

# Digital Packaging: Maximizing Innovation and Impact

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# Table of Contents

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- Executive Summary .....4
- Key Findings .....5
  - Digital Printing Prominent, yet Complementary..... 5
  - Maximizing Digital’s Efficiency Advantages..... 5
  - SKU Proliferation and Versioning Persists in Packaging..... 5
  - Staffing and Workforce Drive Automation Desires..... 6
  - Digital Printing’s Role in Emerging Packaging Trends..... 6
- Introduction.....6
- Digital Printing: Prevalent And Prominent.....9
- Digital’s Role In Addressing Efficiency ..... 13
- Versioning And SKU Proliferation Continue To Impact Packaging ..... 16
- Digital Print Usage And Investment Plans ..... 18
- Top Packaging Trends And Digital Printing’s Role ..... 20
  - Sustainability Pressures Intensify..... 20
  - The Potential of Automation and Artificial Intelligence.....21
  - E-Commerce Opens Digital Print Opportunity.....24
- Conclusions ..... 26

## EXECUTIVE SUMMARY

Over the years that Alliance Insights has researched the rise of digital printing in packaging, the technology has evolved from its adoption phase to mainstream acceptance and now has become an indispensable tool to satisfy shifting trends and demands. This fourth edition of the Digital Packaging research series unveils the impact of transitions in the market on the entire value chain, and how digital equipment plays an increasingly important role in meeting the needs of this dynamic segment.

Package and label printing has always been fast paced. But the data collected in this study demonstrate that efficiency and speed to market remain top of mind for brand owners, as they contend with a consumer base that is now accustomed to getting the products they want, when they want them, and tailored to their specific needs. Beyond these efficiency pressures, package printers and converters are tasked with increasingly complex workflows. SKU proliferation and versioning have been at the forefront of brand owners' strategies for their product lines, a trend that shows no sign of slowing, and will likely push continued adoption of digital printing in the packaging segments. Additionally, as brand owners seek to reduce label and packaging inventory, this confluence of trends will result in even more short run demand, another benefit digital printing provides.

Package printers are recognizing the need to meet these customer needs, with the majority of converter respondents reporting increasing demand for faster turnaround times and shorter run lengths. As a result, more than 70% of respondents have adopted digital printing to at least some degree, indicating this is an industry that has recognized the advantages and benefits of the technology.

That's not to say however, that digital printing has, or even will become a replacement technology for conventional printing processes such as flexography, offset, or rotogravure printing. Across all segments of the packaging industry, conventional technologies account for a sizable majority of printed output, which is reflected in the data collected in this year's study.

Since digital printing's initial emergence in packaging, its ability to serve as a complementary technology, ideal for taking on the short-run, variable work that brand owners are requesting, has been among its most attractive attributes. This mindset is likely to persist as the demands for digital printing's benefits grow, while long-run, high-volume work continues to account for most packaging output. But, with digital printing able to efficiently and cost-effectively take on these highly versioned shorter runs, conventional assets can also be used to the best of their abilities, churning out long-run work and not getting bogged down with frequent changeovers and makereadies.

While converters are increasing their knowledge of and comfort with digital printing, brand owners are doing the same. In the early days of digital printing's presence in packaging, brand owners were often unconvinced of the technology's benefits. But now, as their package printing partners have become well-versed in digital, brand owners are receiving the education they need to think creatively about how the technology can enhance their packaging and product lines.

In fact, when asked about various factors they consider when assessing a label or packaging printer, offering production-level digital printing was the top answer, with more than half indicating it is essential and more than one-third deeming it to be very important. Additionally, nearly 90% of brand owner respondents report currently purchasing digitally printed labels or packaging, and of those brands, the top reported advantages of the technology are cost-effective short runs and increased speed to market.

This study, conducted by Alliance Insights, the research division of PRINTING United Alliance, surveyed package printers and brand owners to explore the state of digital printing and production technologies across the packaging landscape.

Converter respondents represent a variety of company sizes with approximately half (44%) having fewer than 50 employees and 56% with 50 or more employees.

On the brand owner side, 102 survey respondents represented various sizes and scopes, spanning small regional brands, to major national and international corporations.

## KEY FINDINGS

### Digital Printing Prominent, yet Complementary

- Of the label and packaging printers surveyed, 71% report currently offering digital printing. This is indicative of an industry that understands the advantages and benefits the technology provides and that it should no longer be considered a novel production method.
- Despite its prevalence among survey respondents however, digital printing accounts for a fraction of overall printed label and packaging output. While some digital label and packaging printing specialist companies have emerged, basing their entire business models around the technology, most printers and converters utilize digital printing to support and complement their conventional printing assets. In fact, of the respondents surveyed that currently offer digital printing, 54% report it accounts for 50% or less of their volume.
- Digital's complementary nature is evident in sales as well. While respondents largely expect sales growth from their digital printing offerings, 44% report digital printing accounts for 10% or less of their company's sales.

### Maximizing Digital's Efficiency Advantages

- Of the many benefits digital printing offers, its speed to market and quick turnaround capabilities are taking center stage. Brand owners that purchase digitally printed labels and packaging report cost-effective short runs (51%) and increased speed to market (44%) are the primary benefits of the technology.
- Converters report managing customers' speed to market demands to be a primary challenge, with 60% indicating this demand to be either a moderate (35%) or significant challenge (25%).

### SKU Proliferation and Versioning Persists in Packaging

- While the trend of increasing SKUs and packaging versions is far from new, it is important to continuously monitor brand owner activity, as it directly impacts the packaging production workflow. Brand owners that report having an increase in SKUs over the past 24 months report an average 34% increase. Those expecting an increase in SKUs over the next 24 months anticipate a 29% increase.
- Versioning of packaging is also continuing its prevalence, as brand owners can now more easily alter their text and graphics. Forty-four percent of label and package printers report increasing demand for versioning, indicating that this trend continues to impact packaging production.

## Staffing and Workforce Drive Automation Desires

- When presented with a series of potential business challenges, label and package printers highlighted staffing shortages and workforce development as two of the top three. In fact, 37% deemed staffing shortages to be a significant challenge, the most among the options presented. Meanwhile, 27% reported workforce development is a significant challenge and 41% indicated it is a moderate challenge.
- Training for existing staff and increasing pay to align with the cost of living are the most common actions printers and converters have taken to address workforce challenges. However, 45% report having also invested in automation in their production processes, underscoring the need for more digitization in the press room.

## Digital Printing's Role in Emerging Packaging Trends

- As sustainability has transitioned beyond being a “nice to have” to a “must have” packaging attribute driven by legislation and regulations, digital printing offers an opportunity to help converters and brands meet these needs. With minimal makereadies and reduced material waste, converters seeking to help their customers meet their sustainability objectives can leverage these benefits that digital offers.
- Personalization of packaging has been a prominent benefit of digital printing since its launch in the industry. As e-commerce continues its prominence among consumers, brands and converters can leverage digital printing's personalization capabilities more than ever due to an influx of personal data they can obtain from online purchases.

## INTRODUCTION

Digital printing is no longer a nascent technology — it's a proven, evolving production platform within the label and packaging industry. Many converters now operate multiple generations of digital equipment as they refine workflows and expand capabilities. Though adoption varies by segment — with labels and folding cartons leading — printers across the industry are advancing from early-stage learning to strategic deployment, aligning digital investments with customer and consumer expectations.

For brand owners, fast product turnaround times and speed to market are a top priority. Across nearly all industries, and certainly in consumer packaged goods (CPG) segments, retailers and consumers have become accustomed to on-demand or just-in-time deliveries, and as such, it has pressured the entire supply chain to increase its efficiency. Among brand owners surveyed, improving supply chain efficiency and responsiveness was among their top packaging challenges and 83% indicated that it is either very important or essential that their label or packaging printers accept rush jobs. On the converter side, 65% of respondents reported their customers are demanding faster turnaround times, underscoring the increasing pressure on production speed.

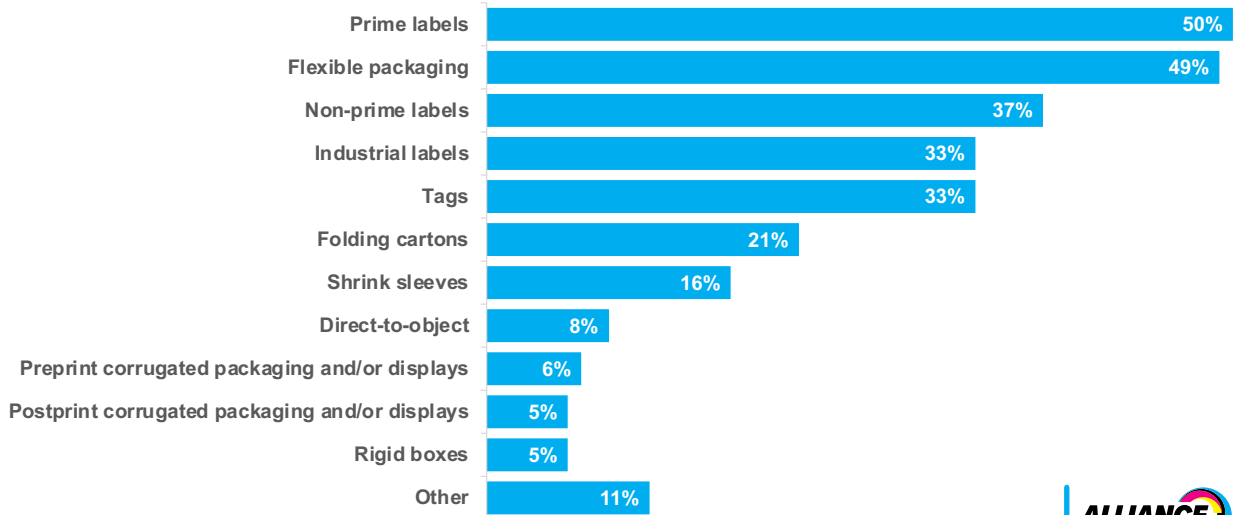
Short runs and increased SKUs and packaging versions are also continuing to drive adoption of digital printing, and this report explores the latest trends behind these primary digital printing attributes. Additionally, the continued rise of e-commerce, increasing pressures of packaging sustainability, and the emergence of automation and artificial intelligence are also poised to have an impact on how digital printing continues to take hold across the packaging spectrum.

