Digital Packaging: The Pursuit of Prosperity

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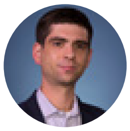

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EXECUTIVE SUMMARY

The package printing industry has rounded the corner in its digital journey, as printers and converters, along with their brand owner customers, have moved beyond the adoption phase and are now in position to strategize on how to leverage the technology to enhance their businesses. While adoption rates vary throughout the industry, the four main packaging segments of labels, folding cartons, flexible packaging, and corrugated have all seen digital printing and production technologies go mainstream, and brands are recognizing how digital can meet their evolving needs.

While digital printing has proven itself to be a powerful tool in taking label and packaging production to new heights, there are still challenges that printers and converters must consider as they implement the technology into their workflows. Namely, maintaining efficiency in production to meet increasing turnaround time pressures, keeping pace with increased versioning and SKUs, and maintaining color consistency across conventional and digital technologies are among the top challenges converters face in their operations.

However, as package printers adjust to the challenges of brand owners' evolving packaging needs, digital printing and production technologies have proven to be ideal solutions to these obstacles. For example, among converter respondents that have installed digital solutions, the top reported advantages include accommodating demand for faster turnarounds, eliminating plate and tooling production and costs, and better optimization of the entirety of their print equipment.

With these advantages in mind, converters are seeing a large swath of their overall sales stemming from digital printing. While total output volume of digitally printed packaging is still minimal compared to conventional print, the high value of digital printing has made the technology an indispensable component of converters' revenue streams. Additionally, converters with digital printing state they expect to see their sales of digitally printed labels and packaging continue to grow over the next 24 months.

For brand owners, digital printing is no longer the mystery it once was when it was first gaining adoption across the packaging industry. As reported in 2023's digital packaging study, *Digital Packaging: Opportunities to Thrive*, brand owner recognition and understanding of how digital printing and production technologies could meet their evolving needs for faster turnaround times was evident. This was encouraging to see, as an education gap existed among package printers and brand owners, as printers learned and acclimated to the technology ahead of their brand owner customers.

A year later, the latest brand owner data reveals that more than 90% of respondents currently purchase labels or packaging that have been digitally printed and that brand owners are savvy to the advantages the technology provides. Specifically, the top advantages that brand owners report from digital printing include cost-effective short runs, increased speed to market, versioning and personalization benefits, and the ability to more frequently change designs. This demonstrates that brand owners are aware of the efficiency advantages that digital provides in addition to its ability to enhance their packaging creativity.

This study, conducted by NAPCO Research, a unit of NAPCO Media and PRINTING United Alliance, takes a deep dive into the state of digital printing and production in the label and packaging industry. It is a continuation of the NAPCO Research Digital Packaging research series, which includes prior reports *Digital Packaging: The Time is Now!* and *Digital Packaging: Opportunities to Thrive*. Both package printers and brand owners were surveyed to ensure a well-rounded picture of the trends, demands, challenges, and opportunities presented by digital printing in packaging.

KEY FINDINGS

Digital Adoption Keeps Steady Pace

- Though digital printing accounts for a minority of total printed packaging output, its adoption is gaining traction across the packaging spectrum. Having been established in the label and folding carton segments, advancements in digital printing platforms are expanding the technology's presence in other segments including flexible packaging and corrugated.
- Digital print investment is a key strategy for package printers adding new applications to their offerings. Along with workflow software and finishing, digital printing is playing an important role in converters' growth strategies.
- Of the respondents seeking to invest in digital printing in the next 24 months, interest is prevalent in inkjet, electrophotographic, and hybrid platforms.

Brands Understand and Want the Digital Print Advantage

- Brand owners, who were often left unaware of digital printing's advantages when it first emerged in labels and packaging, now not only recognize the various benefits the technology can bring to their businesses, they demand it.
- Among the top attributes brands look for in a package printer are the ability to produce personalized or variable packaging, a core strength of digital printing, and that they offer production-level digital printing. This indicates that brands both understand the need for their package printers to provide digital, but also understand how it can differentiate their packaging and product lines.

Production Efficiency and Increased Versioning are Digital Printing Drivers

- While personalization and variability are important to brand owners, their top priorities center on efficiency. Brand owners report that improving supply chain efficiency and responsiveness is among their top packaging challenges.
- SKU proliferation has been an ongoing trend in packaging and is expected to continue. Nearly 80% of brand owner respondents saw an increase in their SKU quantities over the prior 24 months and the same amount expect an increase over the next 24 months.
- Consumers continue to drive SKU proliferation. More than half of brand owners expecting an increase in SKUs report that consumer demand for more variety in their product lines is behind this anticipated influx of packaging versions.

Digital Printing Brings Value to the Bottom Line

- Digital printing produces higher-value packaging output, and though it accounts for a lower overall volume than conventionally printed work, converters report a noticeable percentage of their sales stem from digital printing.
- Nearly 80% of converter respondents report more than half of their sales are produced on digital presses, and they anticipate growth over the next 24 months. In fact, two-thirds of respondents expect to see digital print sales grow, though most respondents expect their digital print sales growth to be less than 20%.

Packaging Trends Support Continued Digital Growth

- Beyond versioning and SKU proliferation, other top packaging trends, including e-commerce and sustainability, will continue to support the growth of digital printing in packaging.
- On the e-commerce side, brand owners report leveraging data collected in the online shopping process to personalize packaging to the recipient.
- As sustainability becomes increasingly important to consumers, brands, and retailers, the waste reduction capabilities enabled by digital printing will be beneficial to all stakeholders in the packaging process.

INTRODUCTION

Digital printing has advanced beyond being a novel technology in the label and packaging industries. In fact, companies across all of the packaging segments have seen the technology enter the mainstream to at least some degree. While it is still most prevalent in the label and folding carton sectors, digital is continuing to grow in both flexible packaging and corrugated and is allowing those segments to benefit from the numerous advantages that were previously solely prominent in the other segments. It is also clear that digital printing is viewed by both package printers and brand owners as far more than a tool to create personalized or variable packaging. It is, first and foremost, a crucial component of ensuring an optimized workflow that runs at peak efficiency.

Atop the list of digital's growth drivers in packaging is increased versioning of labels and packaging, along with a continued rise in SKUs, which is expected to proliferate. Both package printers and brand owners report an increase in versioning and SKUs, and state that digital printing's ability to cost effectively produce this type of packaging is among its primary advantages. However, other trends are also pushing digital printing's growth in packaging, including demand for personalized packaging, more sustainable processes, and an increased need for design flexibility.

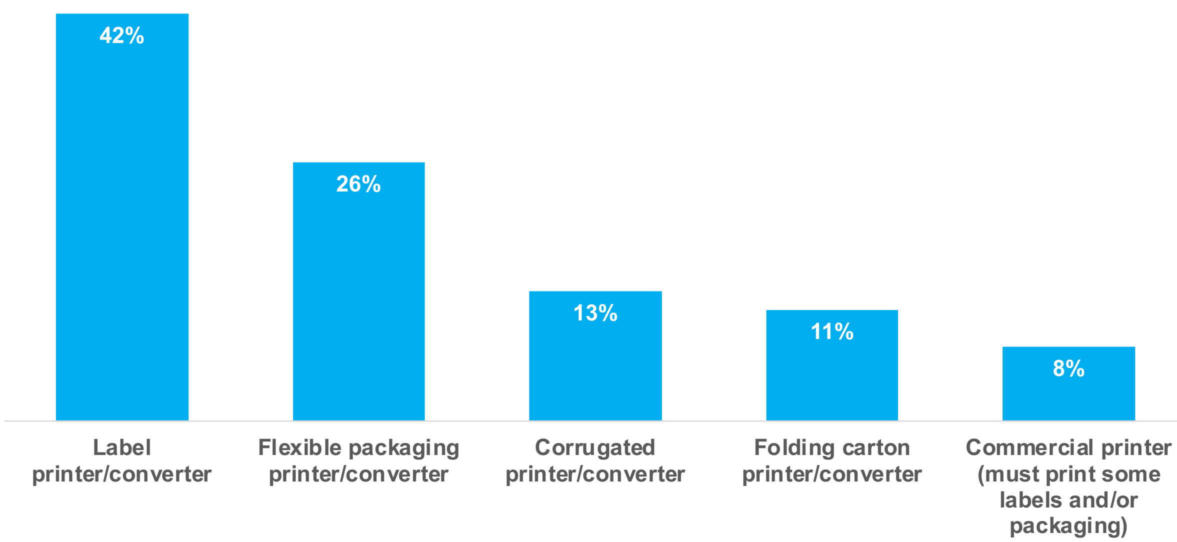
Other trends poised to impact packaging are the rise of artificial intelligence (AI) in production, which is primarily used in content generation and customer service capacities. However, printing and production processes are viewed by package printer survey respondents as the top areas in which they plan to implement AI in the future. E-commerce is also a major consideration for brand owners and presents distinct opportunities for printers and converters to leverage their digital equipment to enhance the brand and consumer relationship.

NAPCO Research conducted this study with the support of sponsors, BOBST, Fiery, Screen Americas, and TLMI to reveal the trends and market factors that have made digital printing such a key component of the label and package printing industry's future. To gather this data, NAPCO Research surveyed both package printers and converters representing all four major packaging segments, along with brand owners, thus providing a full scope perspective of how those in the industry and their customers view the role digital printing will play in their businesses going forward.

