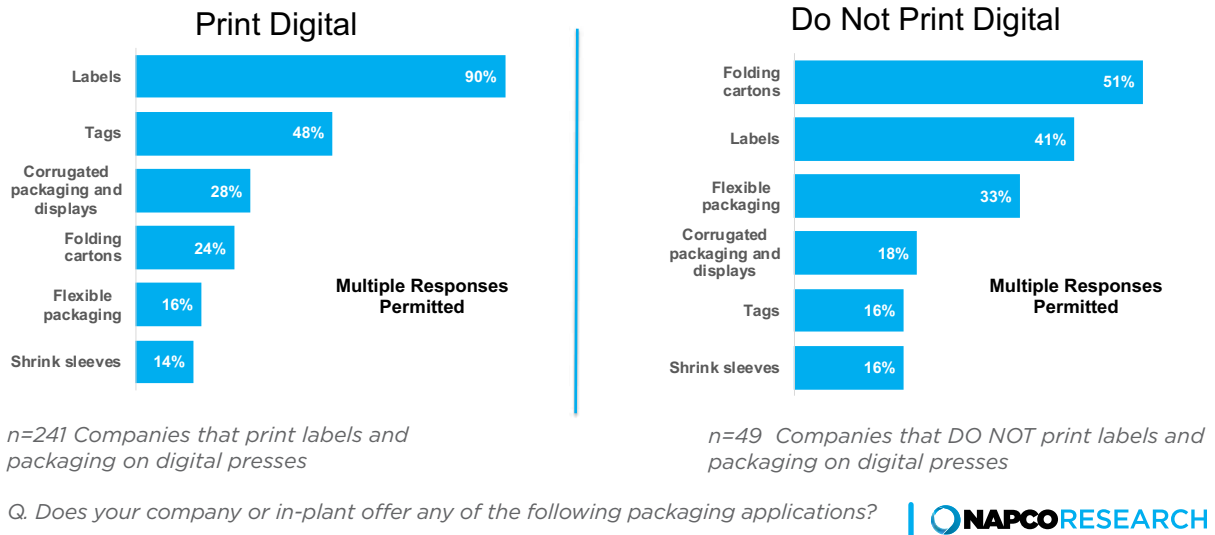
Figure 1: Survey Respondent Profiles

Primary Business

83% print labels and packaging on digital presses

Digital printing specialist 14%

In-Plant print shop 20%

Commercial printer 45%

Package printer and/or converter 21%

Q. Which category best describes your company's PRIMARY business?
n= 290 Package printers/converters

Number of Employees

100 or more	21%
20 to 99	29%
10 to 19	14%
1 to 9	36%

Q. How many employees work at your company or in-plant?
n=290 Package printers/converters

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DIGITAL PRINTING OF PACKAGING TAKING HOLD

Eighty-three percent (83%) of survey respondents print labels and/or packaging on digital presses. Figure 2 shows the types of packaging applications printed by respondents, segmented by those that print labels and/or packaging on digital presses and those that do not. Those that print packaging on digital presses reported a higher incidence of printing labels, reflecting the fact that label printing was an early packaging application to migrate to digital.

