America's ink market diversifies

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Following the economic impact of the Covid-19 pandemic, this report analyses the recovery of the digital textile printing inks industry in the Americas. It assesses the impact of new business models, sustainability, inflationary pressures and ongoing supply chain vulnerabilities on sales volumes.

Contents

1. Introduction

The growth in digital textile printing across the Americas has created a surge in demand for a wide range of digital inks, which is spreading into Latin America as well as North America. The adaptability and broad use of digital inks, for garments, household products, technical textiles, and more, fits the diversity of the textile sector in the Americas, which spans higher wage industries such as US textile production to lower cost manufacture in Central America.

The use and attractiveness of digital inks is gaining ground thanks to technological advances; not just in the inks themselves, but also in printing equipment. The increasing appreciation of the commercial potential of garments and short-run specialist output, when compared to the traditional mass-manufactured model, plays to the strengths of flexible digital textile printing and its inks. The disruption of supply chains caused by Covid-19 has also highlighted the security offered by near-sourced or re-shored finishing, which can be offered more cost effectively by digital textiles. This is of particular interest to the US textile sector, which has retained its strength as a supplier to Latin American clothing manufacturers. The Americas, as a result, comprise a healthy proportion of the global digital textile inks market, valued by US-based market researcher Allied Analytics at US$1.11bn in 2019 and projected to reach US$2.66bn by 2027 despite the impact of the pandemic [1].

2. Features of the Americas

American printing products company Global Imaging Inks [2] has stressed that disperse ink, which is used in the dye-sublimation printing process, is the most widely consumed ink type in the Americas for inkjet textile printing. Used on polyester, acetate rayon, poly-lycra and acrylics, these inks infuse into and dye the fabric, becoming part of the textile itself and require a calender to apply heat and pressure, according to the company. Sublimation by transfer, which happens when the design is first printed on paper, is much more widely used compared to the process of printing directly on the fabric.

Dr Madhu Kaushik, vice-president at Vera Inkjet, a Montréal, Canada-based company specialised in inkjet inks and fluids research, says: “In the Americas, the two largest digital ink segments are dye sublimation inks for polyester fabrics, mainly in the signage and sportswear industries, and pigment inks for cotton and natural fibres, especially for the T-shirt and home textile markets.”

Kaushik adds: “Dye sublimation’s use of heat transfer to apply an image printed on special transfer paper onto polyester and polyester-resin coated products gives bright colours and excellent wash fastness, as the colours are embedded into the substrate. The fact that no water is required, along with inexpensive printers, makes these systems both sustainable and affordable, even though sublimation inks themselves are more expensive than standard inks and images fade in direct sunlight.

“In contrast, direct disperse systems print the ink directly onto the polyester fabric, which is then fixed by steaming and washing, hence eliminating the use of transfer paper. But for this process, printers are more expensive.”

“Reactive dye inks are also popular with manufacturers seeking bright colours,” says Kaushik. “They also enable outstanding wash fastness and good light fastness properties, with the dyes becoming an integral part of the fibre. However, reactives are weaker on sustainability – an increasingly important issue in the American and Canadian markets [as consumers call for more supply chain transparency].”

Kaushik continues: “Reactive ink systems use tremendous amounts of water, and hence pollution, and it is not recommended for synthetic fibres. Similar issues face acid dye inks, given streaming and washing is used for fixation onto substrates like wool, silk and lycra, delivering good wash fastness with lightfastness.”

Global Imaging Inks confirms how reactive inks are used for cotton, linen, rayon, nylon and other cellulosic materials. When applied and fixed to pre-treated fabric, they create a chemical bond with the cellulose in that fabric.

Both reactive and acid inks require the fabric to be washed post-printing to remove residues. Moreover, acid inks are printed directly to the textile before a steaming process takes place to set the ink. The dyes used to form acid ink create ionic or electrostatic bonds with textiles such as silk, wool and nylon.

Finally, pigment inks are finely ground powders suspended in liquid carriers with binders that work best when applied to cotton applications or predominantly cotton blends. While sublimation creates permanency when the dye is encapsulated into a polymer, pigments are bonded to natural fabrics using binders followed by a heat calender process, according to Global Imaging Inks.

Kaushik considers pigment inks to be the most technologically advanced of the digital ink chemistries, and the greenest solution with no washing or steaming required. She says: “They [pigments] can be used to print directly or indirectly onto all kinds of fabrics, albeit offering an average wash fastness.”

Analysing the USA and Canadian markets, Ray Weiss, vice president of e-learning and certifications at the American trade association for printing professionals, PRINTING United Alliance, says that dye sublimation ink, both direct and transfer, is the runaway leader.

Weiss adds: “Reactive and acid inks are the next largest ink categories, but they suffer from a perception that they are polluters. They can be printed on natural fibres, but this advantage will be reduced when pigment inks become more prevalent in the digital printing process. Given pigment inks are used for almost half of all conventional printing output, Weiss predicts pigment consumption will accelerate throughout the US and Canadian digital textile printing markets.