Among converters, respondents were spread across the following industry segments as represented in the following chart:

Figure 1: **Converter Respondents' Primary Segments**

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



n = 106 package printers

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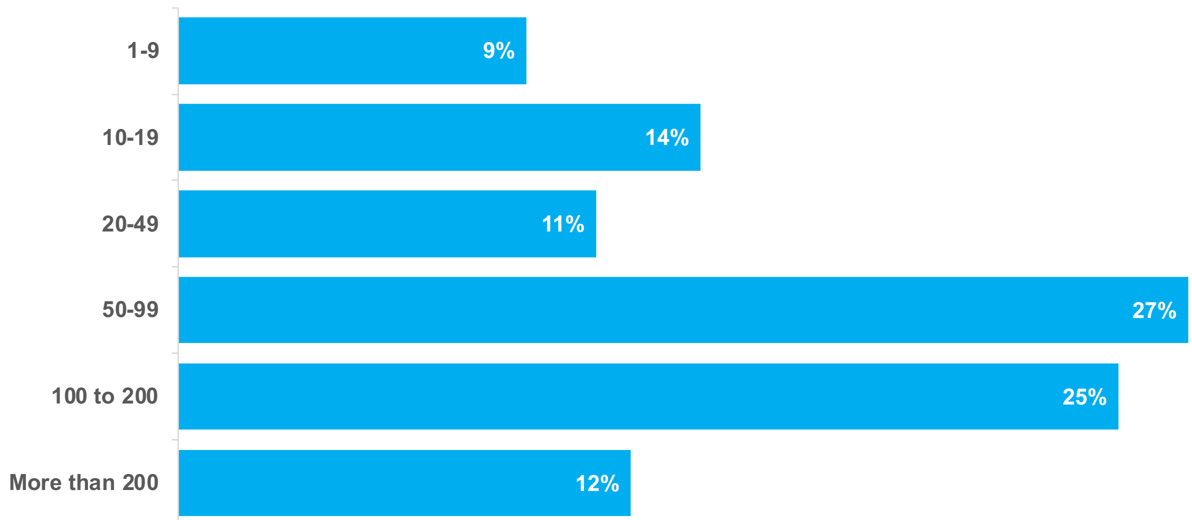
Converter respondents also represented companies of various sizes, with the majority (64%) representing companies of 50 or more employees.

Figure 2: **Employee Quantities at Converter Facilities**

Q. How many employees work at your facility?

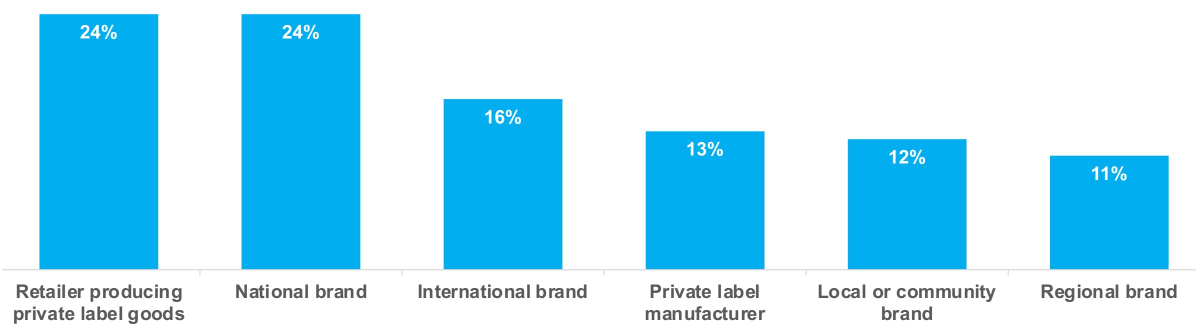


n = 106 package printers

Brand owner respondents varied in scope and size as well. In terms of scope, brands reported the following:

Figure 3: **Brand Owners Vary in Scope**

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

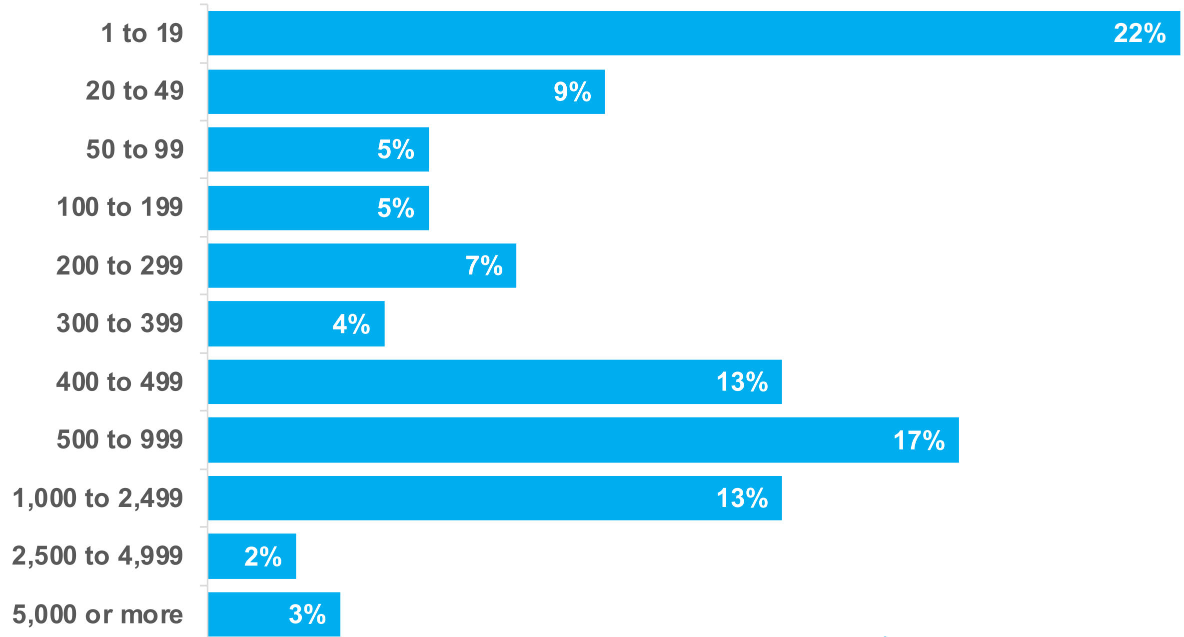


n = 131 brand owners

Brand respondents also represented companies of differing sizes, spanning from fewer than 20 employees to more than 5,000.

Figure 4: **Brand Owner Respondents Represent Varying Company Sizes**

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



n = 131 brand owners

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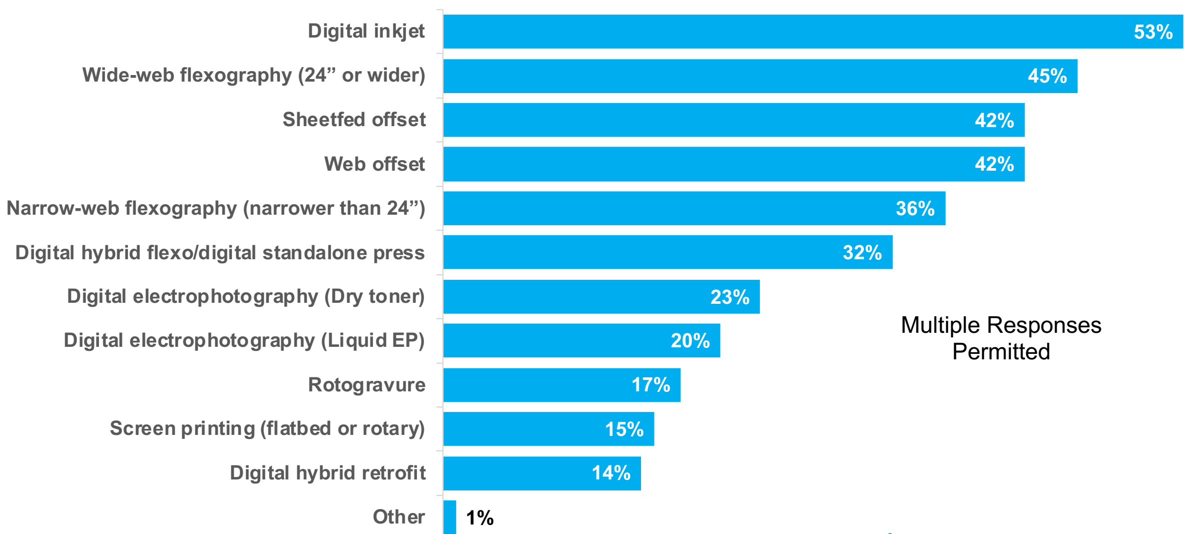
DIGITAL PRINTING EXTENDS ITS REACH

While digital printing accounts for a small percentage of overall printed label and packaging output, data demonstrates it has made its presence felt across the packaging spectrum. With more than half (53%) of respondents stating they use some form of inkjet technology in their operations, it is clear that package printers have embraced digital printing **(Figure 5)**. In addition to inkjet, electrophotographic technologies are also prevalent, with 23% of respondents reporting they utilize dry toner equipment and 20% having implemented liquid electrophotography.

Despite digital printing's prevalence in packaging, it is important to note that it has not overtaken conventional printing, both in terms of output volume and installation. For example, flexography remains the most prevalent printing technology across packaging, with 45% of respondents reporting they operate flexo presses 24" or wider, and 36% operate narrow-web flexo equipment narrower than 24". Sheetfed offset printing, the most common conventional technology used in folding carton production, is used by 42% of respondents.