Alliance Insights conducted this study with the support of sponsors Billerud, Flexible Packaging Association, and TLMI to reveal the trends and market factors that have made digital printing a prominent force in the packaging industry. To gather this data, Alliance Insights surveyed package printers and converters spanning labels, folding cartons, flexible packaging, and corrugated, along with brand owners. This approach provides a full view of how printers and their customers see the evolving role of digital printing and how they expect it will impact their businesses in the future.

Respondent demographics are detailed below:

## Figure 1: Converter Respondents Produce Several Packaging Applications

Q. Which of the following label and packaging applications does your organization print? Select all that apply

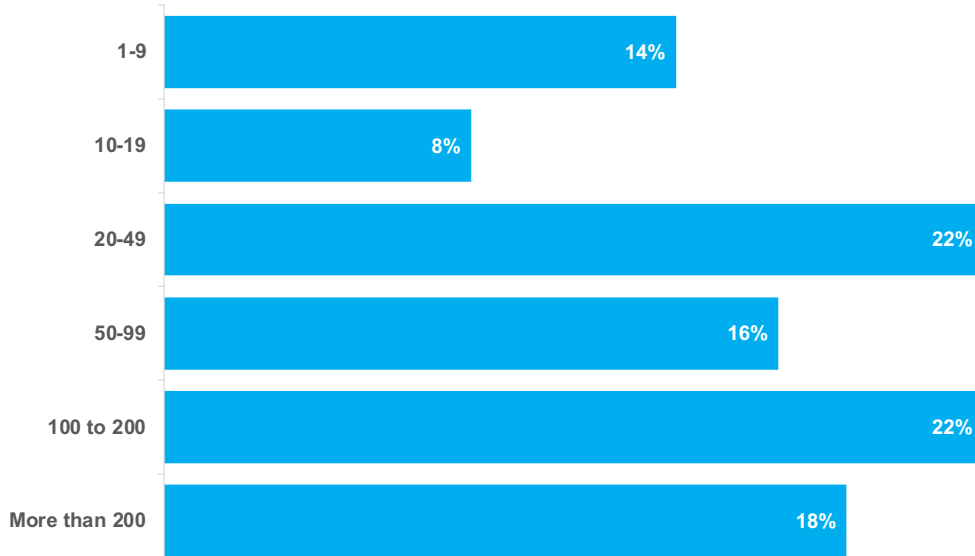


n = 110 label and package printers



## Figure 2: Converter Respondents Represent Various Company Sizes

Q. How many employees work at your facility?

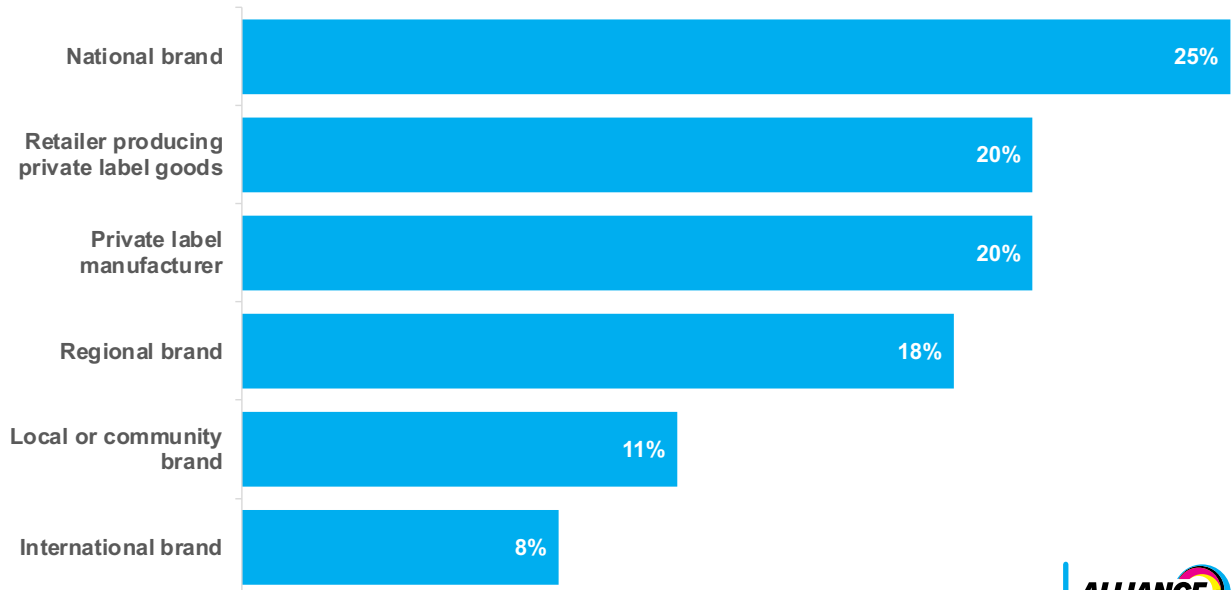


n = 110 label and package printers



### Figure 3: Brand Owner Respondents Vary in Scope

Q. Which of the following best describes your company's scope?

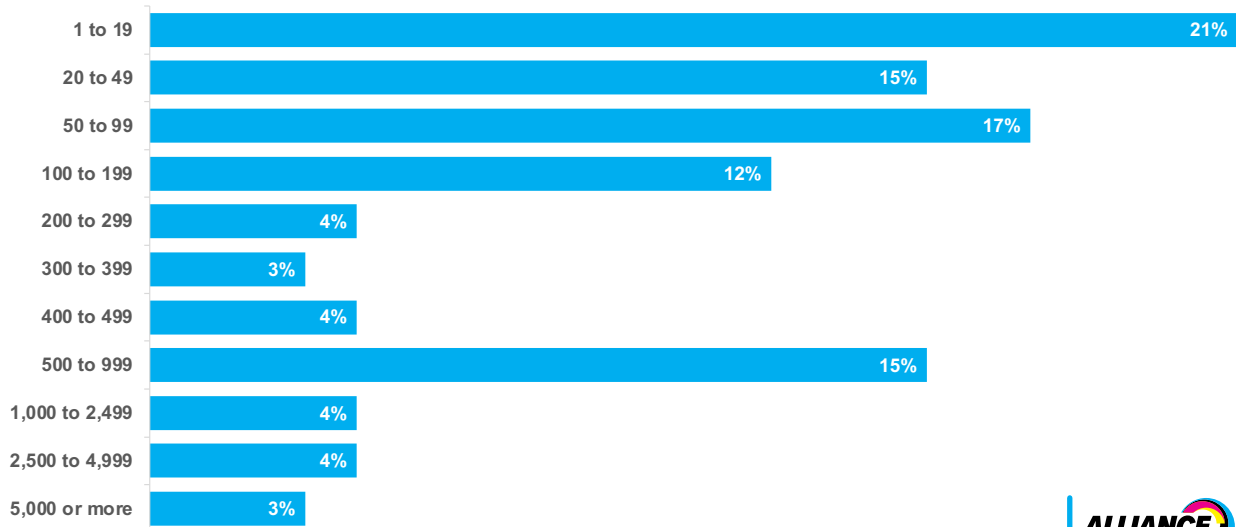


n = 102 brand owners



### Figure 4: Brand Owners Represent Multiple Company Sizes

Q. In total, how many employees work at your company?



n = 102 brand owners

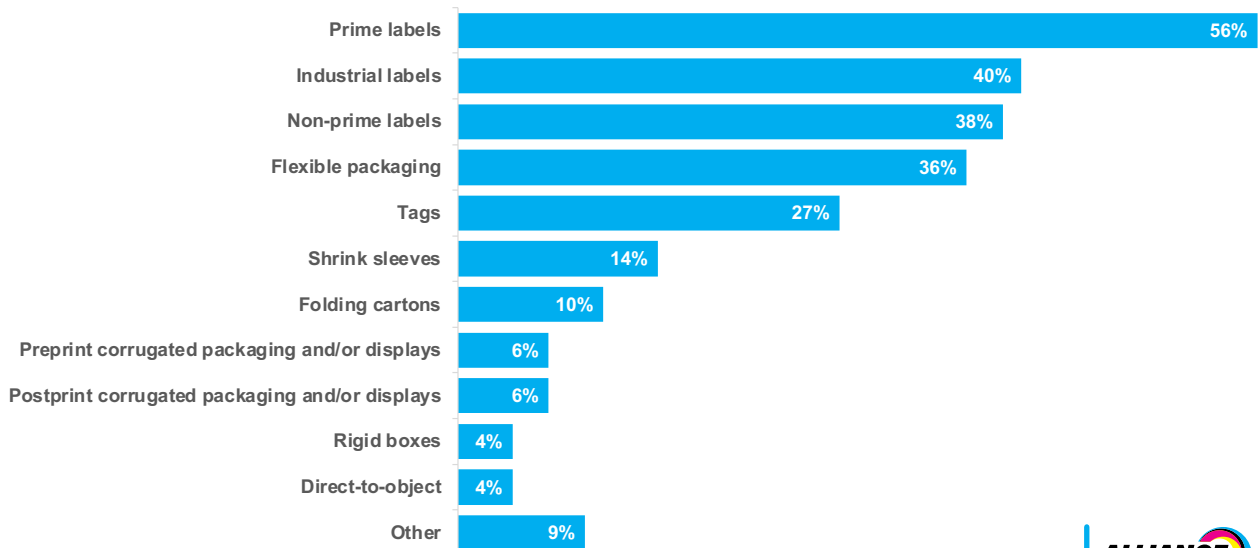


## DIGITAL PRINTING: PREVALENT AND PROMINENT

While digital printing comprises a small fraction of overall printed label and packaging volume, it has become commonplace in press rooms throughout the industry. Of the printers and converters surveyed for this study, 71% report currently offering digital printing, and it is being used across several applications (Figure 5). Since digital printing emerged in the packaging industry, the label segment has led the way. That is also where survey respondents are primarily using digital presses, with 56% producing prime labels, 40% implementing digital for industrial labels, and 38% digitally printing non-prime labels. However, other segments are seeing an influx of digital printing with 36% of respondents utilizing it for flexible packaging and 14% producing digitally printed shrink sleeves.