Labels was the first sector to use digital printing, because most self-adhesive labels are printed narrow-web on lightweight substrates well suited for printing on the toner-based printing devices available at the time. While more widely produced than any other print application, labels are driving digital adoption in other segments as well. Respondents indicated their operations are printing cor-rugated packaging, folding cartons, and flexible packaging on digital presses. This finding serves as a signal that packaging applications beyond labels are starting to migrate to digital.
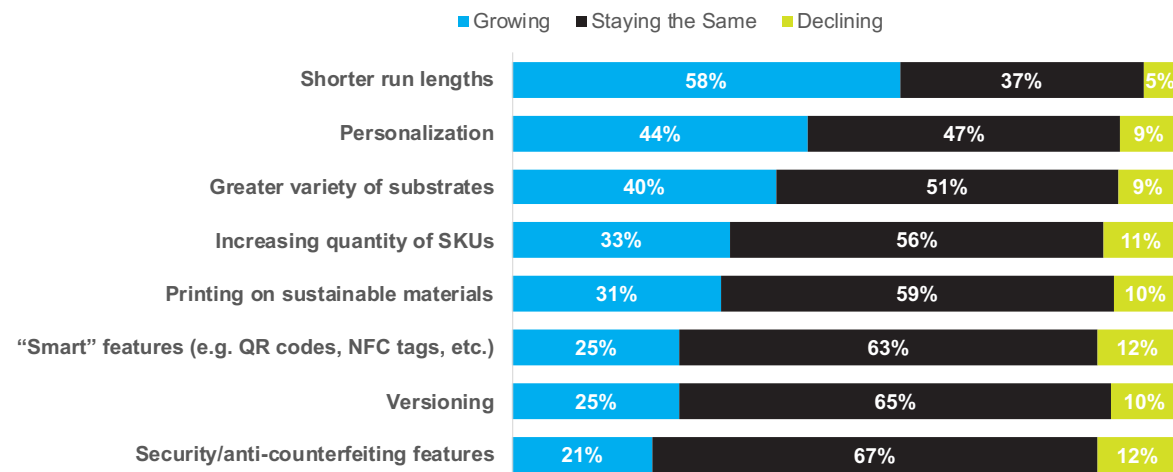
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Figure 2: Types of Packaging Applications Printed

Print Digital

Application	%
Labels	90%
Tags	48%
Corrugated packaging and displays	28%
Folding cartons	24%
Flexible packaging	16%
Shrink sleeves	14%

Multiple Responses Permitted

n=241 Companies that print labels and packaging on digital presses

Do Not Print Digital

Application	%
Folding cartons	51%
Labels	41%
Flexible packaging	33%
Corrugated packaging and displays	18%
Tags	16%
Shrink sleeves	16%

Multiple Responses Permitted

n=49 Companies that DO NOT print labels and packaging on digital presses

Q. Does your company or in-plant offer any of the following packaging applications? **NAPCORESEARCH**

MARKET DEMANDS ACCELERATING NEED FOR DIGITAL INVESTMENT

The survey asked respondents to rank the level of customer demand for various requirements. Respondents report high growth in demand for features and services that improve packaging results, reduce costs, accommodate versioning, and support sustainability (Figure 3). Digital printing accommodates many customer requirements that respondents reported are in high demand.

Figure 3: Customer Demands Driving Use of Digital Printing

Legend: ■ Growing ■ Staying the Same ■ Declining

Requirement	Growing	Staying the Same	Declining
Shorter run lengths	58%	37%	5%
Personalization	44%	47%	9%
Greater variety of substrates	40%	51%	9%
Increasing quantity of SKUs	33%	56%	11%
Printing on sustainable materials	31%	59%	10%
"Smart" features (e.g. QR codes, NFC tags, etc.)	25%	63%	12%
Versioning	25%	65%	10%
Security/anti-counterfeiting features	21%	67%	12%

Q. Please indicate if demand from your label and packaging customers for the following requirements is growing, staying the same, or declining. n=290 companies that print packaging and labels

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Aligning customer demands with the value of emerging technologies and materials makes a strong case that digital printing of packaging is set to accelerate. Consider the following proof points:

Accommodate Shorter Run Lengths

More than half of the survey respondents indicate demand for short runs continues to grow among their customers. Just 5% said their short-run work is in decline. Most package printers/converters initially consider purchasing a digital press so they can satisfy the demand for short-run jobs.

Digital printing's short-run capabilities offer brand owners important operational benefits, including accommodating stock-keeping unit (SKU) proliferation, reducing storage requirements, minimizing product obsolescence, and improving design testing. Prior to digital printing devices, brand owners' packaging testing options were limited as the costs to produce printing plates and other setup costs made it too expensive to print lower quantities.

Improve Customer Engagement

Brand owners rely on their package printers/converters to support their efforts in improving packaging engagement. Respondents report that demand for personalization, versioning, substrate variety, and sustainability (all features that capture customer attention) are either growing or holding steady. Few indicate declines in these areas. Shelf impact and designing product packaging that stands out from competitors is top-of-mind for brands.