Figure 5: **Package Printers Use Many Print Technologies**

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



n = 106 package printers

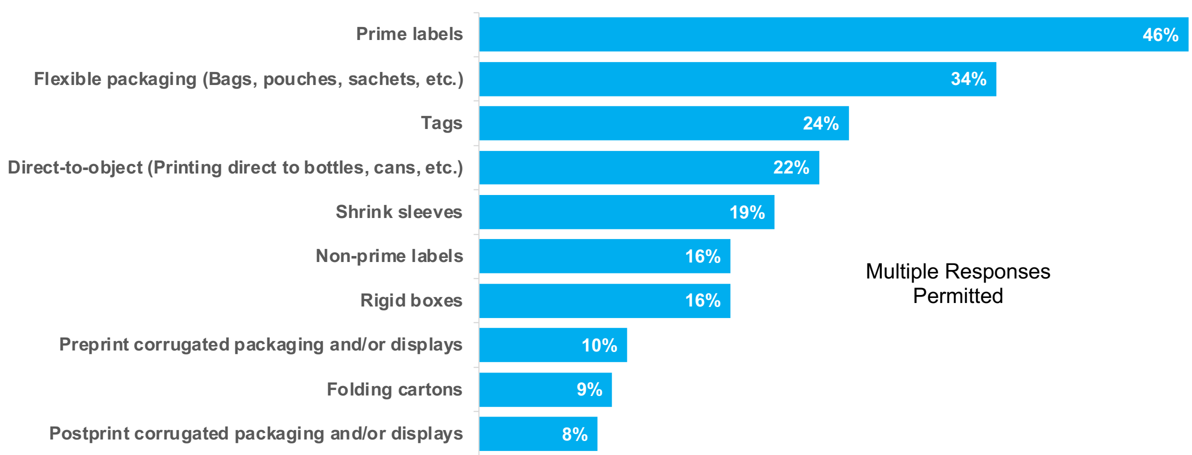
Respondents also report using digital printing across all packaging applications **(Figure 6)**. Unsurprisingly, prime labels are at the top of the list, with 46% of respondents that have digital printing indicating they use it for prime label production. The label segment was the first to see significant implementation of digital printing and it has remained at the forefront of digital adoption. Flexible packaging, which is in its early stages of digital adoption, was second behind prime labels, with 34% of respondents using digital equipment to print flexible packaging. Though digital printing of flexible packaging is newer compared to other segments, it is possible that in addition to the respondents that have invested in digital equipment designed specifically for flexible packaging, other respondents may be using existing roll-fed digital assets to produce flexible packaging on small scales.

Because label and flexible packaging printing are both roll-fed processes, there are commonalities in their production processes. While flexible packaging does often necessitate additional complex steps, such as implementing multiple layers, lamination, and closures, label printers are increasingly viewing flexible packaging as a logical growth area. It is also possible that respondents that print flexible packaging with conventional technology utilize digital marking or coding on these applications, leading to the high quantity of respondents reporting they use digital printing to produce flexible packaging.

On the paperboard packaging side, digital has not been adopted to the same degree as the label segment, but it is undoubtedly making its mark on these applications. Of the respondent base that reported using digital printing for labels and packaging, 16% reported using digital for rigid boxes and 9% reported using it for folding cartons. In corrugated, another segment that is in its early stages of digital adoption, 10% of respondents state they are using digital printing in preprint corrugated, while 8% have implemented it for postprint corrugated. As more digital solutions come online for the corrugated segment, and ongoing trends in e-commerce change the way consumers interact with retailers and brands, growth opportunities in digital corrugated production will likely drive continued adoption of the technology.

Figure 6: **Digital Print's Prevalence Across Packaging Applications**

Q. Which of the following applications do you print with digital equipment?



n = 104 package printers that currently offer digital printing of labels and/or packaging

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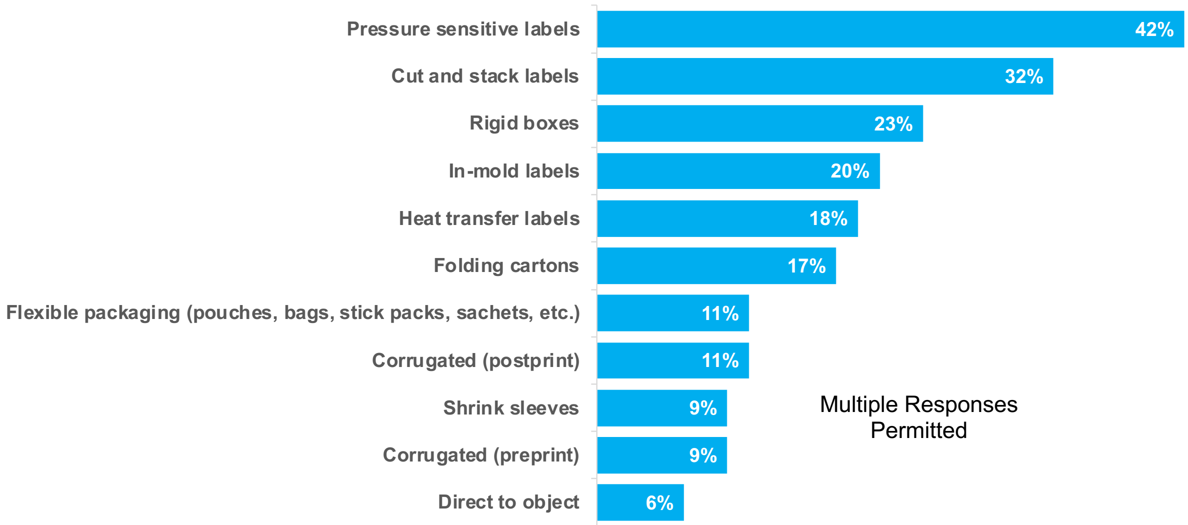
Converters' planned investments in digital printing also reveal the growth of the technology across the packaging segments **(Figure 7)**. For example, 61% of respondents indicated they plan to invest in some form of digital printing in the next 24 months to print labels and/or packaging. Among those respondents, label printing was the most desired objective for the investment, with 42% aiming to add digital pressure sensitive label production and 32% seeking to grow their digital cut-and-stack label production. Nearly one quarter (23%) cited their plan to use digital for rigid boxes, while 17% cited folding cartons, an indication that advancements in sheetfed digital production are driving printers to explore opportunities in these segments. Meanwhile, 11% of respondents investing in digital package printing plan to use it for flexible packaging, an indication of the burgeoning, yet steady, rise of the technology in that segment. Similarly, 11% are investing for the purpose of printing postprint corrugated, while 9% plan to use their new digital investment for preprint corrugated.

Figure 7: **Converters' Digital Investments Span Packaging Segments**

Q. What packaging applications do you expect to print using this new digital equipment?



n = 65 package printers whose companies are planning to invest in at least one digital printing technology in the next 24 months to print labels and/or packaging

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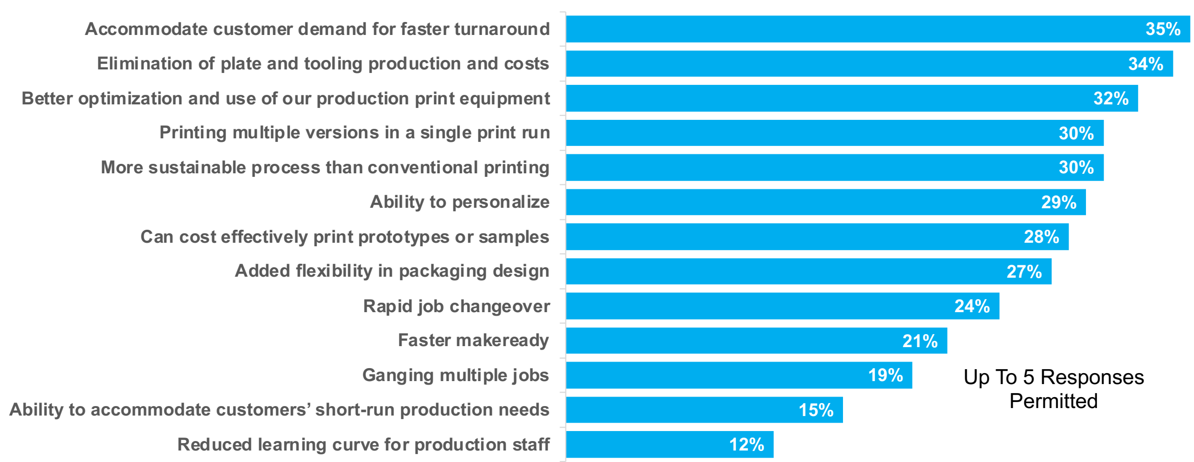
HOW CONVERTERS VIEW DIGITAL PRINT'S BENEFITS

With package printers and converters expressing a desire to invest in digital printing for a multitude of packaging applications, it makes sense that converter respondents that have already made a digital print investment are realizing several benefits from the technology. The survey asked converters to select up to five of the top benefits that digital printing provides for their businesses, and results were nearly evenly distributed across efficiency benefits, cost savings, versioning, and sustainability **(Figure 8)**.

At the top of the list, converters indicated that digital's ability to accommodate customer demand for faster turnaround is a key benefit (35% of respondents). Fast turnarounds was just slightly ahead of the cost savings provided by the elimination of plates and tooling in production (34%). Internal efficiency also emerged as a key benefit, with 32% citing better optimization and use of all of the company's production print equipment. Meanwhile, 30% of respondents indicated that digital's key creative benefit of printing multiple versions in a single print run is a top advantage, and 30% cited the sustainability advantages digital printing offers over conventional processes.