### Figure 5: Digital Printing Used Across Applications

Q. Which of the following applications do you print with digital equipment? Select all that apply.



n = 78 printers whose companies currently offer in-house digital printing of labels and/or packaging



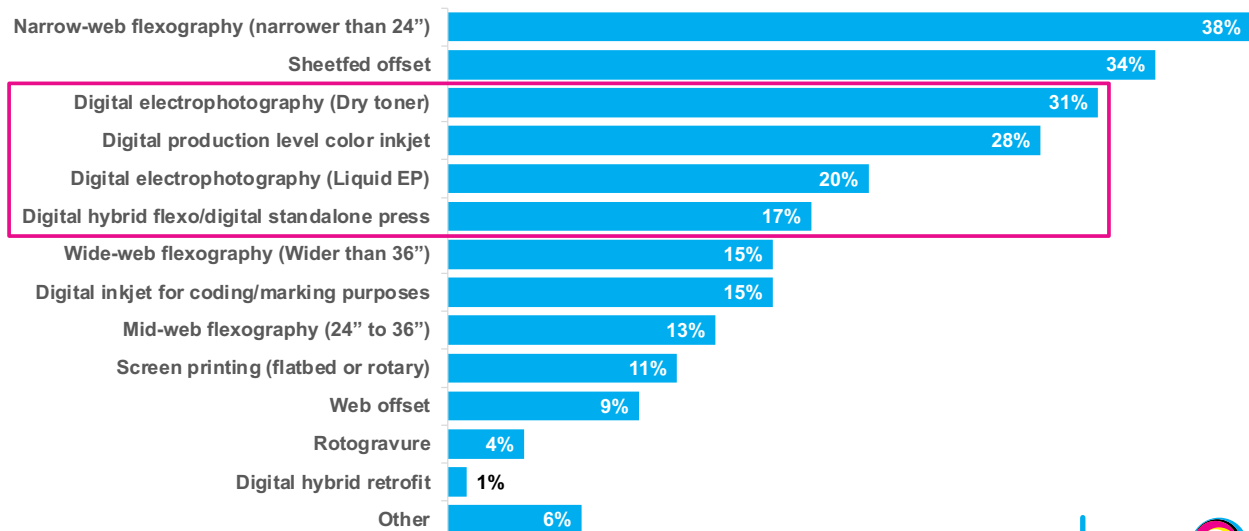
It is also telling that respondents' equipment mix is varied, and digital printing is competing with conventional in terms of its adoption across the respondent base (Figure 6). When asked to select all of the print technologies they use, conventional processes emerged at the top, with 38% printing with narrow-web flexography, the most common technology in label printing, and 34% using sheetfed offset presses, the most common printing platform in folding carton production.

After these top two conventional technologies, the next four are all digital, with respondents reporting using the following:

- Electrophotography (Dry toner): 31%
- Production level color inkjet: 28%
- Electrophotography (Liquid EP): 20%
- Hybrid flexo/digital standalone press: 17%

### Figure 6: Digital Adoption's Prevalence in Packaging

Q. Which of the following printing technologies does your company use in house to print labels and/or packaging? Select all that apply



n = 110 label and package printers



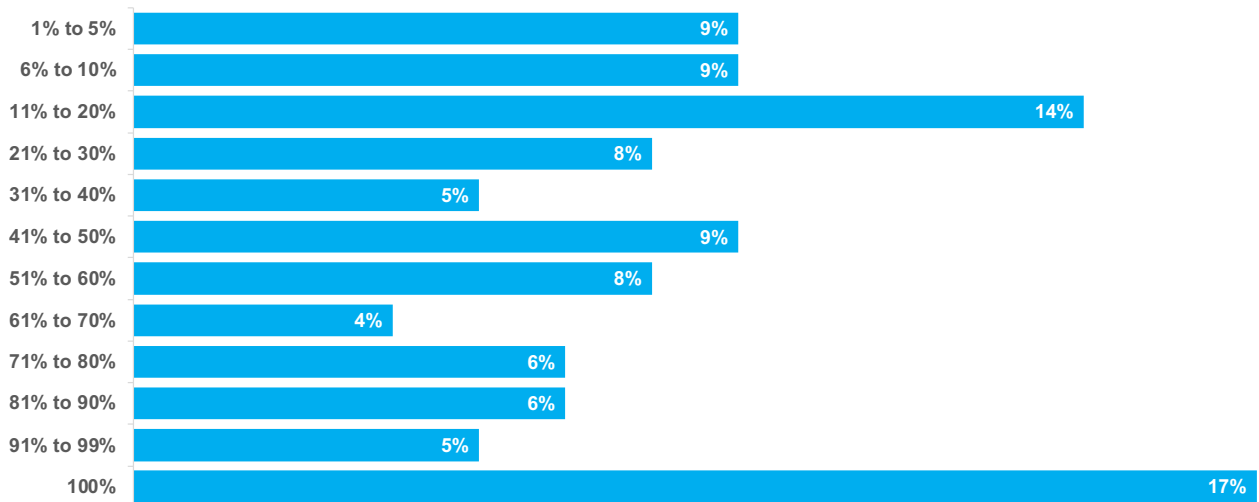
When assessing digital printing adoption and installation in packaging, however, it is important to recognize that this is still an industry that is dominated by conventionally printed output, which accounts for a sizable majority of packaging output across each segment.

In this study, label and package printers that have adopted digital printing were asked to approximate the percentage of their company’s overall output that is printed digitally (Figure 7). Responses varied greatly, with 18% of respondents estimating their digitally printed output to be 10% or less of their overall production volume, indicative of package printers implementing digital printing equipment to complement their conventional presses, taking on short run work, versioning or variable jobs, and other low-volume specialty runs.

However, other package printing companies have either been established or shifted their business model to be digital printing specialists, utilizing the equipment to pick up the type of work that may not be a good fit for their conventional printing competitors. This is evident in 17% of respondents reporting digital printing comprises the entirety of their printed packaging output. For these companies, the proliferation of smaller startup brands that require lower volumes of packaging and may be more willing to change their graphics and text based on consumer feedback and input are good candidates to work with, as their distinct needs fit digital printing’s strengths.

## Figure 7: Converters Vary in their Digitally Printed Output

Q. Approximately what percentage of your total printed label and/or packaging VOLUME is digitally printed?



n = 78 respondents whose companies currently offer in-house digital printing of labels and/or packaging



The majority of converter respondents also anticipate an investment in digital printing equipment in the next 24 months, with 55% reporting their companies plan to add new digital equipment. All digital technologies were represented in these investment plans with inkjet, hybrid, and electrophotography all garnering interest.

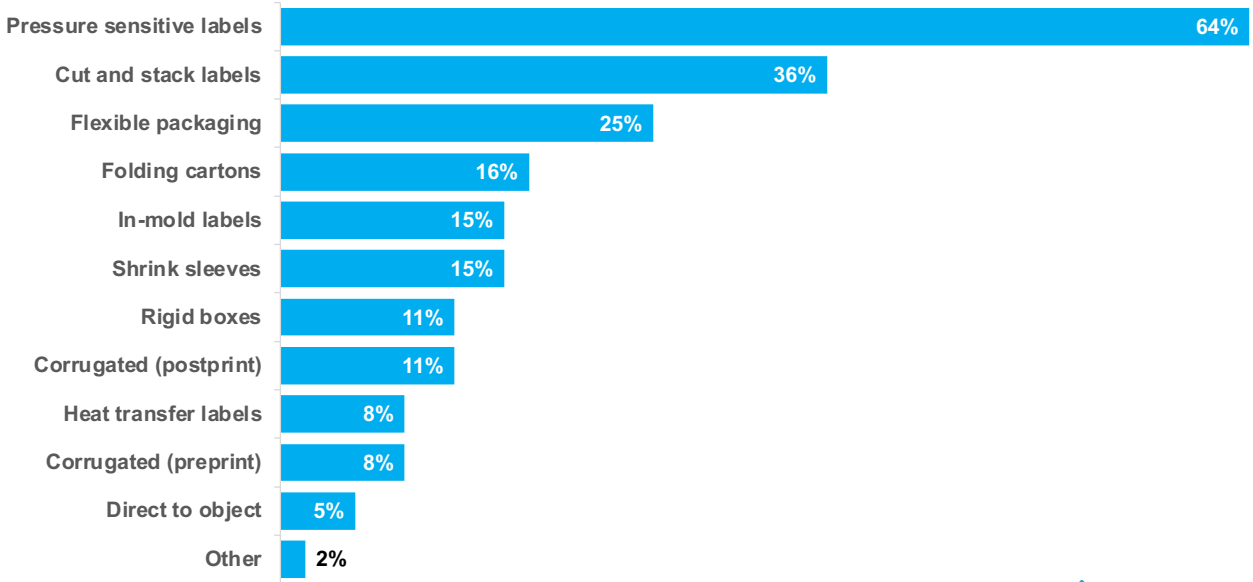
The equipment being considered spans a variety of widths, which is notable, as wider printing equipment can typically handle higher-volume runs, indicating that label and package printers are seeking to push their digital offerings into medium-length runs. Additionally, wider print production widths open the door to flexible packaging and corrugated, the applications that have been slower in their digital adoption. Among respondents seeking to invest in digital printing equipment in the next 24 months:

- 28% are considering equipment narrower than 13"
- 44% are considering equipment between 13" and 17"
- 20% are considering equipment between 17" and 21"
- 31% are considering equipment 21" or wider

The packaging work converters are eyeing for this equipment is also indicative of digital printing's growing prominence across packaging applications (Figure 8). While most respondents report plans to print labels with their new digital equipment, one-quarter cite plans to digitally print flexible packaging, which could be a sign that this is the application segment where digital printing could see increased growth, especially as multiple equipment manufacturers have revealed plans to launch wider aqueous inkjet presses.