Kaushik also foresees growth in digital textile inks, with reductions in pollution and supply chain costs being major advantages. Considering that most of the 30 bn+ sqm of textiles printed each year is undertaken in developing countries through polluting, labour- and capital-intensive conventional textile printing, Kaushik hopes that digital printing will boost the reshoring and nearshoring trends. “This will deliver reductions in water, energy and material consumption,” she says.

Digital textile inks will also generate more quality products. Weiss sees a drive among younger designers to create more durable, longer-lasting materials and bring an end to the throwaway culture exacerbated by fast fashion. Quality digital printing inks are helping to deliver this through their advanced fastness properties.

Weiss has also noticed that consumers are more aware of their environmental impact. This is fuelling a desire among brands and manufacturers to reshore or nearshore production, which will reduce a product’s proximity to the end consumer and in turn cut carbon emissions and lead times – a key commercial pressure in the US.

Weiss adds: “With digital inks enabling a much broader base of printing, there may be a push for a print-to-finish movement that is all local, much like the farm-to-table movement in the food sector.”

3. North America

3.1 Market data

The US digital inks market – North America’s largest – is set to double in value within the next five years, research suggests, with advances in medical textiles, sportswear manufacturing and the fashion industry driving the sector out of its pandemic slump. Manufacturers are working on innovative inks to satisfy demand in those areas.

Sustainability also appears to be a key factor in new ink development in the region, with opportunities for nearshoring or reshoring business models to re-establish themselves in a move away from reliance on low labour costs in developing economies.

The United States digital textile printing inks market size was estimated at US$187.39m in 2020 and was expected to reach US$215.4m in 2021. By 2027, the market value will be in the region of US$409.74m, said a report from Maharashtra, India-based 360iResearch, published in January this year [3].

In separate research conducted by Inkwood Research, based in Boston, US, a 9.05% CAGR in volume is predicted between 2021 and 2028, with North America (categorised in their research as the US and Canada) set to be the fastest growing region for digital inks sales in the world [4]. This paper, however, predicts a revenue rise of just 7.09% CAGR over the same timescale.

The report says: "In North America, the demand for digital textile printing ink is primarily acquired from the sportswear and fashion industries. Medical textiles are among the most crucial and continually augmenting fields, in terms of technical textiles. Moreover, the industry is concentrating on improving existing products while creating new items with enhanced materials as well as innovative designs. These products are mainly designed for catering to less invasive surgical procedures, accelerated healing, and infection control. As a result, these aspects are anticipated to fuel the digital textile printing inks market in the United States during the forecast period."

Global Industry Analysts' April 2021 report on the digital inks market estimated the US value to be US$801.1m in 2020 and predicted Canada's growth would have a CAGR of 7.4% in the reporting period 2020-2027 – identifying it as a noteworthy geographic market [5].

While researchers are at odds over the size of North America's market growth, they agree that increases would have been greater still were it not for a number of negative Covid-19 related factors.

Allied Market Research, in its report from April 2020, indicates that post-pandemic unemployment levels will result in lower consumer spending capacity and an associated decrease in demand for garments. The report said: "This factor is anticipated to hamper the digital textile printing inks market growth [6]." However, it must be said that government support in the form of furlough schemes and relief from business rates has helped alleviate the issue of spiralling unemployment.

Meanwhile, disruptions in sectors such as hospitality have rendered the market 'volatile' notes a report from Future Market Insights (FMI) in April 2020 [7].

3.2 Innovation

Ink manufacturers, however, are aware of the current growth phase and have been “eagerly working on the development of innovative, game-changing inks addressing the current, as well as emergent, market requirements,” notes the Michigan, US-based Stratview Research [8].

Moreover, FMI says: “North America, capturing around one-third of total revenue growth, continues to offer value-creation opportunities. Strong presence of digital natives and leading players are propelling the digital textile printing market growth in this developed region.”

Illinois-based printer manufacturer Dover, through its acquisition of JK Group, last year launched new sustainable packaging for its reactive inks and an extended shelf life on its products to reduce its environmental footprint.

The company's Kiian brand launched a reactive ink series called Digistar Bellagio in December 2018, with one of its innovative features being its Bag-in-Box (BiB) packaging. Through this environmentally-friendly initiative, all reactive inks will now be packed in flexible, multi-layered plastic bags, which are incorporated into a cardboard outer shell, the company says [9].

Dover adds: “The system has several advantages and represents an 80% reduction in the use of plastic compared to traditional high-density polyethylene containers of a similar capacity. Additionally, the reduced packaging creates a reduction in shipping and warehouse space, leading to lower transport and storage costs and a reduced environmental impact across the supply chain.”

Last April (2021), JK Group also announced a shelf life extension of all its ink products having conducted stress tests to determine more precisely how long they will last on the shelf. “The resulting extension of shelf life means improvements for stock management and order rationalisation, enabling efficiency and cost savings,” the company said.

Sustainability was also identified as the driver behind a collaborative venture between Ricoh Europe and Rhode Island-based ink manufacturer Farbenpunkt [10].