Figure 8: **Converters Cite Several Advantages of Digital Printing**

Q. What are the most important benefits digital printing provides to your business?



n = 104 package printers that currently offer digital printing of labels and/or packaging

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DIGITAL PRINT INTEGRATION CHALLENGES LINGER

While package printers cite several highly beneficial advantages of digital printing in their workflows, all of which contribute to the ongoing adoption of the technology, challenges in implementing digital processes persist **(Figure 9)**. Like any new technology being added to a package printing workflow, it is important for printers and converters to understand where challenges may lie and use that information in making their investment and integration decisions.

Matching colors between various press technologies was at the top of the list of obstacles converters cited when asked to indicate the top challenges faced when transitioning conventionally printed work to digital. This result is strikingly similar to 2023's digital packaging research study, as 47% of converter respondents cited it as a top challenge a year ago, compared to 51% this year. In both surveys, these color consistency challenges were the No. 1 difficulty reported by package printers making the conventional to digital transition.

This is a concerning survey finding considering the importance of color for brand owners. Brands rely on their colors as a core component of their identities and if consumers see a noticeable color disparity among a brand's packaging on shelf, that can lead to quality concerns and could ultimately negate the purchase of that product. For converters seeking to optimize their workflows and provide digital's advantages to their customers, maintaining color consistency across all of their printing equipment is essential. In a situation, for example, in which a package printer is producing a long run of a brand's core product on a flexographic press, and a limited-edition version on a digital press, there will likely be a need for identical brand colors. Despite the packages being produced for different products, any noticeable color differentiation will be damaging to the brand's identity.

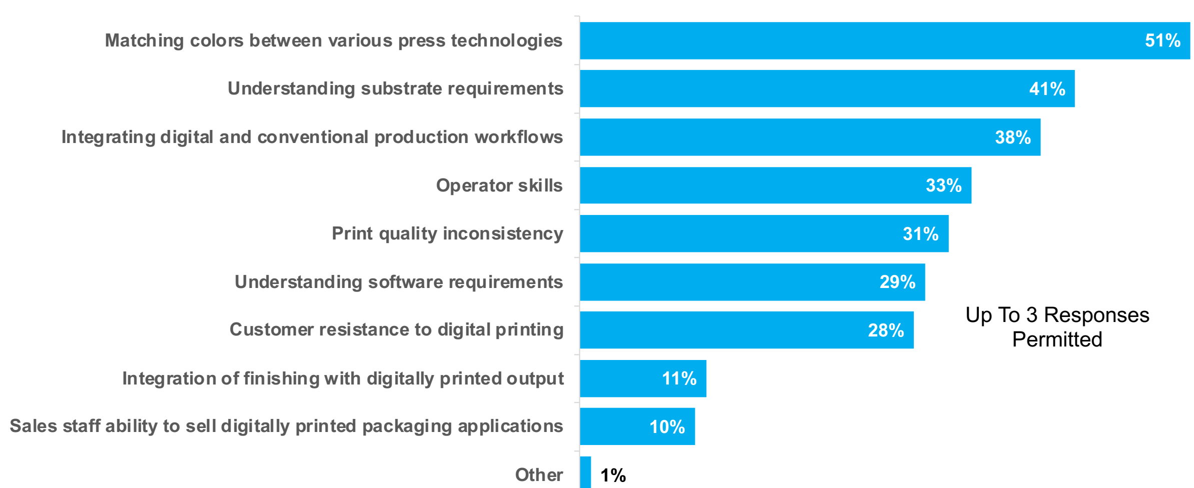
Other top challenges converters face when transitioning conventionally printed work to digital include:

- Understanding substrate requirements: 41%
- Integrating digital and conventional production workflows: 38%
- Operator skills: 33%

Integration of digital printing into a conventional production environment requires careful thought and consideration. In addition to file management and prepress steps being different, package printers will need to assess their finishing and converting processes to ensure that both their conventionally and digitally printed output maintains its efficiency throughout its end-to-end process.

Figure 9: **Challenges Persist in the Conventional to Digital Transition**

Q. What are the top obstacles, if any, your organization experienced in transitioning label and packaging work from conventional presses to digital printing devices?



n = 104 package printers that currently offer digital printing of labels and/or packaging

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BRAND OWNER DEMANDS AND TRENDS ALIGN WITH THE DIGITAL ADVANTAGE

For package printers to thrive and maximize their revenue and growth opportunities, it is essential they stay cognizant of their customers' challenges and goals. When assessing the top challenges brand owners reported in this year's survey, it is evident that they will need to lean on digital printing and production solutions to overcome these obstacles.

The top three challenges brand owners report **(Figure 10)** are designing packaging that influences purchasing (39%), improving supply chain efficiency and responsiveness (38%), and meeting sustainability and environmental goals and objectives (37%). When assessing the top challenge of designing packaging that influences purchasing, brand owners can leverage the unique advantages of digital, such as versioning, customization, and variability, to differentiate their products on shelves and attract consumers' attention. In an age where print quality is strong across all technologies, utilizing digital printing to enhance design flexibility, implement new packaging versions, and even target consumers across different geographies and demographics can help a brand stand out against its competition.

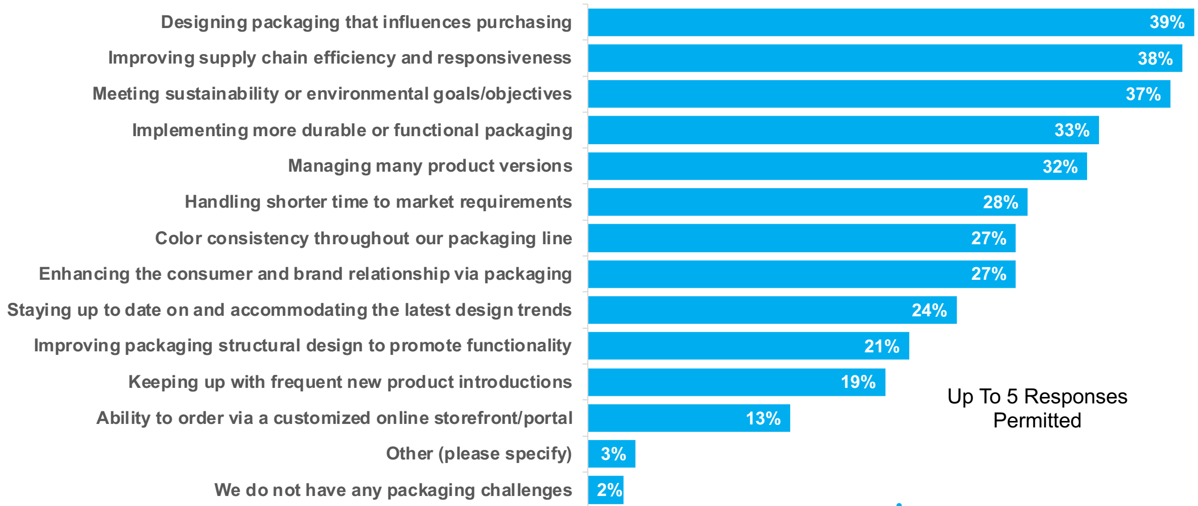
Meanwhile, in terms of addressing supply chain efficiency and responsiveness, the quick turnaround times that digital provides can help brand owners be more agile in getting their products into the market and filling demand. It is important to consider run lengths when assessing the efficiency of digital and conventional technologies, however. While digital printing eliminates lengthy makereadies and getting a press up to color, these advantages often do not extend to longer runs. Because conventional equipment offers faster run speeds, longer jobs with static text and imagery are often more efficient and cost-effective to produce on analog platforms.

Sustainability has become an increasingly important consideration for brand owners, with 37% of respondents ranking it as a top five challenge in 2024, compared to 33% in 2023. Digital printing does provide some sustainability advantages that package printers and converters can tout in their production processes, namely the reduced material waste that results from the minimal makereadies the equipment requires.

Similar to a year ago, 32% of respondents also state that managing many product versions is a top challenge, and as this study reveals, versioning is going to continue to be a major trend among brand owners. The fast changeovers that digital provides and its cost-effective short run production opens the door to brand owners expanding their label and package versions more seamlessly compared to conventional printing.

Figure 10: **Brand Owner Challenges Correlate to the Digital Print Advantage**

Q. What are your company's top packaging challenges?



n = 131 brand owners

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SKU PROLIFERATION AND VERSIONING: TOP PRIORITIES

An increase in packaging SKUs and versions has been an ongoing trend in the packaging industry and should come as no surprise that it is expected to continue. But what package printers should be aware of as they assess their customers' needs, is just how important versioning has become to brand owners.

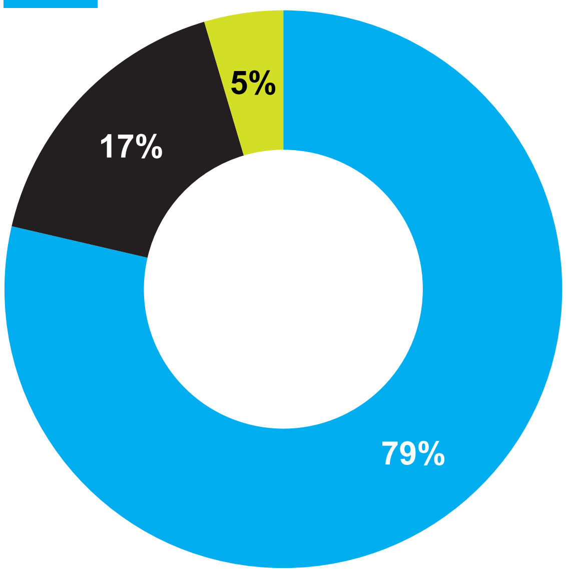
When asked to rank the level of importance of a variety of package printer attributes, brand owners placed the ability to produce personalized or variable packaging at the top of the list. Nearly all respondents (98%) reported that this capability is at least somewhat important, with nearly half (46%) stating it is essential. The need for variable packaging is demonstrated even further when assessing brand owners' recent versioning statistics.