**Figure 8: Converters' Plans for Newly Installed Digital Equipment**

**Q. What packaging applications do you expect to print using this new digital equipment? Select all that apply.**



n = 61 respondents whose companies are planning to invest in digital printing technologies in the next 24 months to print labels and/or packaging

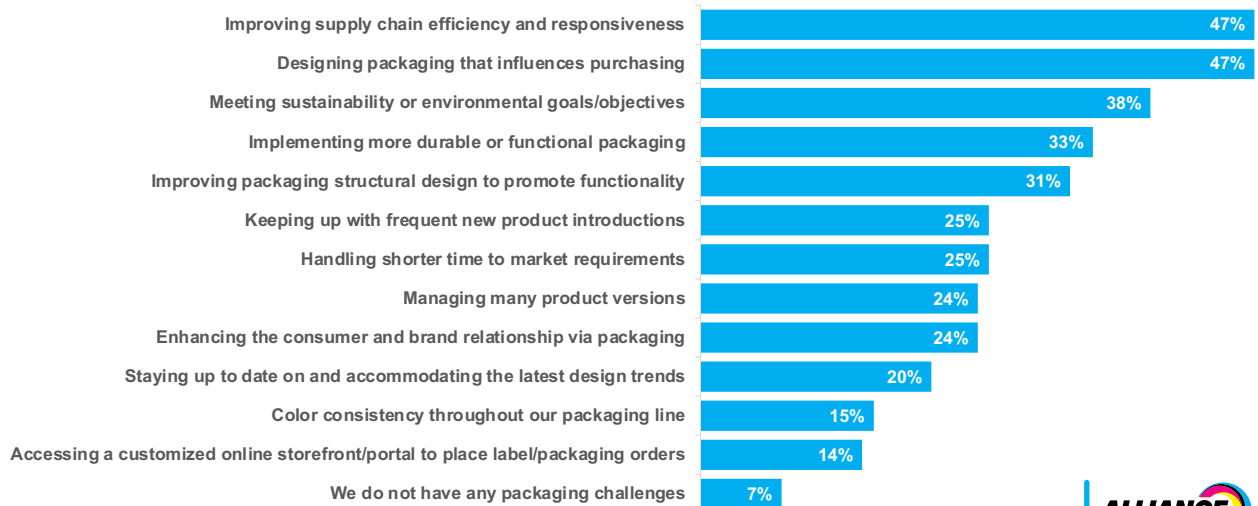


## DIGITAL'S ROLE IN ADDRESSING EFFICIENCY

Beyond creating engaging packaging that connects with consumers, brand owners report that speed to market and overall efficiency is a primary packaging challenge. When asked to share their top packaging challenges, 47% of brand owner respondents selected improving supply chain efficiency and responsiveness, the same percentage that selected designing packaging that influences purchasing (Figure 9).

### Figure 9: Efficient and Engaging Packaging are Top Brand Owner Challenges

Q. What are your company's top packaging challenges? Select up to 5



n = 102 brand owners

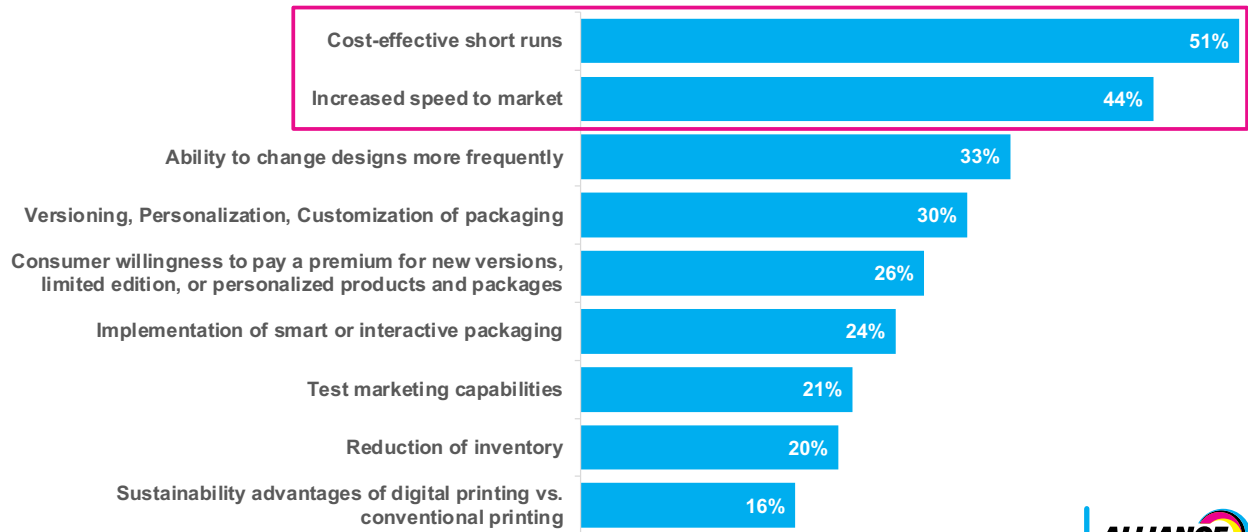


Brand owners also report that digital printing has been beneficial in easing their efficiency challenges, with 51% reporting cost-effective short run production is a top benefit of digital and 44% citing increased speed to market (Figure 10). Because digital printing does not require plates or extensive makereadies, jobs can be sent to press and produced very quickly, slashing lead times and providing brands with opportunities to get their products to market faster.

Since digital printing is best suited for shorter runs of packaging production, this allows brands to acquire a lower volume of packaging to satisfy an immediate market demand. Should that brand then require higher volumes of packaging, they can turn to their printers for a subsequent conventional run. This flexibility in being able to acquire lower volumes of packaging and have it on shelf quicker are brand owners' top reported digital printing benefits, surpassing the creative components digital printing provides, such as versioning and personalization.

## Figure 10: Digital Printing's Efficiency Advantages Top Creative Benefits

Q. What do you view as the top benefits digital printing of labels and packaging can provide to your company? Select up to three



n = 91 brand owners whose companies currently purchase labels or packaging that have been digitally printed

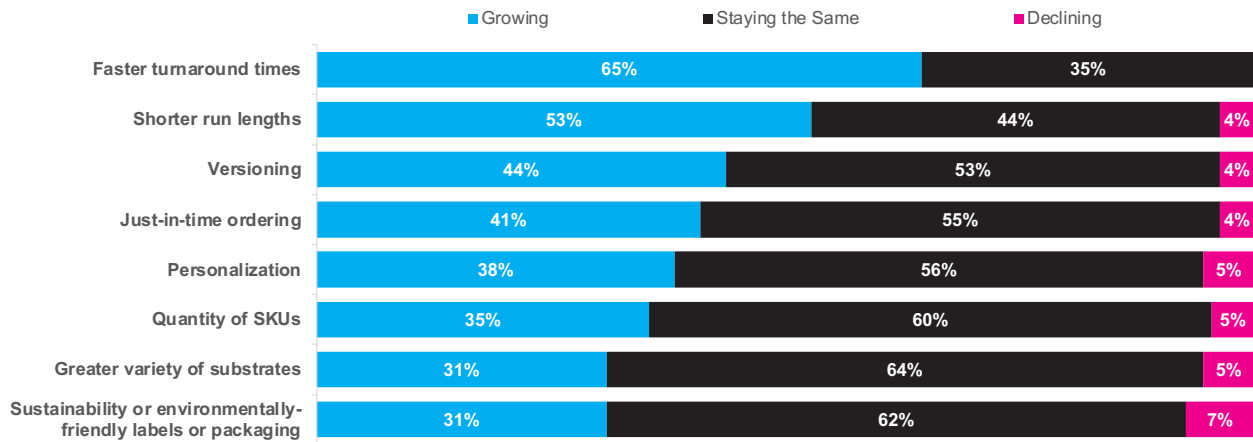


Converters also report an influx in demand for efficient production. In fact, when asked if a series of packaging demands were growing, staying the same, or declining, faster turnaround times and shorter run lengths were the two highest responses for increased demand at 65% and 53% respectively. Just-in-time ordering, another key attribute of digital printing, was also reported to be on the rise by 41% of respondents (Figure 11).

This indicates that brands are actively asking their label and package printing partners for help with these pressing challenges, and that converters must rise to the occasion. Converters also report these demands to be challenging, as 25% indicate managing customers' speed to market demands is a significant challenge and 35% report it to be a moderate challenge. With tools like digital printing and finishing equipment, printers and converters can both help their customers meet their efficiency goals while reducing the strain on their production staff.