Digital printing makes it far easier to customize packaging and add personalization to products. The use of versioning and personalization by top product brands on their labels and packaging has had a positive effect on sales. Food and beverage markets offer many high-profile packaging examples such as people's names on soft drink labels; consumers' faces on snack food bags and wrappers; sports teams pictured on beer cans; and products featuring seasonal themes.

Showcase Smart Packaging Options

One-quarter (25%) of respondents report demand for "smart packaging" is increasing as brand owners look to include technology features that connect the package to digital media for interactive customer experiences, product security requirements, and anti-counterfeiting measures.

Offer a Variety of Substrates

Forty percent (40%) of respondents reported that demand for a greater variety of substrates is growing among customers, with 51% of this group indicating it is staying the same. In addition, 31% of respondents report customer demand for printing on sustainable materials is growing.

Substrate innovations are lowering entry barriers. Material suppliers are investing significantly in R&D efforts to produce and certify substrates that are compatible with both toner and inkjet technologies. These include products that leverage digital's value proposition for low minimum quantities and fast turnaround. While some substrate suppliers are focusing on developing materials that are "inkjet ready," appealing to converters that would like to run jobs without having to apply corona treatment or inline priming, other suppliers are beginning to supply easy-to-use in-line treatment systems that offer greater flexibility and substrate choice.

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Additionally, many label materials suppliers offer programs that have no maximum or minimum order requirements. These programs help digital printers avoid excess inventory while keeping costs down.

Accommodate More Product Versions

One-third (33%) of survey respondents report that the quantity of stock-keeping units (SKUs) is increasing. SKU proliferation, also known as product versioning, has exploded in recent years. In packaging segments like craft beer, cannabis, nutraceuticals, health & beauty, and many others there are more flavors, sizes, and varieties than ever before.

Digital printing makes it possible for brand owners to source either entirely new or updated labels and packaging quickly and efficiently. Launching a seasonal brew, a craft brewery can have corresponding themed labels created at a moment's notice in small batches. In the CBD (cannabidiol) space, for example – another market with a massive number of SKUs – digital printing allows updates to be made right away should there be new regulatory requirements for packaging.
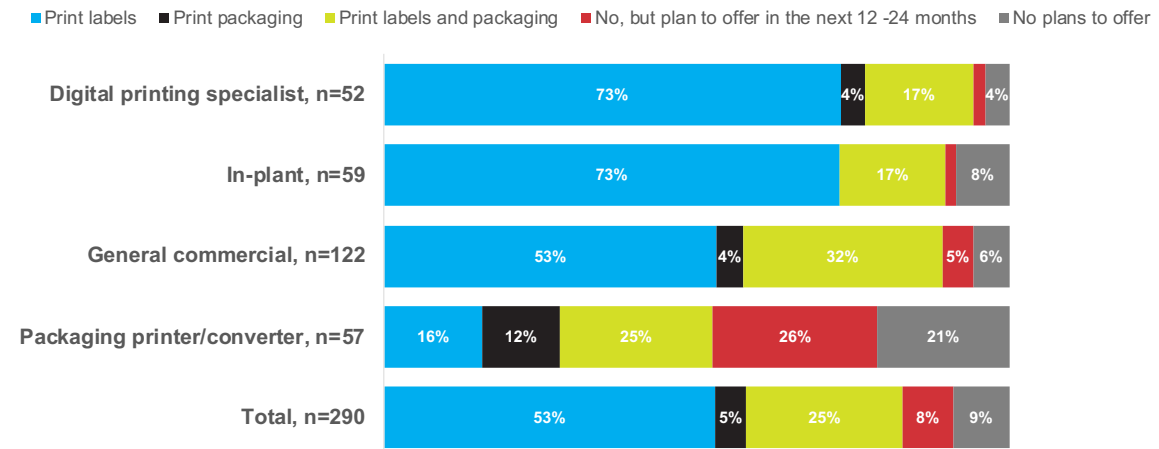
DEFINING THE ATTRACTION OF DIGITAL PRINTING

Digital printing offers label and packaging producers and their customers many attractive benefits. The technology's ability to print affordable, high-quality color work in shorter quantities, when needed, is supporting brand owners in more efficiently managing inventory and supply chains. In addition, retailers, brand owners, marketers, and agencies see the production of labels and packaging on digital printing devices as an opportunity to expand product versions and improve customer engagement.