Comparing this year's survey to a similar question asked in 2023 reveals that SKUs are increasing **(Figure 11)**. When asked to indicate how their number of SKUs had changed over the past 24 months, 79% of respondents cited an increase, compared to 41% in 2023.

Figure 11: **Brands Report Increasing SKU Quantities**

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

2024



Increased
Stayed the same
Decreased

n = 131 brand owners

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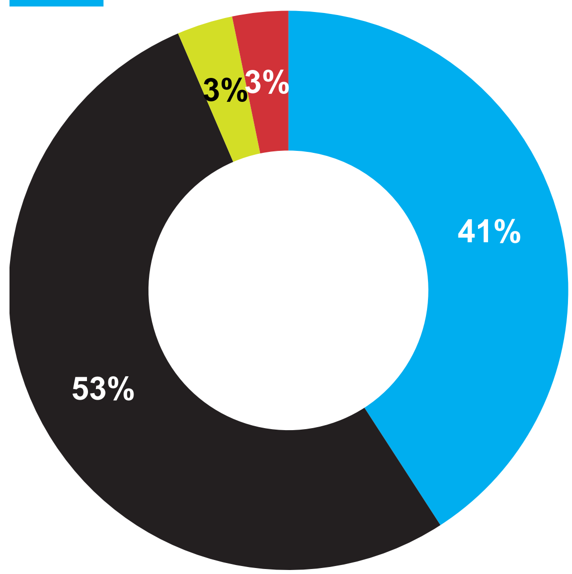
Q. Which of the following best describes the quantity of your packaging stock-keeping units (SKUs) over the past 24 months?

2023



Increased
Stayed the same
Decreased
I don't know

n=93 brand owners

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SKUS EXPECTED TO INCREASE FURTHER

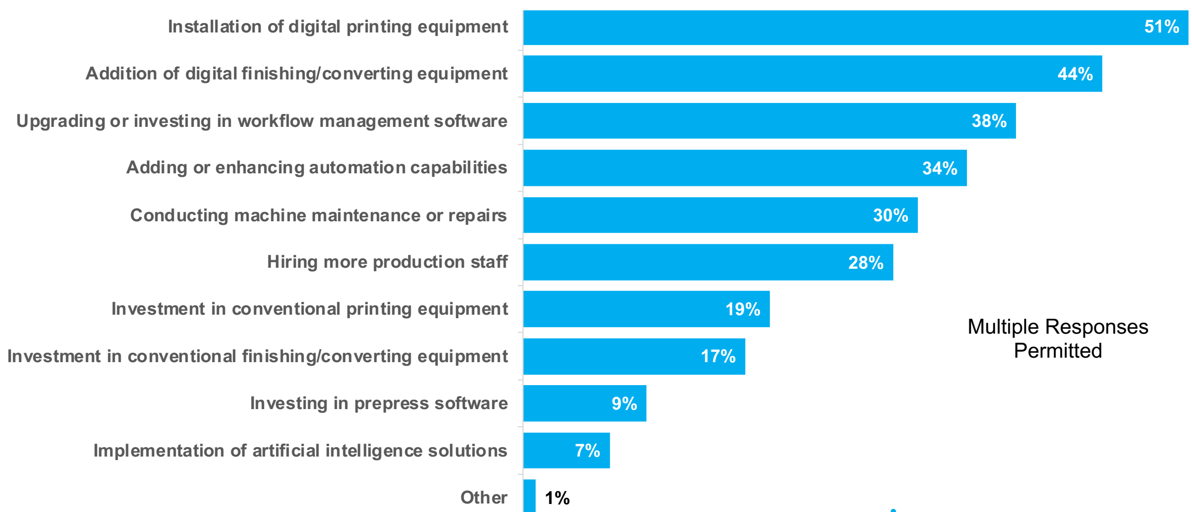
Looking ahead, when asked in this year's survey how they expect to see their SKU quantities evolve over the next 24 months, a similar trend line appears. Again, 79% of respondents state they anticipate a SKU increase in the next two years, indicating a desire to expand their product lines further, and an understanding that the technology exists to make that happen.

For converters, keeping up with increased versions and SKUs was among the top production efficiency challenges their businesses face, with 41% of respondents placing it among their top three, second only to changeover times between jobs (48%). With the expected increase in SKUs reported by brand owners, converters that are finding it challenging to keep up will need to make the necessary investments to rise to the occasion for their customers. Among those that have made a strategic move to improve their production efficiency, investment in digital printing is the clear first step.

In fact, when asked to identify the actions taken to enhance their organization's production efficiency **(Figure 12)**, more than half (51%) of converter respondents cited installation of digital printing equipment. Encouragingly, converters recognize the importance of finishing and converting in the efficiency equation, as 44% of respondents indicated they have invested in digital finishing/converting equipment to improve their efficiency. Since the introduction of digital printing in packaging, converters have had to assess their finishing processes to ensure they maintain the advantages of digital printing throughout the entirety of their production process.

Figure 12: **Digital Technologies Aid in Converters' Efficiency Improvements**

Q. Which of the following actions have you taken to enhance your organization's production efficiency?



n = 106 package printers

While digital printing provides efficient production of shorter runs with fast changeovers, converters that attempt to use conventional finishing equipment on digitally printed output are liable to run into bottlenecks as, much like conventional printing, conventional finishing is best utilized for long run jobs that do not need rapid changeovers. Converters seeking to gain efficiency advantages from investment in digital equipment should assess their end-to-end process and understand how their printing and finishing investments will be best used in tandem.

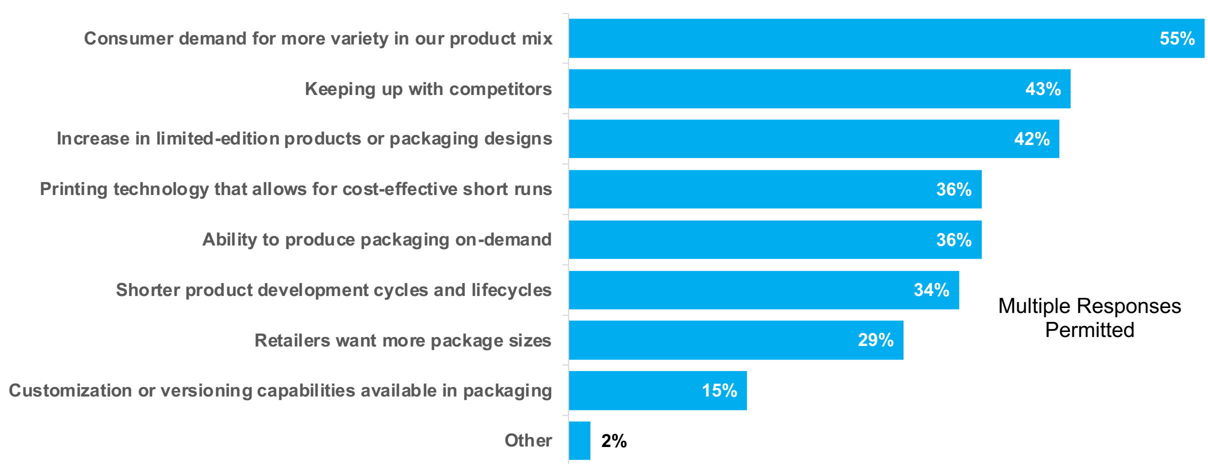
CONSUMER AND TECHNOLOGY TRENDS PUSH SKU PROLIFERATION

Brand owner education on the ability of digital printing to serve this growing need is revealed in that when asked what is driving their anticipated expansion of SKUs **(Figure 13)**, 36% of respondents each indicated that printing technology that allows for cost-effective short runs was a top driver, along with the ability to produce packaging on demand. With just over one-third of respondents citing these technological advancements as tools they can leverage to expand their product lines, it is evident that a growing swath of brand owners recognize digital printing's ability to produce efficient and cost-effective short runs. This provides brands with the latitude to expand their product lines and receive orders quickly when a new version or SKU is created.

At the top of the drivers of SKU proliferation, however, is a reported desire among consumers for more variety in the products they purchase, cited by 55% of brand owner respondents. While this number is noticeably down from the 2023 survey, in which 75% of brand owner respondents expecting an increase in SKUs reported it was due to consumer demand for increased variety, it is evident that consumers have developed an expectation for more options in the products they buy.

Figure 13: **Drivers of Ongoing SKU Proliferation**

Q. What are the main drivers behind your expected increase in SKUs?



n = 104 brand owners who expect the quantity of their packaging stock-keeping units (SKUs) to increase in the next two years.

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In addition to consumers seeking out these new product variations, whether through new flavors, holiday-centric limited editions, or regional releases, brands are also embracing various levels of personalization in their packaging. For example, while not a one-to-one personalization, 42% of brand owner respondents report their expected increase in SKUs stems from a rise of limited-edition products or packaging designs. As brands seek new ways to connect with consumers, changing their standard product line and packaging to coincide with certain times of the year, whether for holidays, sporting events, or even simply the changing of the seasons, can give consumers something to look forward to and signify that the brand is in tune with the events that matter to their customers.