## Figure 11: Increasing Demand for Efficient Production and Short Runs

Q. Please indicate if demand from your label and packaging customers for the following requirements is growing, staying the same, or declining.



n = 110 label and package printers

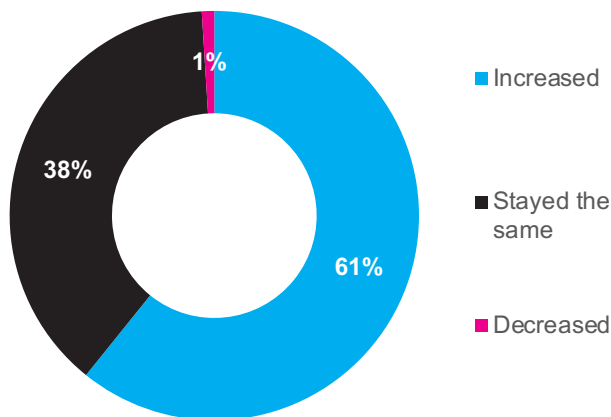


## VERSIONING AND SKU PROLIFERATION CONTINUE TO IMPACT PACKAGING

In addition to their desire to get their products to market faster, brand owners report an ongoing diversification of their product lines, resulting in an increase in packaging versions and SKUs. This trend has been prominent in the packaging segment for many years, and has led to increased production complexity, as converters end up with more individual jobs to process through their facilities. Brand owners largely report having increased their SKU quantities over the past 24 months, with 61% reporting an increase. When asked then what they anticipate for the next 24 months, 75% report an expected SKU increase (Figure 12).

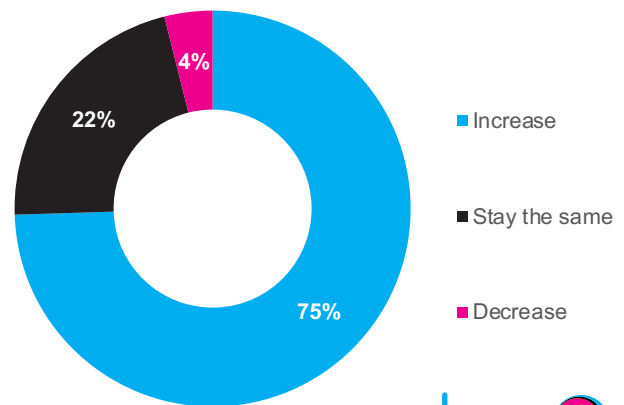
**Figure 12: SKU Proliferation Continues its Impact on Packaging**

**Q. Has your company's quantity of SKUs increased, stayed the same, or decreased over the past 24 months?**



n = 102 brand owners

**Q. How do you expect your company's quantity of SKUs to change over the next 24 months?**

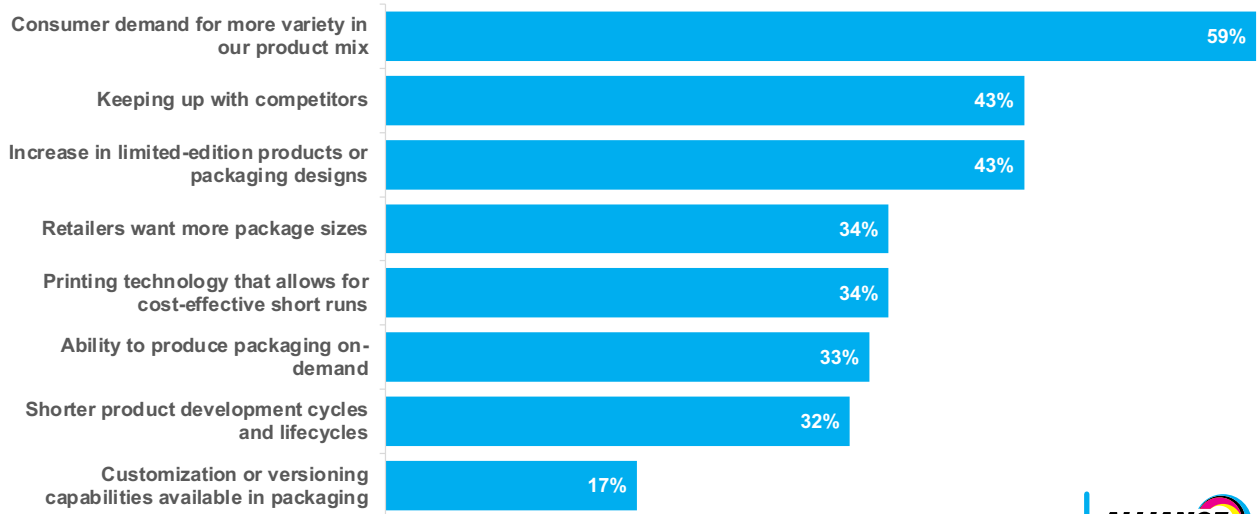


The drivers behind brand owners' expected SKU increase are telling, with nearly 60% indicating that consumer demand for more variety in their product mix is pushing them to diversify their product lines (Figure 13). This is indicative of an ongoing consumer desire for brands to offer more options, whether that be more flavors, scents, sizes, or features.

This can also extend to versioned packaging, which is another method of connecting with the consumer on a more personal level. Whether enticing a consumer in a specific region through a branding opportunity with a local sports franchise, or implementing a celebrity endorsement on a package, finding ways to create packaging versions that connect with a subset of consumers can help brands deepen these key relationships.

### Figure 13: Consumers Pushing Brands for More Product Variety

Q. What are the main drivers behind your expected increase in SKUs? Select all that apply



n = 76 brand owners who expect an increase in their company's quantity of SKUs over the next 24 months



## DIGITAL PRINT USAGE AND INVESTMENT PLANS

Label and packaging printers that have invested in digital printing equipment vary in terms of the overall volume and sales that it accounts for. This is because as digital printing has gained adoption across the packaging industry, it has proven it can fit into a wide variety of business models. This is evident in the sizable range in package printers' reported digitally printed output volume. Of note, nearly one-third (32%) report digital printing accounts for 20% of their volume or less. However, 22% indicate digital accounts for more than 90% of their output volume, with 17% reporting their output is entirely digital.

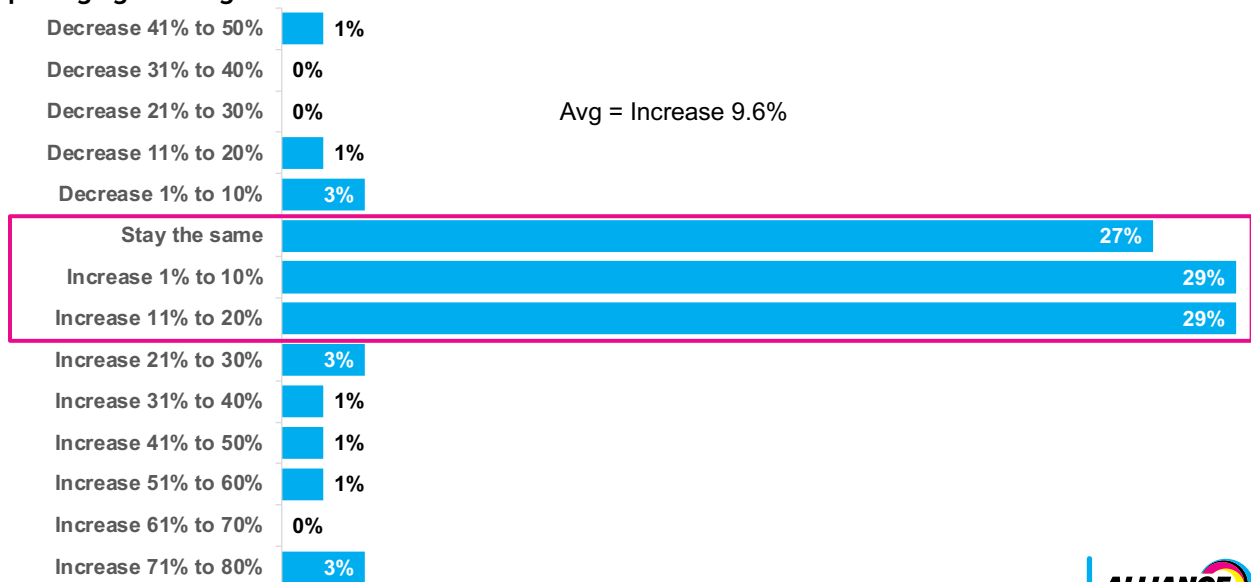
This range is evidence that package printers and converters are utilizing digital printing in a variety of ways. For example, if a label or package printer largely relies on high-volume long run work but has enough short run demand to justify purchasing a digital press to reduce the strain on the conventional equipment, it makes sense that the percentage of this printer's overall digitally printed output volume would be minimal.

Conversely, several package printing companies have fully embraced digital printing, basing their entire business model around the technology, and targeting customers and brand owners that best fit the digital advantage. These companies that digitally print all or nearly all of their labels and packaging are often ideal partners for startup brands or regional businesses that may solely want cost-effective short runs or to be able to quickly change their packaging's graphics and text.

On the sales side, package printers that have installed digital printing anticipate growth over the next 24 months. In fact, only 5% of converter respondents reported an anticipated decline in their digital printing sales. Growth projections are modest however, with more than one-quarter (27%) expecting their sales from digitally printed packaging to remain the same over the next two years, while 58% of respondents expect an increase between 1% and 20% (Figure 14). The full results lead to an average 9.6% expected sales growth, demonstrating package printers' expectation that digital printing will be an expanding part of their business.

### Figure 14: Steady Sales Growth Expected for Digitally Printed Packaging

Q. In the next 24 months, how do you expect your company's SALES from digitally printed labels or packaging to change?



n = 78 label and package printers that currently offer in-house digital printing



This upward trajectory for digitally printed labels and packaging has led to printers and converters eyeing the technology for future investments. When asked if they had plans to invest in a digital printing platform of some type in the next 24 months, 55% of respondents indicated that they did, with comparable interest across inkjet and electrophotographic technologies.