Many types of printing operations are reaping benefits from digital printing processes. Innovations in technology continue to prompt print providers to investigate, invest in, and use digital presses to produce labels and packaging. Segmenting survey respondents by their primary business highlights the fact that non-traditional types of print providers are harnessing digital printing to offer labels and packaging. Figure 4 shows that commercial printers, digital print specialists, and in-plant respondents reported a higher incidence of printing labels and packaging on digital presses than packaging printers/converters. This is partially explained by the fact that mainstream packaging printers/converters continue to rely heavily on non-digital processes for long-run production – although many are taking a closer look at digital as well.

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Figure 4: Digital Packaging Printing by Market Segment

Legend: ■ Print labels ■ Print packaging ■ Print labels and packaging ■ No, but plan to offer in the next 12 -24 months ■ No plans to offer

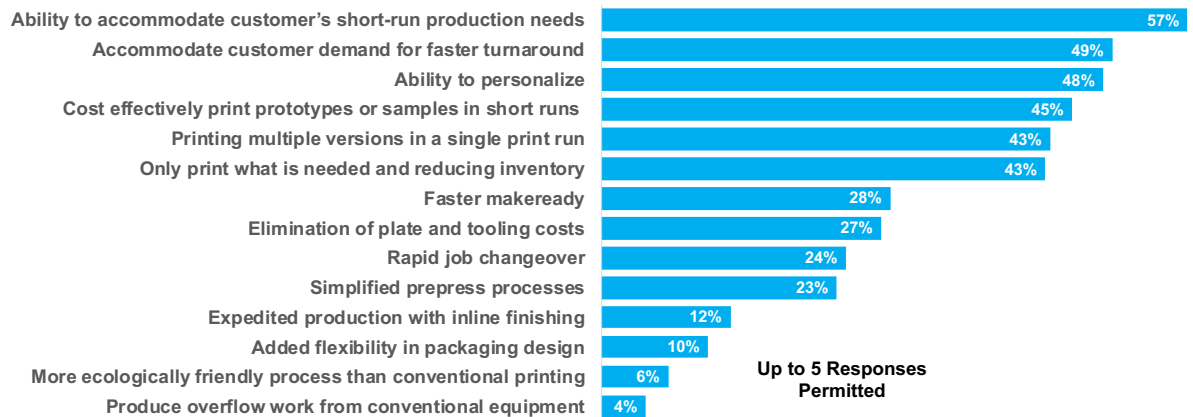| Market Segment	Print labels	Print packaging	Print labels and packaging	No, but plan to offer in the next 12-24 months	No plans to offer
Digital printing specialist, n=52	73%	4%	17%		4%
In-plant, n=59	73%		17%		8%
General commercial, n=122	53%	4%	32%	5%	6%
Packaging printer/converter, n=57	16%	12%	25%	26%	21%
Total, n=290	53%	5%	25%	8%	9%

Q. Do you print labels and/or packaging products on digital printing devices?

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Top benefits reported by survey respondents that print labels and packaging on digital devices include accommodating customers' short-run production needs (57%), faster turnaround (49%), personalization (48%), the ability to cost effectively print prototypes or short run samples (45%), printing multiple versions in a single print run (43%), and the ability to only print what is needed (43%), thus reducing inventory (Figure 5).