DIGITAL PACKAGING: A HIGH-VALUE PRODUCT OFFERING

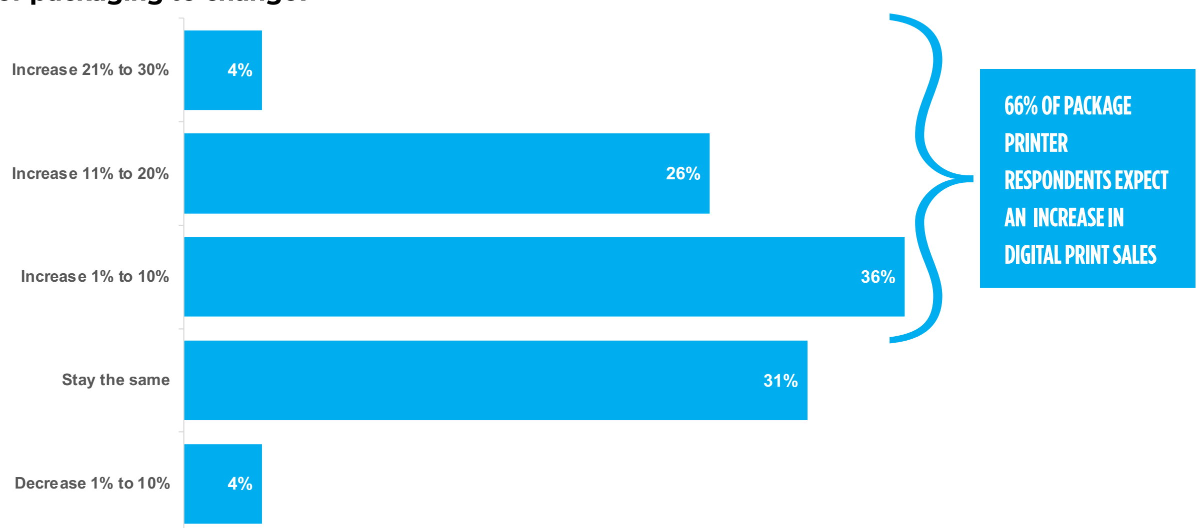
With digital printing's ability to satisfy so many key brand owner demands and challenges, it has become indispensable to many printers' and converters' sales figures. In fact, among the converter survey respondents that currently offer digital package printing, digital accounts for an average of 63% of their sales. While this number is indicative of the substantial value that digital printing provides to label and package printers, it should be noted that it is representative of a small sample from the overall packaging industry, in which digitally printed packaging makes up a small percentage of total printed output.

Still, the sales figures provided from this survey's respondents demonstrate how lucrative of a product offering digitally printed packaging can be. Survey respondents also report that they expect their sales volume of digitally printed packaging to increase over the next 24 months **(Figure 14)**. In fact, 66% of respondents stated they anticipate their sales of digital packaging to increase in that time frame, with just 4% anticipating a decrease of less than 10%.

Among respondents expecting an increase, the anticipated boost is modest, at approximately 10% on average. Despite this modest expected increase, converters should not be discouraged by the prospects for digitally printed packaging. With just 4% of respondents anticipating a decrease in their printed label and packaging sales over the next two years, package printers can feel confident their digital print offerings will at least provide a steady, consistent form of revenue.

Figure 14: **Package Printers Expect a Modest Increase in Digital Print Sales**

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



n = 104 package printer respondents that currently offer digital printing of labels and/or packaging

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BRAND’S RECOGNIZE DIGITAL PRINT’S ADVANTAGES

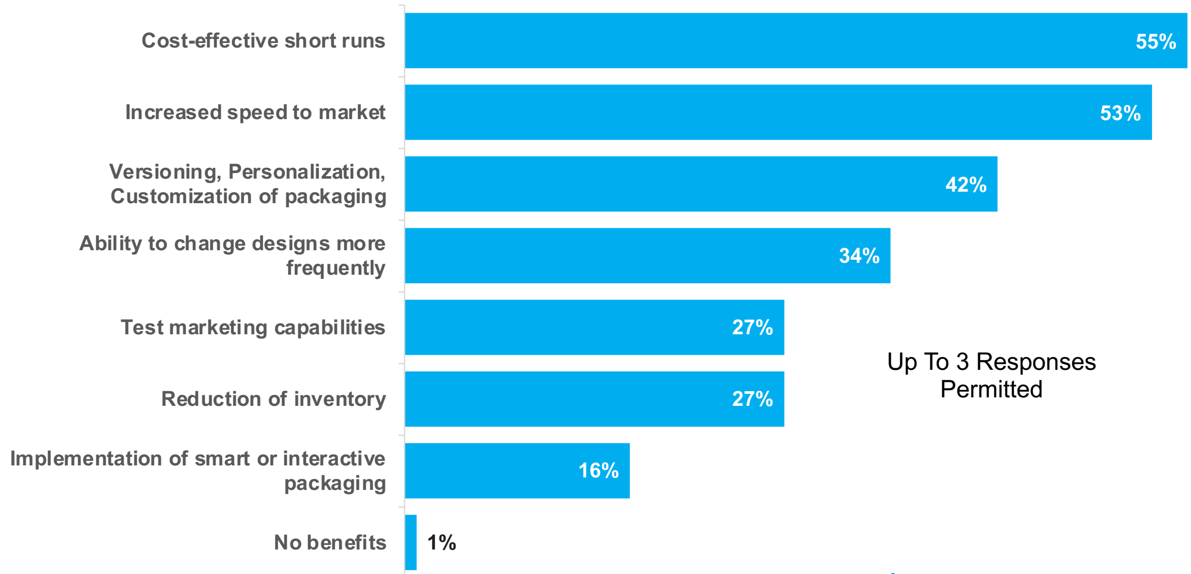
Brand owner perspectives on digital printing also make clear that they view the technology as an integral part of their printed labels and packaging going forward. With 91% of brand owner respondents stating that at least some of their printed labels and packaging are digitally printed, the ubiquity of the technology is further underscored. Additionally, brand owners express that when they are seeking out a label or package printer, production-level digital printing is imperative. Specifically, 39% of brand owners report that it is essential for their package printers to offer production-level digital printing, and nearly half (49%) describe it as very important.

With this inherent desire to have digitally printed packaging available when needed, converters should view the technology as key to their sales strategies. Brands recognize the key advantages the technology provides, and view it as a way to solve their top challenges **(Figure 15)**. For example, among brand owner respondents that purchase digitally printed labels or packaging, 55% report cost-effective short run production is a top advantage, and 53% indicate increased speed to market is a top benefit of digital. When comparing these top reported digital advantages to brand owners’ top packaging challenges (Figure 10), a clear throughline emerges. In particular, improving supply chain efficiency and responsiveness is the No. 2 packaging challenge among brands (38% of respondents), while more than one-quarter (28%) state that shorter time to market requirements is a top challenge.

The design flexibility offered by digital also makes it a premium service for brand owners, with 42% citing versioning, personalization, and customization of packaging as a top digital advantage, and 34% highlighting the ability to change their packaging designs more frequently. With the top packaging challenge of designing packaging that influences purchasing (39%), and 32% of brands indicating managing product versions is a top challenge, the distinct creative benefits of digital make it an even more valuable solution to brand owner challenges. This alignment of digital printing’s advantages and brands’ top packaging difficulties will ensure that digital printing of labels and packaging remains an essential component of brand owners’ strategies and spending.

Figure 15: **Brand Owners' Perceived Benefits of Digital Printing**

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



n = 119 brand owners that have their labels and/or packaging digitally printed

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PACKAGING TRENDS DRIVING DIGITAL'S GROWTH

Internal factors, such as the desire to add more packaging versions and operate more efficiently, are at the forefront of digital printing's rise in packaging. But external pressures and evolutions in retail and consumer behavior also loom large in digital printing's future in the industry. Among the top trends pushing packaging in new directions are the prominence of e-commerce across many market segments, and increasing sustainability pressures stemming from prospective legislation, retailer mandates, and consumer backlash against packaging. The rise of artificial intelligence is also a trend package printers should have an eye on, as it emerges as an essential tool in improving efficiency and enhancing production processes.

E-commerce

As e-commerce use has become increasingly prevalent among consumers, it has also become an indispensable strategy for brand owners, many of whom now sell their products via online platforms, whether their own, a third party's platform, or both.

Among brand owners surveyed, 88% report they currently offer their products via e-commerce channels, and among the 12% that do not, 7% indicate that they plan to in the future. With this shift from brick-and-mortar retail to online shopping, brand owners have taken on new packaging strategies to enhance the consumer's experience, which package printers should monitor and ensure they can assist with using their technology offerings **(Figure 16)**.

Personalization is a key opportunity in e-commerce because it allows the brand to connect to the consumer on a one-to-one level that was typically not feasible in traditional brick-and-mortar retail. While brands can target certain consumer demographics with in-store shopping, there were rare opportunities to actually connect to individual consumers, as there was no way to know exactly who would be selecting a product off of a shelf. Now, with e-commerce, brands not only have the ability to collect the consumer's name and geographic location, but they can also track their buying trends over time and personalize their packaging in multiple ways, including customized images and text on corrugated shipping boxes and on the primary labels and packaging of the product inside.