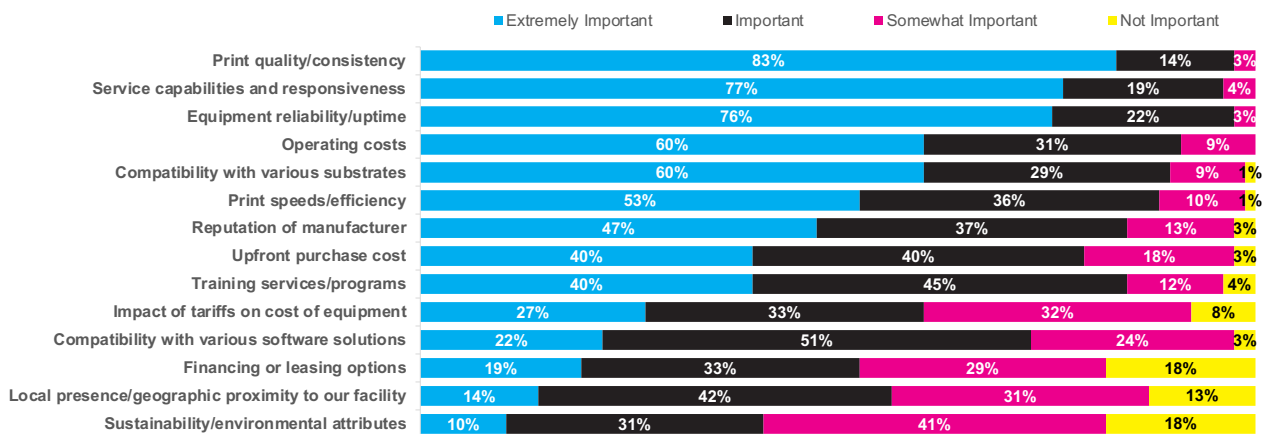
Label and package printers' top priorities for their digital printing equipment manufacturers are another key takeaway in their investment strategies. When asked to rank the importance of several equipment manufacturer attributes, costs emerged as secondary. In fact, perhaps unsurprisingly, print quality and consistency was the most important attribute respondents cited, with 83% deeming this to be extremely important.

What is more telling though, is that label and package printers are prioritizing overall equipment reliability and their vendors' service capabilities. In fact, service capabilities and responsiveness was the second highest manufacturer attribute selected, with 77% rating it as extremely important. Equipment reliability and uptime placed just behind with 76% deeming it an extremely important attribute. This finding reveals that once package printers have a digital press installed, they place immense value on ensuring it stays up and running, consistently providing the company with digital printing's distinct advantages. It is also telling that printers and converters are placing high importance on quality and speed of service, indicating that while they recognize equipment maintenance is necessary, they want it done quickly and effectively to get their digital assets back on track as soon as possible.

All these attributes outweigh cost in the digital press decision process, and it is also interesting to see that operating costs of the equipment are a more prominent consideration than the upfront purchase cost. In fact, 60% of respondents consider operating costs to be extremely important, compared to 40% that said the same of upfront purchase cost. This indicates that package printers and converters understand that the sticker price of a piece of equipment may be inevitable, but once the equipment is installed, they do not want to feel as though they are continuing to spend money just to keep the equipment running (Figure 15).

## Figure 15: Quality, Service, and Reliability Top Costs when Assessing Digital Equipment

Q. When assessing a digital printer manufacturer, please rank the importance of the following attributes:



n = 78 label and package printers that currently offer digital printing



# TOP PACKAGING TRENDS AND DIGITAL PRINTING'S ROLE

## Sustainability Pressures Intensify

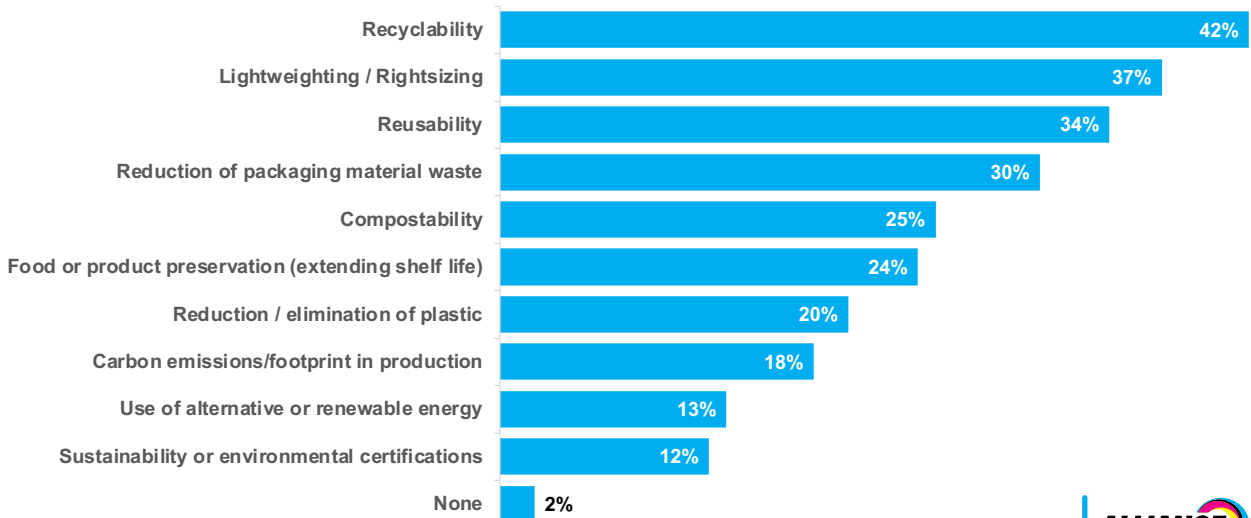
The importance of sustainability in the packaging industry is paramount and has been for many years. However, the priorities and drivers of environmental practices are changing. For example, in the 2024 Alliance Insights Digital Packaging report, recyclability was brand owners' clear No. 1 priority when it came to sustainability of labels and packaging, having been selected by 60% of brand owner respondents. In this year's report, recyclability was still brand owners' primary packaging sustainability priority, but by a much smaller margin.

This year, 42% of brand owners selected recyclability, which was followed closely by lightweighting/rightsizing (37%) and reusability (34%). Reduction of packaging material waste also jumped up the list, going from 17% in 2024 to 30% this year. The findings illustrate that all stakeholders in the packaging value chain now see sustainability as more than just recyclability. Brands are now recognizing that in addition to being able to recycle their discarded packaging, consumers appreciate packaging that makes sense for the product they are purchasing and are viewing any excess packaging as wasteful.

It is also telling to see that brand owners are increasingly viewing packaging production processes as areas where they can increase their sustainability. While the consumer does not see what happens during packaging production, the fact that nearly one-third of brand owner respondents aim to reduce wasted packaging materials reveals that they are factoring in the early stages of a package's lifecycle, as opposed to just its disposal. With digital printing's reduced makereadies, printers and converters can help ensure less substrate is wasted during printing as presses get up to color and registration.

### Figure 16: Brands' Sustainability Priorities Extend Beyond Recycling

Q. Of the following, which are your company's top sustainability attributes it considers when sourcing labels and packaging? Select up to three.



n = 102 brand owners



On the converter side, respondents report taking action to meet the growing array of sustainability needs across the industry. Regarding recyclability, respondents report:

- Using recyclable label and packaging substrates (51%)
- Using recycled content in their packaging materials (46%)
- Designing packaging for improved recycling (22%)

But much like their brand owner customers, package printers are taking their sustainability initiatives beyond recyclability of the final product. Other top sustainability initiatives include:

- Improving energy efficiency in their facilities (48%)
- Recycling of production material waste (48%)
- Reducing waste via digital production technologies (38%)

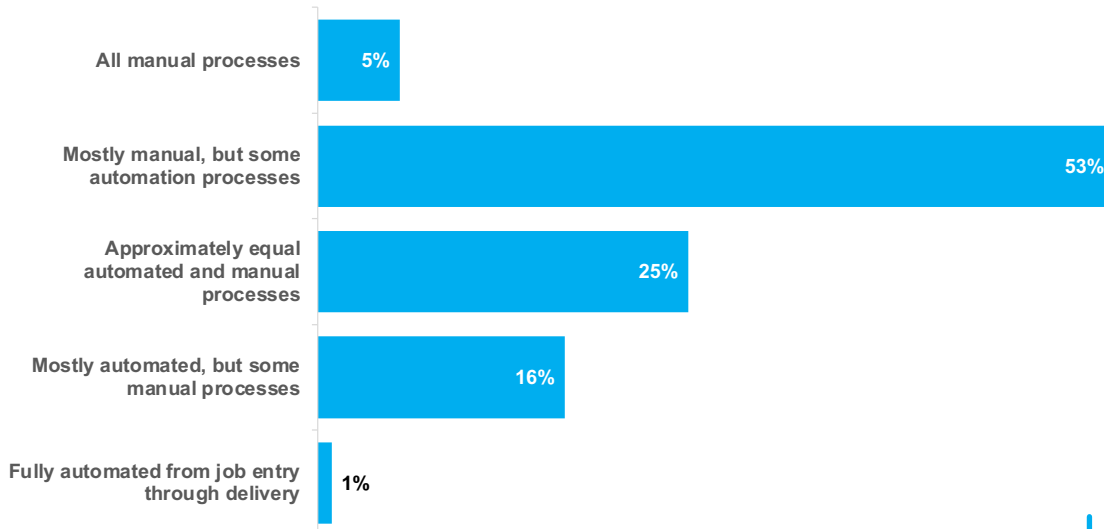
With more than one-third of converter respondents reporting that their adoption of digital technologies has allowed them to reduce production waste, it adds another potential selling point of the technology. And as brand owners continue to push for waste reduction throughout the packaging lifecycle, touting digital printing's sustainability benefits will be advantageous for label and package printers.