Figure 5: Benefits of Printing Packaging on Digital Presses

Benefit	Percentage
Ability to accommodate customer's short-run production needs	57%
Accommodate customer demand for faster turnaround	49%
Ability to personalize	48%
Cost effectively print prototypes or samples in short runs	45%
Printing multiple versions in a single print run	43%
Only print what is needed and reducing inventory	43%
Faster makeready	28%
Elimination of plate and tooling costs	27%
Rapid job changeover	24%
Simplified prepress processes	23%
Expedited production with inline finishing	12%
Added flexibility in packaging design	10%
More ecologically friendly process than conventional printing	6%
Produce overflow work from conventional equipment	4%

Up to 5 Responses Permitted

Q. What are the most important benefits that printing labels and packaging on digital printing devices provides your operation?
n=233 Companies that print labels and packaging on digital presses

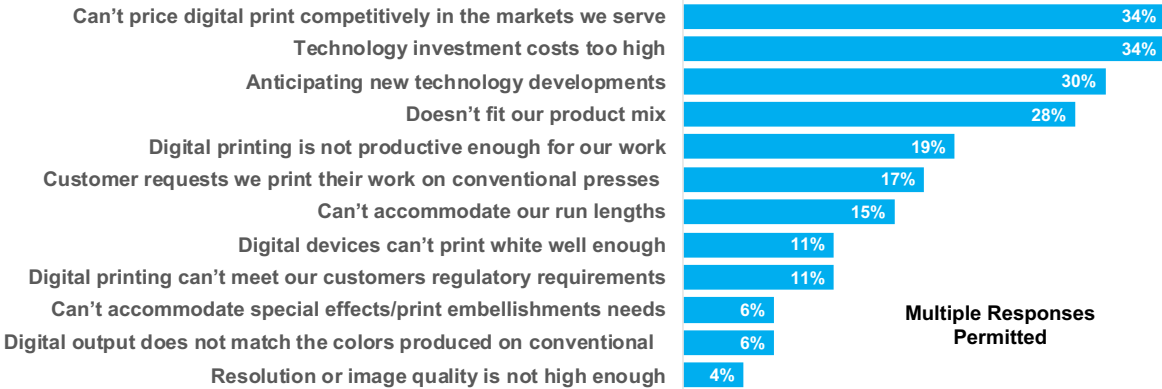NAPCO RESEARCH

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REASONS FOR NOT INVESTING IN DIGITAL PRINTING

The top reasons survey respondents were not printing on digital presses (Figure 6) are because:

1. They can't price it competitively (34%),

2. Technology costs are too high (34%),

3. They're waiting for future developments (30%), and

4. It doesn't fit their product mix (28%).

Figure 6: Reasons for Not Printing Labels & Packaging on Digital Presses

Reason	Percentage
Can't price digital print competitively in the markets we serve	34%
Technology investment costs too high	34%
Anticipating new technology developments	30%
Doesn't fit our product mix	28%
Digital printing is not productive enough for our work	19%
Customer requests we print their work on conventional presses	17%
Can't accommodate our run lengths	15%
Digital devices can't print white well enough	11%
Digital printing can't meet our customers regulatory requirements	11%
Can't accommodate special effects/print embellishments needs	6%
Digital output does not match the colors produced on conventional	6%
Resolution or image quality is not high enough	4%

Multiple Responses Permitted

Q. Why don't you print labels and/or packaging products on digital printing devices? n=47 respondents that don't print labels and/or packaging on digital devices

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Interestingly, the top reasons respondents were not printing packaging on digital presses did not include quality, productivity, run lengths, or enhancement requirements.
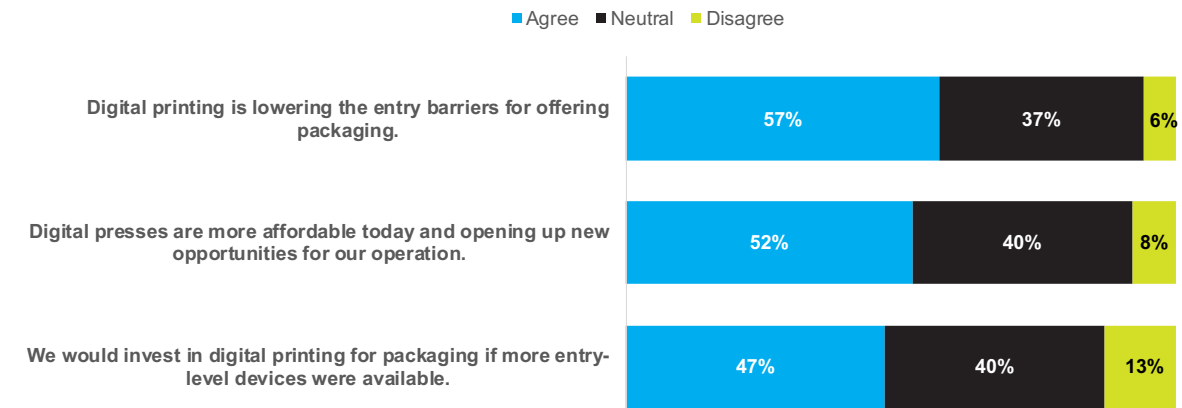
FORCES LOWERING ENTRY BARRIERS