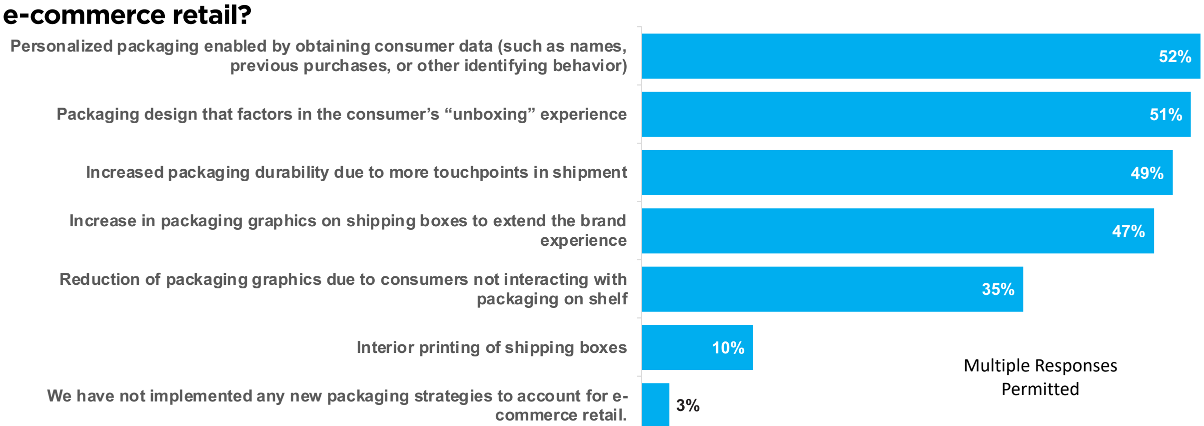
Brands have caught onto these opportunities as 52% of respondents that offer their products via e-commerce report they have personalized packaging by obtaining consumer data such as names, previous purchases, or other identifying behavior. This is an important statistic for package printers seeking new ways to leverage the power of their digital printing assets. Personalization on a true one-to-one level is only feasible with a digital printing workflow – one that incorporates combining consumer data with digital printing to produce personalized packaging.

These personalization opportunities extend beyond just the personalization of corrugated shipping boxes as well, though that is an exciting opportunity for those in the corrugated segment. For example, digital printing has allowed brands such as Milk-Bone to personalize folding cartons for consumers, who through an online portal, can upload a photo of their dog with its name, and then receive a personalized package of the dog treats delivered to their front door.

51% of brand respondents also report they have implemented e-commerce packaging strategies that factor in the consumer's unboxing experience. This has become a key component of e-commerce, as the goal for packaging shifts from enticing a consumer to interact with a product on shelf to extending the brand experience when they receive the package at home. While on-pack personalization can certainly enhance the consumer's experience with a package, intriguing structural components can also supplement the unboxing process. For example, digital laser diecutting that can create chambers for products to nest within a shipping box can make unboxing more fun, along with connected packaging that extends content to the virtual realm. A custom QR-code for example, digitally printed on a shipping box, can provide the consumer with even more brand related content, extending the length of the interaction beyond just the time it takes to remove the product inside.

Figure 16: **Brands Implement Several E-Commerce Packaging Strategies**

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



n=116 brand owners that offer their products via e-commerce retail.

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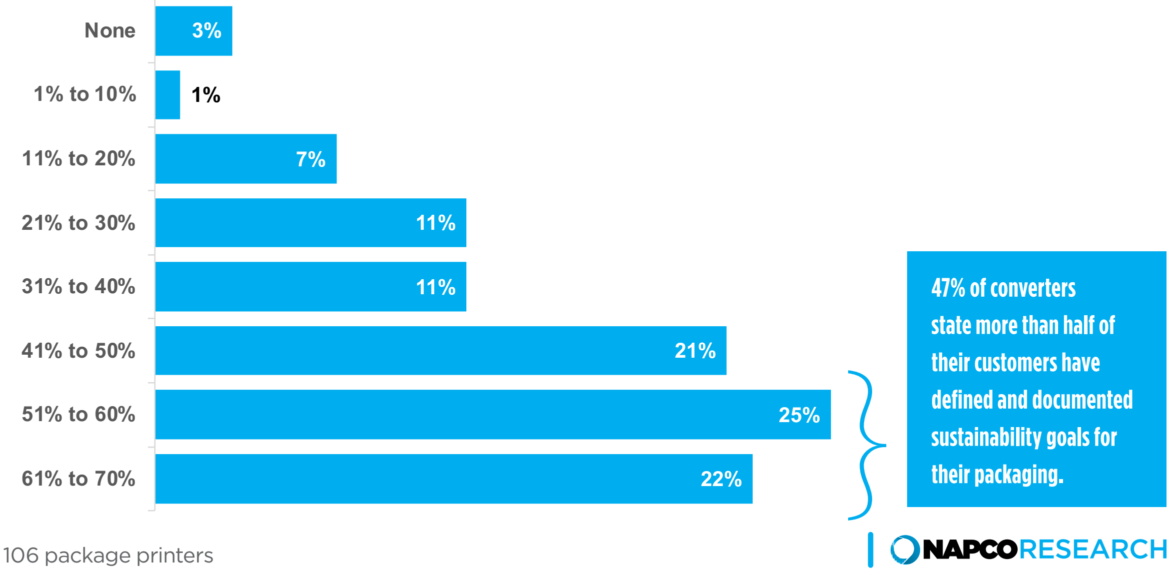
Sustainability

The conversation around sustainability in packaging has been ongoing for decades, but it has become increasingly urgent in recent years. Environmentally conscious packaging and production processes that were once viewed as nice to have are becoming non-negotiable essentials for printers and converters. With a combination of legislative action, brand and retailer mandates, and consumers' desire for sustainability, improving its environmental impact has become arguably the No. 1 issue at hand for the packaging industry.

Converters are feeling the impact of this, with 39% of respondents reporting they are experiencing an increase in demand from their customers for more sustainable or environmentally friendly labels and packaging. Additionally, converters also report that their customers are not just simply making requests for more sustainability in their packaging – they're requiring it. When asked to indicate approximately how many of their customers have defined and documented sustainability objectives for their packaging, converter respondents stated that on average, 45% of their customers have defined sustainability objectives **(Figure 17)**. However, many report that more than half of their customers are coming to the table with defined goals, as 47% of respondents indicated between 51% and 70% of their customers have documented sustainability objectives.

Figure 17: **Documented Sustainability Objectives Among Converters' Customers**

Q. Approximately what percentage of YOUR CUSTOMERS have defined and documented SUSTAINABILITY objectives for their packaging?



n = 106 package printers

Brand owners, meanwhile, have also expressed the importance of sustainability in their packaging. In particular, 93% of brand owner respondents indicate that it is at least somewhat important for their package printers to be able to provide documented sustainability information or an environmental record, with 37% of respondents reporting it is an essential attribute for their printers to have. Additionally, 37% of brand owners also stated that having a strong grasp of current packaging regulations and legislation is essential, and 98% overall describe it as at least somewhat important. Brand owners also indicate that acquiring environmentally friendly packaging is a key difficulty, as 37% of respondents report that meeting their sustainability or environmental goals or objectives is among their top five packaging challenges.

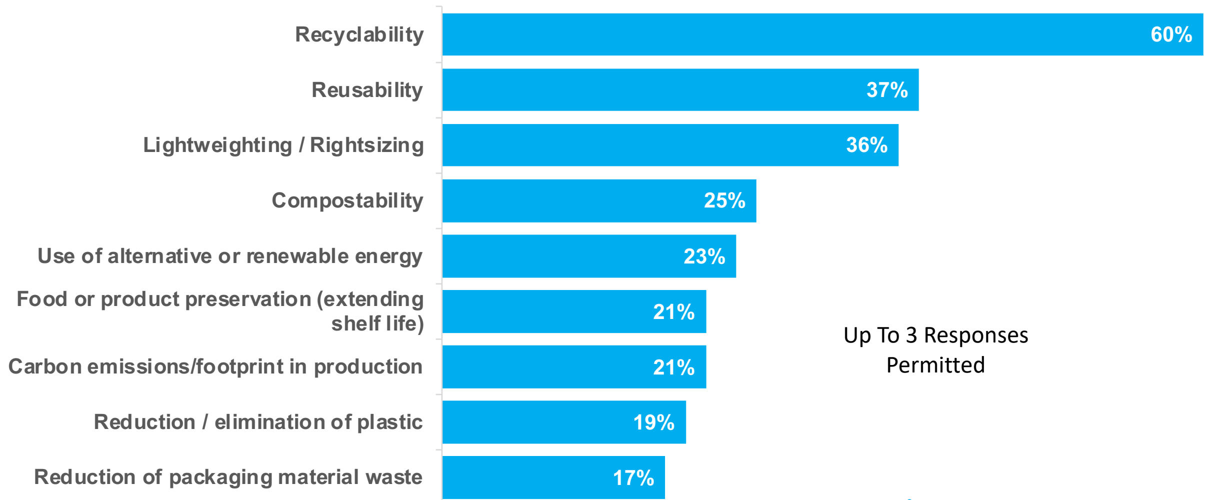
While there are several factors to consider when assessing sustainability, there is a positive story for digital printing and production technologies. A primary advantage is digital printing's ability to reduce material waste in production, due to its minimal makereadies. In many conventional printing processes, substrate material is often wasted as the press gets up to color and operators ensure it is ready to meet the needs of the run of labels and packaging being produced. With digital equipment, presses typically hit their color targets right away, reducing the built in material waste that stems from conventional makereadies.