## The Potential of Automation and Artificial Intelligence

In addition to the digitization of their printing and production processes, package printers have also been increasingly exploring automation and artificial intelligence opportunities. Among package printer respondents, nearly all (95%) have implemented at least some level of automation, though most are in the early stages, as 53% report their production processes are mostly manual with just some automation. Meanwhile, 25% report approximately equal amounts of automated and manual processes, and 16% indicate their production is mostly automated, with some lingering manual processes (Figure 17).

**Figure 17: Package Printers Beginning their Automation Journeys**

**Q. Which of the following best describes your company's level of automation in its production processes?**



n = 110 label and package printers



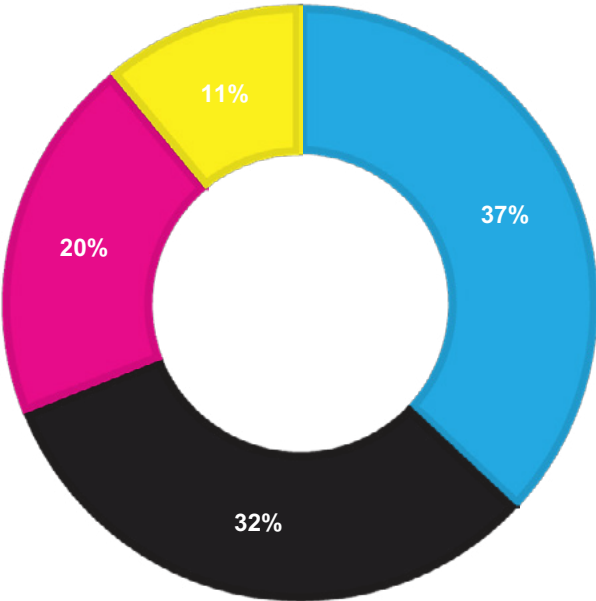
While increasing production efficiency is a key driver of automation initiatives in the industry, package printers and converters also report ongoing labor and workforce challenges, which have led to a heightened need to reduce human touchpoints in production. In fact, staffing shortages and workforce development account for two of the top three challenges respondents report, with 37% indicating shortages are a significant challenge and 27% reporting workforce development to be a top challenge (Figure 18).

### Figure 18: Labor Challenges Persist in Packaging

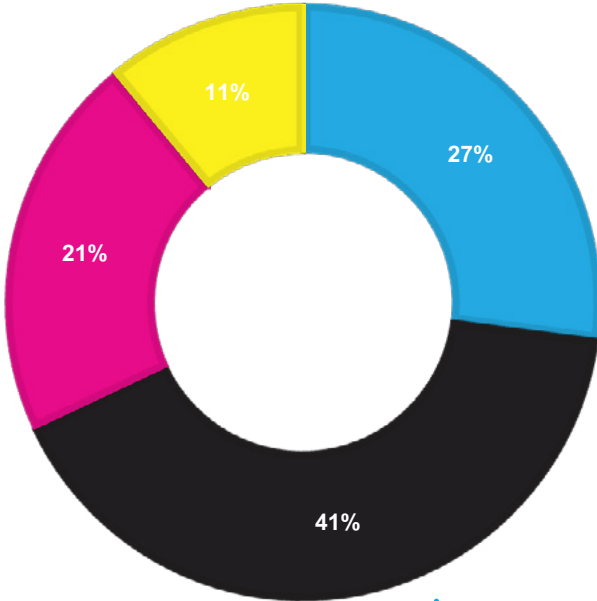
Q. Thinking about the current state of your business, please rate the following on how much of a challenge each presents.

■ Significant Challenge ■ Moderate Challenge ■ Slight Challenge ■ Not a Challenge

Staffing Shortages



Workforce development



n = 110 label and package printers

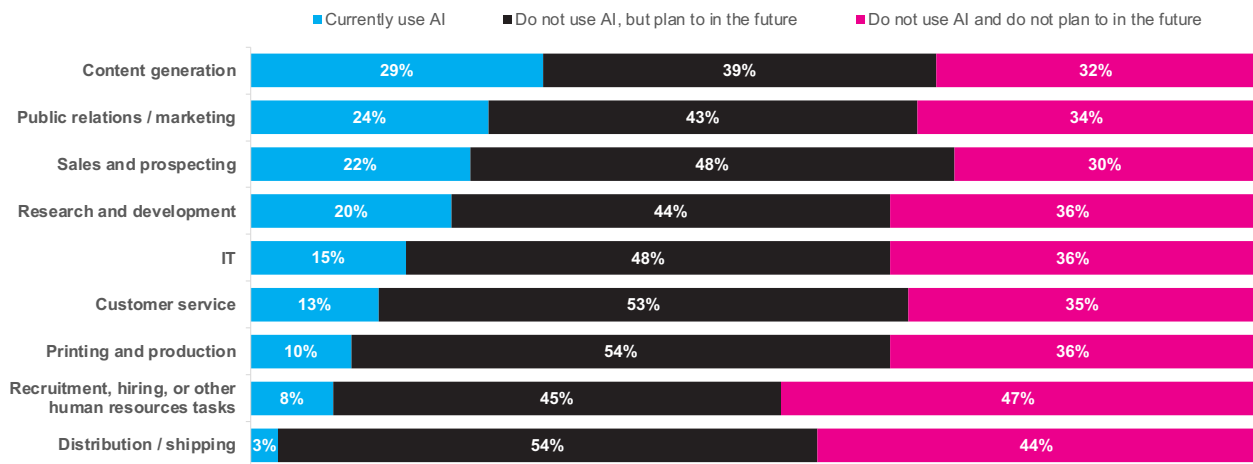


With staffing challenges prominent among printers and converters, 93% of respondents report taking at least some action to address these difficulties. The top responses were providing additional training for existing staff on new equipment (60%) and increasing pay to align with cost of living (54%), indicating that printers and converters are primarily seeking to invest in their people to contend with these challenges. However, 45% of respondents reported they have invested in machinery automation in production, indicating they are also turning to technology to support a reduced workforce.

Artificial intelligence has also quickly garnered attention and adoption in the package printing industry. While few respondents report adopting AI in printing and production (10% of respondents), several have taken on AI initiatives in content generation (29%), public relations and marketing (24%), and sales and prospecting (22%). These areas represent good starting points for AI, as it has demonstrated its strengths in copywriting and in locating potential sales prospects. The production floor appears to be the next target for printers and converters to add AI, as 54% report plans to implement the technology in printing and production (Figure 19).

## Figure 19: Package Printers Getting Started with AI

Q. Please indicate your company's usage status of artificial intelligence in the following business areas.



n = 110 label and package printers



## E-Commerce Opens Digital Print Opportunity

The shifting retail landscape has also been a key catalyst of how brand owners think about packaging and make packaging decisions. Online shopping and e-commerce have become primary methods for consumers to obtain products, as home delivery of just about anything is available at the click of a button. While the rapid growth rate e-commerce experienced has cooled since the pandemic era ([with sales penetration in the U.S. increasing from about 16% to about 35% from 2019 to 2020 per McKinsey research<sup>1</sup>](#)), it is still on the rise, and consumers have grown accustomed to supplementing their brick-and-mortar retail purchases with online transactions.

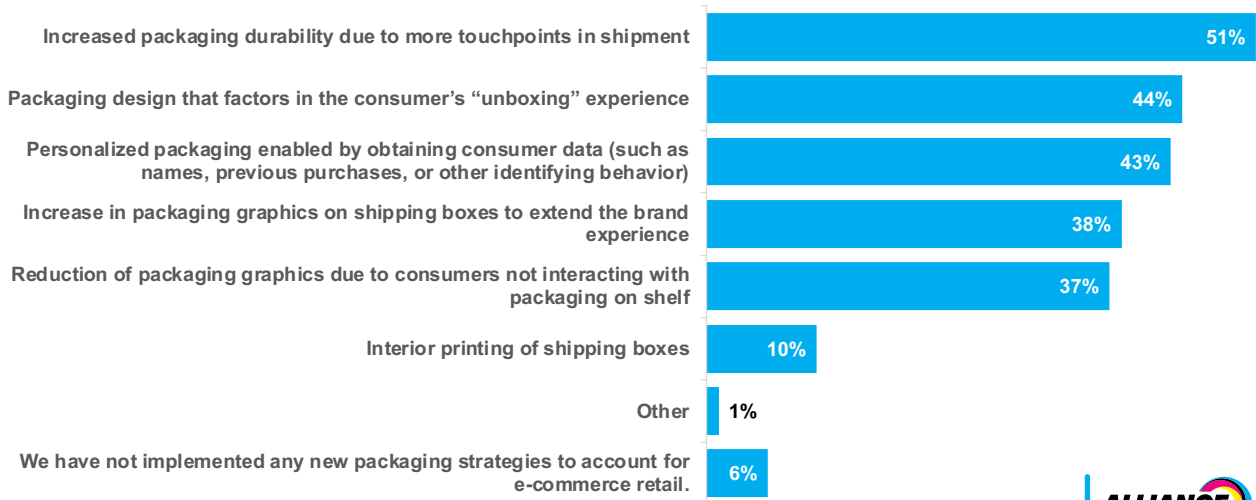
As such, brand owners have widely added e-commerce channels to their distribution strategies, with 87% of brand owner respondents reporting offering their products to consumers via e-commerce channels. Meanwhile, 7% of respondents that do not currently offer their products online indicate they plan to in the future.

With this growing retail channel comes packaging opportunities and challenges. Nearly all brand owner respondents that offer their products via e-commerce report taking on new packaging initiatives to support this platform. Specifically, brands indicate they have increased packaging durability to account for the increase in shipping touchpoints (51%), implementing packaging design elements that factor in the consumer's unboxing experience (44%), and personalizing packaging through the collection of consumer data (43%).