Hardware, software, inks and toners, and substrates for producing labels and packages on digital presses are constantly evolving, resulting in more automated and less complicated processes. Reducing technology complexity, workflow steps, and process variables lowers investment risk. The majority of survey respondents, 57%, believe that digital printing is lowering the entry barriers to offering packaging (Figure 7).

Today there is a digital device for every budget and pressroom size, from digital machinery costing well into the seven figures to tabletop devices for a few thousand dollars. A typical barrier to entering or expanding in the packaging market is investment cost. Over half of survey respondents believe that digital package printing equipment is indeed more affordable today and does offer new opportunities for their operations (Figure 7).

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Figure 7: Factors Driving Digital Printing of Packaging

■ Agree ■ Neutral ■ Disagree

	Agree	Neutral	Disagree
Digital printing is lowering the entry barriers for offering packaging.	57%	37%	6%
Digital presses are more affordable today and opening up new opportunities for our operation.	52%	40%	8%
We would invest in digital printing for packaging if more entry-level devices were available.	47%	40%	13%

n=201 Companies that print labels and packaging on digital presses

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The Influence of Inkjet

A key digital printing technology that is reducing entry barriers to producing packaging is inkjet. For years, the potential of inkjet has been an ongoing industry discussion, but innovations in technology, inks, and substrates are turning talk into viable printing solutions that offer more providers access to the packaging market.

Printhead developments, in particular, are yielding higher resolutions, faster speeds, and lower-cost printers. In turn, digital press manufacturers are able to integrate these printheads into inkjet printing systems that are less expensive and less complicated than other alternatives. As a result, more package printers/converters can leverage the value of production inkjet for labeling and packaging applications.

Close to half of survey respondents, 47%, indicated they are looking for more entry-level digital printing devices, noting they would invest in digital if more entry-level devices were made available (Figure 7).
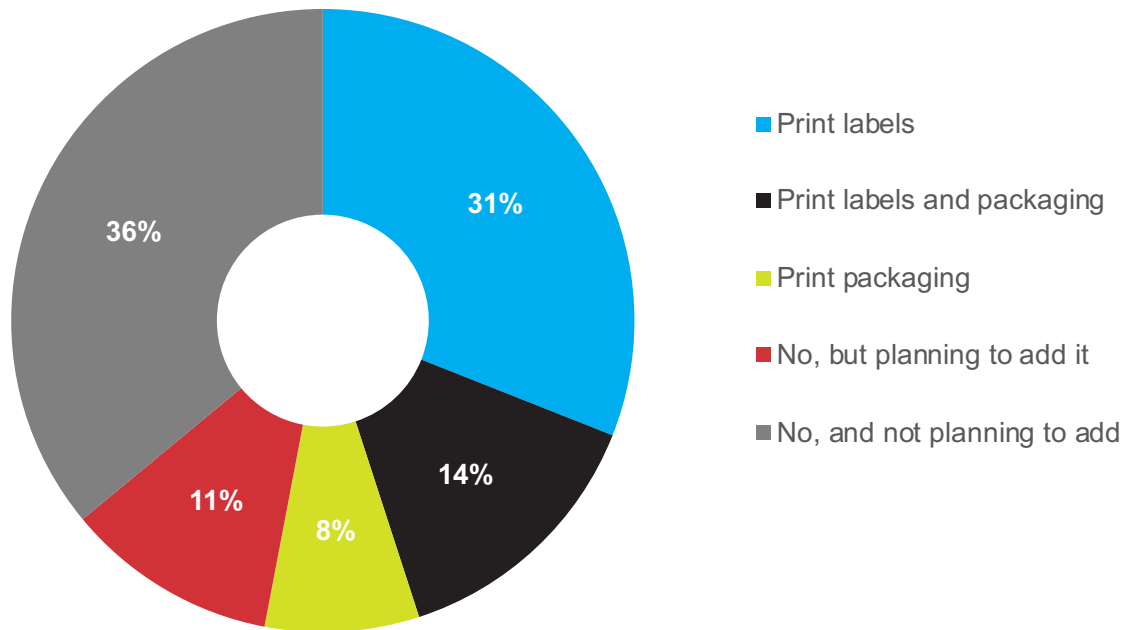
More entry-level digital devices are now available for printing packaging. Compact tabletop or desktop inkjet printers are an option for companies just wanting to make small leaps into digital package printing, to test the waters before getting in deeper.