Digital presses can also provide reduced emissions in production, which can help package printers lower their overall carbon footprint – an enticing attribute for brand owners. Because digital print can also provide print on-demand services and short runs, it can help reduce inventory on hand for brand owners, thereby reducing waste down the line as a product or package becomes obsolete. For brands seeking a more environmentally friendly approach to packaging, being able to order the exact quantity of labels or packages they want when they want can be beneficial in reducing the frustrating and wasteful experience of discarding obsolete inventory.

For package printers, these sustainability advantages should be viewed as an opportunity. Brand owners often prioritize sustainability factors that are more visible and tangible for consumers **(Figure 18)**. Specifically, when asked to identify the top sustainability attributes their companies consider when sourcing labels and packaging, the top responses were recyclability (60%), reusability (37%), and lightweighting/rightsizing of packaging (36%). While those are all undoubtedly important sustainability attributes, they only play a small part of the overall lifecycle of a package. Brand owners seem to be less aware of the need for reduced carbon emissions, as just 21% cited that as a top sustainability priority, and even more surprisingly, 17% cited reduction of packaging material waste as a top sustainability attribute.

Figure 18: **Recyclability Tops Brands' Sustainability Objectives**

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



n=126 brand owners that state sustainability is AT LEAST somewhat important

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It is evident from these responses that package printers that educate their customers on the distinct sustainability advantages of digital printing can win over customers and prospects that may not fully understand that sustainability and environmentally friendly packaging involves much more than just recycling, reuse, and lightweighting packaging. For brands seeking to keep material out of landfills, recycling and reusable packaging is certainly beneficial. But, educating brand owners on how certain printing technologies can reduce the amount of waste being discarded to begin with is an important consideration for package printers with digital. Similarly, brand owners that profess a desire for a more sustainable packaging lifecycle may not realize the carbon emissions that occur in the production process, and learning how those can be reduced can help them meet any carbon footprint-based objectives.

Converters with digital printing seem to recognize the sustainability advantages of the technology, as 30% of respondents report that it offers a more sustainable process than conventional printing, and place that in their top five digital advantages. Relaying these benefits to customers will help all players in the packaging production chain to recognize the valuable role of digital printing in producing sustainable labels and packaging.

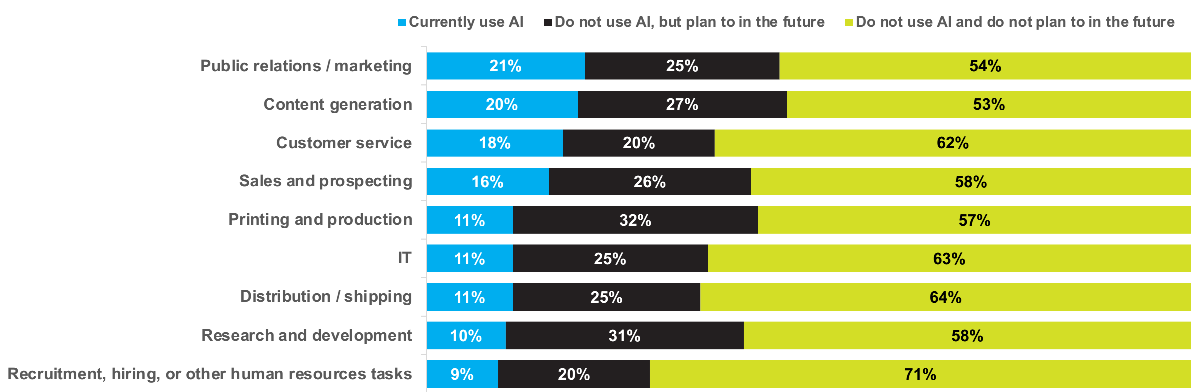
Artificial Intelligence

Digital technology in the packaging industry is also poised to extend beyond printing and finishing processes, as artificial intelligence (AI) is increasing in prominence. While AI is in its early stages of adoption across the printing and packaging industries, there are areas where it is being implemented **(Figure 19)**. When asked to share their current usage statuses of AI across several areas of their businesses, package printers that have implemented AI largely cited public relations, marketing, and content generation as the primary areas they currently use the technology, with 21% using AI in public relations and marketing and 20% having implemented it for content generation.

With readily available tools such as ChatGPT and other generative AI platforms, the barriers to entry into AI have lowered, and package printers that have made the jump into AI appear to be getting their feet wet with content creation. However, when looking at the business areas where package printers plan to implement AI in the future, printing and production (32%) and research and development (31%) emerged as the top two responses. With printers and converters seeking to increase efficiency – especially at a time when hiring is difficult – it is encouraging to see the industry indicate its plans to embrace AI in production. Innovations in AI are expected to emerge across both hardware and software solutions, and package printers interested in embracing this technology would be wise to discuss its potential with their vendors and suppliers.

Figure 19: **AI Gaining Adoption in Package Printing**

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



n = 106 package printers

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CONCLUSIONS

Digital printing has shed the novelty tag that it was so closely associated with as it was introduced into the packaging industry. While digital has garnered adoption in some segments more than others, it is now commonplace across all forms of packaging, and the expectation is that its adoption will continue to increase. Both package printers and brand owners view digital printing as an indispensable tool for their packaging production and are cognizant of its multitude of advantages spanning speed to market, short run capabilities, versioning and personalization, and benefits for burgeoning trends spanning sustainability and e-commerce.

While digital printing remains a small percentage of overall printed packaging output, brand owners see it as a key component of their package printers' offerings and strongly prefer to work with printers that have digital as part of their equipment mix. Not only do they recognize that digital printing has the ability to help ease their top challenges, including designing packaging that influences purchasing, improving supply chain efficiency and responsiveness, and managing many product versions, they recognize that personalization opportunities and sustainability benefits are also key components of the digital advantage.

For many package printers, digital printing has evolved into an essential source of revenue. Package printers surveyed indicate that digital printing provides a sizable percentage of their sales and two-thirds of respondents with digital expect to see their sales grow over the course of the next 24 months. Because digital printing provides such high value to customers in its versioning, short run benefits, personalization opportunities, and design flexibility, the premium price associated with much digitally printed packaging is willingly paid by brands who understand the benefits it provides both in their operations and interactions with consumers.

The ongoing trends of versioning and SKU proliferation are here to stay and are accelerating. Nearly 80% of brand owner respondents reported their SKU quantity increased in the past two years and the same percentage expect to see continued growth over the next two years. Brands report that consumer desire for increased variety in their product mix is continuing to push their SKU expansion, and as they acclimate to digital printing technology, they are recognizing that it is a tool they can use to satisfy consumer demand.

Additional trends are pushing the rise of digital, including the ubiquity of online shopping and the continued rise of sustainability. Digital printing provides significant opportunities for brand owners to extend and enhance their connections with consumers by personalizing e-commerce packaging using the rich data consumers provide during a virtual check out. And on the sustainability side, the reduced material waste and emissions that digital printing offers is sure to be attractive to brand owners seeking to meet sustainability mandates and adhere to regulations and legislation. Education will be essential to help brands understand how these sustainability advantages fit in with recycling and reusable packaging, but converters that conduct this outreach will be viewed as key thought leaders in an increasingly important component of packaging production.

As digital printing continues to solve brand owner challenges and provides converters with the flexibility to meet their needs, packaging stakeholders across all segments will prosper in new and exciting ways as the industry continues its dynamic evolution.

WHO WE ARE

BOBST

We are one of the world's leading suppliers of substrate processing, printing, and converting equipment and services for the label, flexible packaging, folding carton, and corrugated industries.

Founded in 1890 by Joseph Bobst in Lausanne, Switzerland, BOBST has a presence in more than 50 countries, runs 19 production facilities in 11 countries, and employs more than 6,100 people around the world.

As a leading technology company in the packaging world, we shape the industry, with BOBST holding the No. 1 or 2 position in each segment. All members of the Group are leading – and ensure continuous innovation. We shape the future by developing new business models. We anticipate the transformation of the packaging world by expanding our technology reach. Across labels, flexible packaging, folding carton, and corrugated board, we gain insights to sustainably support our customers to answer the current and future consumer needs – and to respond to the challenges of brand owners, retailers, and e-tailers across a flexible and agile workflow.

WHO WE ARE

Fiery is the leading provider of digital front ends (DFEs) and workflow solutions for the global print industry. With a customer base that includes over 2 million DFEs sold worldwide, Fiery's industry-leading software and cloud-based technologies deliver the best possible performance, color, and print quality across a broad range of production printing devices.

Fiery's innovative solutions empower commercial print, industrial, packaging, signs and display graphics, ceramics, building materials, textiles, and more. Through over 30 years of excellent support and service, Fiery has built an unmatched community of customers, dealers, and partners.
For more information, visit https://www.fiery.com

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WHO WE ARE

SCREEN

SCREEN provides pioneering inkjet solutions across a variety of graphics and print markets including label and packaging as well as direct mail, commercial print, and publishing. Our flagship Truepress Jet L350UV Series label press heads a growing portfolio for the label and packaging markets, including new solutions for flexible packaging, paper pouches, and small folding cartons. SCREEN first introduced high speed continuous feed inkjet printing in 2007 and our combination of robust engineering and simplified cost and service models drives the lowest operating costs and highest uptimes in the industry.

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WHO WE ARE

TLMI

Community. Insight. Advocacy.

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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WHO WE ARE

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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.

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