While increased packaging durability is a protective measure, the unboxing experience and personalization of packaging are visual components that enhance the connection between the consumer and brand. On the personalization side, this is a distinct attribute that digital printing can offer and becomes easier in e-commerce versus brick-and-mortar retail. In a physical store setting, there is no way for a brand to know who will be selecting a product on the shelf, making one-to-one personalization next to impossible. However, with e-commerce, brands and online vendors can gather the consumer's name at checkout, track various purchases they've made, and begin to develop a customer profile. With this information, true one-to-one personalization can occur, and with digital printing's ability to provide late-stage customization, personalized packaging has become a reality. This has also resulted in brands launching campaigns that empower consumers to go on their websites and customize their own packaging by entering their names or uploading a photo, among other creative initiatives.

### Figure 20: E-commerce Drives Packaging Creativity

**Q. Has your company implemented any of the following packaging strategies to account for e-commerce retail? Select all that apply**



n = 89 brand owners whose products are available to consumers via e-commerce channels



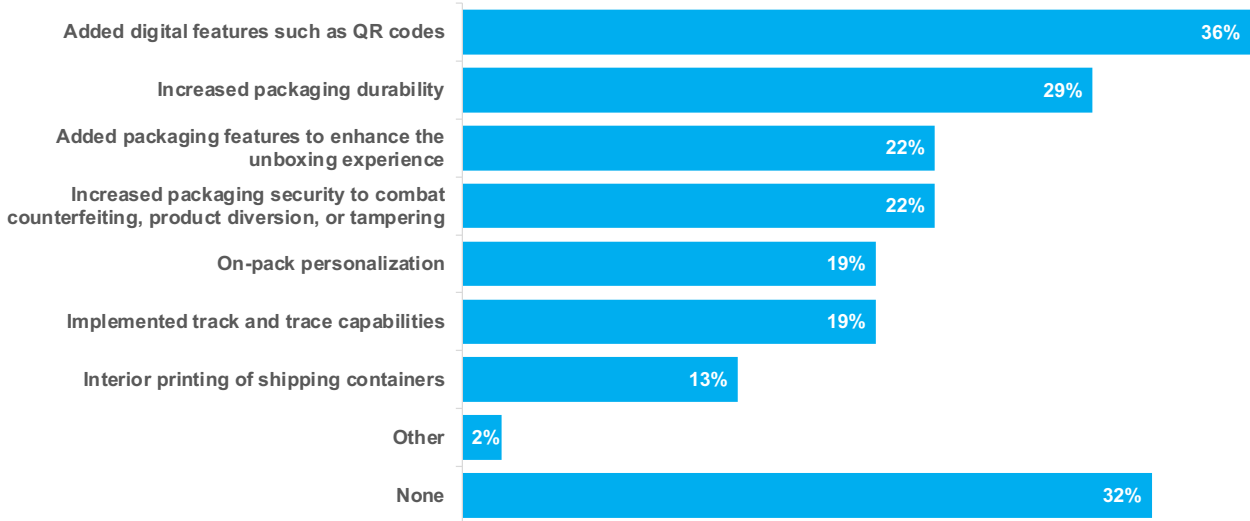
<sup>1</sup>McKinsey & Company. (2025, January 24). What is e-commerce? <https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-e-commerce>

On the converter side (Figure 21), more than two-thirds of respondents (68%) report having taken on packaging initiatives to aid their customers' e-commerce efforts. Most prominently, 36% report they have implemented digital features such as QR codes into their packaging offerings. This packaging attribute has gained steam in recent years as brand owners seek to connect their physical products to digital experiences. Especially with products ordered online, QR codes on shipping containers or on primary packaging can direct the consumer to personalized offers or provide more background on the product.

Security in e-commerce is also an important consideration. With more touchpoints along the package's journey to the consumer, it can lead to more potential for tampering, product diversion, and even counterfeiting. These potential security pitfalls can be highly problematic for brand owners and consumers, and with 22% of converter respondents having implemented security measures into packaging they've produced for e-commerce, it is evident that this is an opportunity for printers and converters to help their customers amidst a new retail landscape. Other digital printing advantages that converters are applying to e-commerce packaging are on-pack personalization (19%), which is a priority for brand owners, and track-and-trace capabilities (19%). Track and trace is a security component that provides visibility into a product's journey throughout the supply chain, which implements serialization components. With digital printing, these unique identifier codes can more easily be added to packaging, providing another layer of oversight into how the product is moving toward its final destination.

### Figure 21: Converters' E-commerce Initiatives Reflect Digital Advantage

Q. Which of the following initiatives has your company taken on to support packaging designed for e-commerce? Select all that apply.



n = 110 label and packaging printers



## CONCLUSIONS

The packaging landscape is transitioning, as speed to market, increased packaging versions, sustainability, and the digitization of retail have all altered the opportunities and possibilities for package printers and brands. Amidst efficiency pressures and increased production complexity, printers and converters are saddled with staffing shortages, making it challenging to rise to the occasion. Like any manufacturing segment going through change, having the right tools in place is essential to navigating an evolving landscape. And in the label and package printing industry, digital printing has proven its worth.

What has stayed the same since digital printing first emerged on the scene in these segments, is that it is best viewed as a complementary technology, positioned to perform certain types of work that its conventional counterparts do not perform as well in. That is taking on the short run, versioned, variable packaging that is increasing in demand, while freeing up conventional presses to thrive on the high-volume, long run work that still comprises the majority of printed label and packaging output.

With brands pressuring their label and package printers to help them get their products to market faster, printers can leverage both digital and conventional technologies to meet this need. For example, if a brand is approved to go to retail with a product, but the retailer wants to see how the product performs before committing to the brand long-term, a digitally printed run of the exact quantity needed to get these products on shelf quickly can make that a low-risk reality. Meanwhile, should the product meet or exceed its sales expectations, the brand can then turn to the converter for a longer run of packaging.

Beyond test marketing capabilities, the increase in SKUs and versioning that this research series has uncovered provides additional opportunities for digital printing. Brands continue to report consumers are pushing them to diversify their product lines, providing more variety and products that are geared toward their specific needs. With this consumer demand comes shorter run lengths, the need to change designs quickly and frequently, and increased complexity as more individual jobs are processed through printing and converting plants. Brand owners anticipate their SKUs to continue to increase in the coming years, and in addition to the push they are feeling from consumers, they also report a desire for digital printing, as they continue to learn and recognize the advantages the technology provides. In fact, more than half of brand owner respondents deem it to be essential that their package printers offer digital printing. Meanwhile, 34% indicate that printing technology allowing cost-effective short runs is driving them toward increased SKUs, along with 33% that report that the ability to produce on-demand packaging is a primary driver.

For converters, digitization of their workflows extends beyond just implementing digital printing technology. With staffing shortages and workforce development among their top challenges, label and package printers are turning toward automation and artificial intelligence to help them meet their and their customers' needs. Though converters are largely in the early stages of their automation journeys, nearly all respondents have implemented it to some degree, and nearly half report having automated production equipment as a direct result of staffing challenges. Printers are also getting started with AI, and those that have implemented the technology have largely kept it confined to content generation, public relations, and sales activities. However, as this technology continues to take hold in package printing, expect to see it incorporated in production, as 54% of respondents report they have plans to add AI to these processes in the future.

Sustainability is another key driver of brand owners' decision making. Like last year's brand owner respondents, this year's data indicates that recyclability of packaging is brand owners' top sustainability priority. However, lightweighting of packaging and reduction of packaging material waste are closing the gap, indicating that brand owners recognize that recyclability is not the only sustainability factor to consider. Digital printing can help in these initiatives, as it can reduce emissions in production, and can lead to less substrate waste due to its minimal makereadies.

If there is one attribute that label and package printing companies should strive for, it is flexibility. Consumers, brands, and retailers are constantly shifting their preferences and demands, and being able to accommodate these changes will be important to remain competitive. Printers and converters that creatively innovate with digital printing will be poised to meet these shifts and will provide lasting impact for their customers and consumers.

# WHO WE ARE



**Billerud North America** produces graphic paper, containerboard, cartonboard, label paper, and market pulp. Billerud has two operationally integrated paper and pulp mills in [Escanaba](#) and [Quinnesec](#), Michigan. We also have a paper converting facility in [Wisconsin Rapids](#), Wisconsin. Our graphic papers are used in a variety of print communication, including catalogs, brochures, and books. Our cartonboard products are used for different packaging needs, including folding cartons and food packaging and our kraftliners are used for high-quality corrugated products. Our label papers are used for pressure-sensitive labels and release liners used for the backing of laminations and hygiene products. To learn more please visit [billerud.com](http://billerud.com).



The **Flexible Packaging Association** is the voice of the U.S. manufacturers of flexible packaging and their suppliers. The association's mission is connecting, advancing, and leading the flexible packaging industry. Flexible packaging represents \$151.4 billion in direct economic impact in the U.S. and is the second largest and one of the fastest growing segments of the packaging industry. Flexible packaging is produced from paper, plastic, film, aluminum foil, or any combination of those materials, and includes bags, pouches, labels, liners, wraps, rollstock, and other flexible products. Learn more at [FlexPack.Org](http://FlexPack.Org).



Founded over 90 years ago, **TLMI**, the **Tag and Label Manufacturers Institute**, is the premier association representing the label and packaging industry. As a not-for-profit with a commitment to excellence, innovation, and sustainability, TLMI serves as the leading voice for its members fostering collaboration, promoting best practices, and driving continuous advancement. TLMI is member-driven with an active Board of Directors and numerous committees where volunteers guide the association and the industry to a more successful and impactful future.



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