INKJET IS THE NEXT STAGE IN MARKET EVOLUTION

Inkjet printing of packaging is the next stage in providers' evolution to serve brand owners. An exciting area of innovation that is set to expand the use of digital printing in packaging applications are low cost, single-pass packaging solutions for labels, corrugated, folding carton, and flexible materials.

Survey respondents that printed labels and packaging on digital presses were asked if they printed those applications on inkjet presses. Over half of respondents reported printing labels and/or packaging on inkjet presses, 45% printed labels and 22% printed packaging (Figure 8). Of the respondents that did not print labels and/or packaging on digital inkjet presses, 11% were planning to in the future.

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Figure 8: Printing Labels and Packaging on Inkjet Presses

- Print labels — 31%
- Print labels and packaging — 14%
- Print packaging — 8%
- No, but planning to add it — 11%
- No, and not planning to add — 36%

Q. Do you print labels and/or packaging applications on digital inkjet presses (presses used for printing graphics and text, not just non-graphical elements)? n=233 Companies that print labels and packaging on digital presses

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Paving the way for growth in inkjet are technological advancements that defy many perceived challenges to adoption, helping users to better serve their customers.

User Experiences Defy Perceived Challenges

The top reasons respondents don't print labels and packaging on inkjet presses are that they don't see the ROI in investing in the technology, prefer toner technology, believe the start-up costs are too high, and don't believe the color produced by inkjet devices meets their requirements.
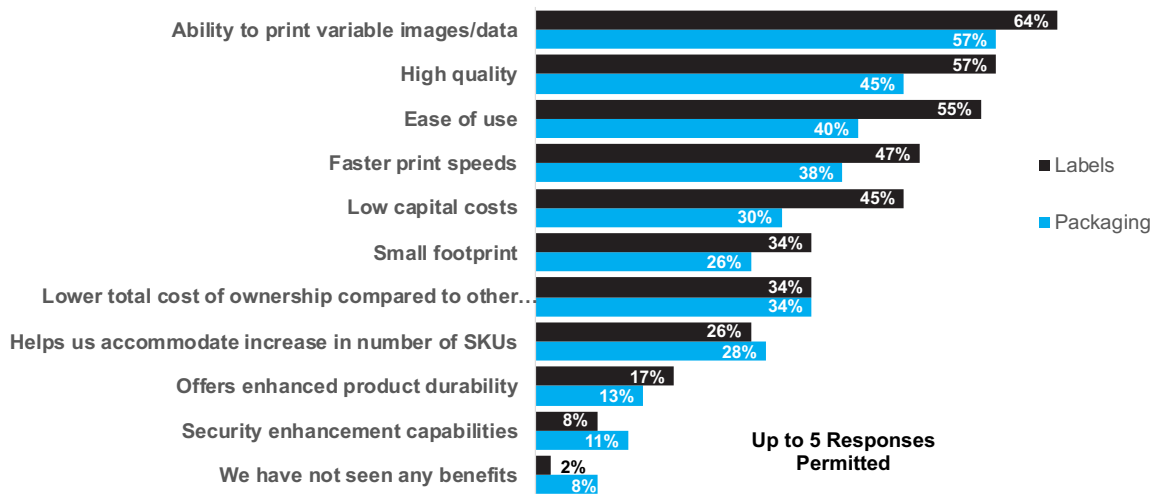
Respondents printing labels and packaging on digital inkjet presses say these are challenges that can be overcome. Users of inkjet report the biggest challenges in printing labels and packaging are matching colors printed on conventional and/or toner devices, as well as substrate limitations. Both are areas where equipment and substrate manufacturers continue to focus research and development efforts. Some print providers are incorporating digital technology onto an existing analog press, often called a retrofit. Hybrid printing provides greater flexibility and allows providers to take advantage of the benefits that both technologies provide.

Top Benefits: Variable Imaging, Ease of Use, and High Quality

Producing labels and packaging on inkjet presses offers printers and converters of labels and packaging many sales and operational benefits. Figure 9 compares the benefits respondents reported in printing labels and packaging on inkjet presses. Many of these benefits counter the reasons that other

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respondents gave for not printing labels on inkjet devices. For example, a key reason for not investing in inkjet was the perception of high start-up costs, but inkjet users identify low capital costs and lower total cost of ownership compared to other types of printing technologies as key benefits.

Figure 9: Benefits of Printing Labels and Packaging on Inkjet Presses

Benefit	Labels	Packaging
Ability to print variable images/data	64%	57%
High quality	57%	45%
Ease of use	55%	40%
Faster print speeds	47%	38%
Low capital costs	45%	30%
Small footprint	34%	26%
Lower total cost of ownership compared to other...	34%	34%
Helps us accommodate increase in number of SKUs	26%	28%
Offers enhanced product durability	17%	13%
Security enhancement capabilities	8%	11%
We have not seen any benefits	2%	8%

Up to 5 Responses Permitted

Q. What are the top benefits of printing labels and packaging on inkjet printing devices?
N=53 respondents that print labels on inkjet printing devices

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CONCLUSION

Digital printing of labels and packaging offers many benefits to print providers and their customers and is poised for more mainstream adoption. Technology advances, process simplification, substrate availability, and more printing press options are all helping to remove former entry barriers and enable more companies to offer digital printing.

A key technology opening up the entry path to digital printing of packaging applications is inkjet. Ongoing developments in printheads and substrates are not going unnoticed by print providers. Respondents printing labels and packaging on inkjet devices report the technology is yielding higher resolutions, faster speeds, increasing substrate flexibility, and lower cost printers — all benefits that make packaging a more accessible market opportunity.

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ABOUT THIS RESEARCH

Lowering Entry Barriers in Digital Printing for Packaging is a research study that explores the market trends, innovations, and forces that are reducing obstacles for organizations looking to either enter or expand offerings in label and packaging printing. Based on an in-depth survey of the readers of *Printing Impressions*, *In-plant Impressions*, and *Packaging Impressions*, the research is divided into the following three reports:

- Inkjet Primed for Mainstream

- Opportunities in Inkjet Label and Packaging Applications

- Revolutionizing Food Packaging with Inkjet

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NAPCO Research crafts custom data-centric solutions that leverage our highly engaged audiences across the markets in which we operate, our industry subject matter experts and in-house research expertise. We partner with our clients to identify their unique business problem and create solutions that enable deeply informed decision-making.

NAPCO Research can help with:

• Business goal prioritization

• Opportunity discovery

• Market segmentation

• Landscape insight

• User needs and wants

• Product features and functionality

• Content marketing strategy

• Sales strategy and tactics

• Market conditions

• Benchmarking

• Industry trends

• Brand awareness

Contact research@napco.com to talk with our analysts to find out how we can help you with your research needs.

WHO WE ARE

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Beautiful Precision, Simplicity, and Affordability.

Memjet is a global leader in the design and development of innovative thermal inkjet printhead technology, supporting modules, and aqueous inks. The modularity and technical components, combined with Memjet's commitment to customer success, empower OEM partners all over the world to develop fast, cost-effective printing solutions to grow and succeed in new markets. Together, we are building the future of print.

Memjet's range of digital technology powers the way we print today:
1. VersaPass® technology
2. DuraLink® technology
3. DuraFlex® technology

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