“Ricoh is opening market access to American ink pioneer Farbenpunkt’s innovative new textile ink, PeractoJet,” said Ricoh Europe at the time the partnership was announced. “Reducing the environmental impact of global textile production caused by using dye-based inks,

such as reactives in digital printing, is the driver of this collaboration."

Farbenpunkt's PeractoJet inks contain nano-sized pigment particles, which easily colour textile substrates [11]. "When heating the textile to 285°F (140°C) for a minimum of three minutes, PeractoJet inks form a long chain molecule that attaches to the nano pigments and binds them to the textile substrate."

The combination of this technology with Ricoh inkjet heads produces more than 90% savings in fresh and wastewater use, as well as 50% savings in energy use, delivering significant reductions in CO2 emissions. Also, no volatile organic compounds (VOCs) are emitted, the joint venture announcement confirmed.

Graham Kennedy, director, industrial print with Ricoh Europe, says: "This disruptive ink offering enables more cost-effective production and allows manufacturers to consider establishing local production capabilities through reshoring. This is especially important now when we are seeing growth in on-demand digital production spurred on by the impact of the pandemic on consumer habits and business operations."

Meanwhile, researchers at the US' North Carolina State University have published a study into their work printing layers of electrically conductive ink on polyester fabric to make an e-textile that could be used to develop wearable devices [12].

The research, published last June (2021) in the journal ACS Applied Materials & Interfaces, showed how the team used a Fujifilm Dimatix inkjet printer to create a durable and flexible e-textile material [13].

Researcher Inhwan Kim, a former graduate student at NC State University, says: "We wanted to build a structure layer by layer – it has never been done on a textile layer with inkjet technology. It was a big struggle for us to find the right material composition."

They created the e-textile by printing layers of electrically conductive silver ink like a sandwich around layers of two liquid materials, urethane-acrylate and poly(4-vinylphenol), which acted as insulators. They printed those sandwich layers on top of a woven polyester fabric and found that the chemical properties of the insulating materials, as well as of the textile yarns, were important to maintaining the ability of the liquid silver ink to conduct electricity and prevent it from penetrating through the porous fabric.

Kim says: “We wanted a robust insulation layer in the middle, but we wanted to keep it as thin as possible to have the entire structure thin and have the electric performance as high as possible. Also, if they are too bulky, people will not want to wear them.”

The research team want to use the printing method to create an e-textile that could be used in wearable electronics such as biomedical devices to track heart rate. Alternatively, it could be used as a battery to store power for electronic devices.

“We were able to coat the ink on the fabric in a multi-layer material that’s both durable and flexible,” Kim adds. “The beauty of this is, we did everything with an inkjet printer – we didn’t use lamination or any other methodologies.”

3.3 Mexico

Meanwhile, in Mexico, Alejandro Vivanco, international sales manager at Spain-based packaging and sublimation company, Eurokarpa, says: “Mexico’s digital textile ink market has been growing, with the largest number of companies working in sublimation transfer printing, enabling smaller runs. Direct-to-fabric printers have a smaller install base but print larger quantities due to their enhanced speed.”

Vivanco’s company produces sublimation transfer paper certified as environmentally-friendly by the Forest Stewardship Council (FSC).

Vivanco has extensive experience working in Mexico’s digital textile printing sector, explaining how polyester and other artificial fabrics are printed with disperse and sublimation inks, while natural fibres, such as cotton, are more commonly finished with digital pigment, acid or reactive inks via direct-to-fabric printers.

Vivanco continues: “While sublimation inks are used by small, medium, and large businesses, since they require a simple process, direct-to-fabric printing demands more powerful machines, chemists and specialists, among other requirements.”

Vivanco believes print service providers operating sublimation transfer printers worldwide will start to turn their attention to pigment printing for reasons such as sustainability and time-to-market. However, larger Mexican finishing companies would rather use acid ink, rather than pigments, to dye cotton as they consider it more reliable in the roll-to-roll sector. Pigment inks generally work better on slower printing machines.

Vivanco adds: “Mexico’s digital finishers are losing trade to Central American textile companies because the Mexican market does not buy added value; producers, including exporters, are following suit, with the exception of just a few major players.”

This has stymied the development of a Mexican digital ink industry and most of these inputs are imported mainly from India, China, Italy, Turkey, Japan and the US.

“Some growth in Mexican digital textile production has emerged, however, notably in finishing textile sports and casual polyester wear with sublimation ink and smaller machines,” says Vivanco.

This is because of the powerful internal market of sportswear and casual polyester wear in a country with 131 million people. Vivanco adds: “When you manufacture sportswear and casual polyester wear, the earnings are much higher.”

Mexico is home to several competitive companies and export niches with some US colleges and universities buying Mexico-made sports gear.

An example of a Mexican company exploiting this niche is MTM Soluciones. The company predominantly sells sublimation inks to sportswear manufacturers, but also inks for finishing face masks or interior decoration, says Jovanna Abríz, the company’s direct sales and call centre coordinator.

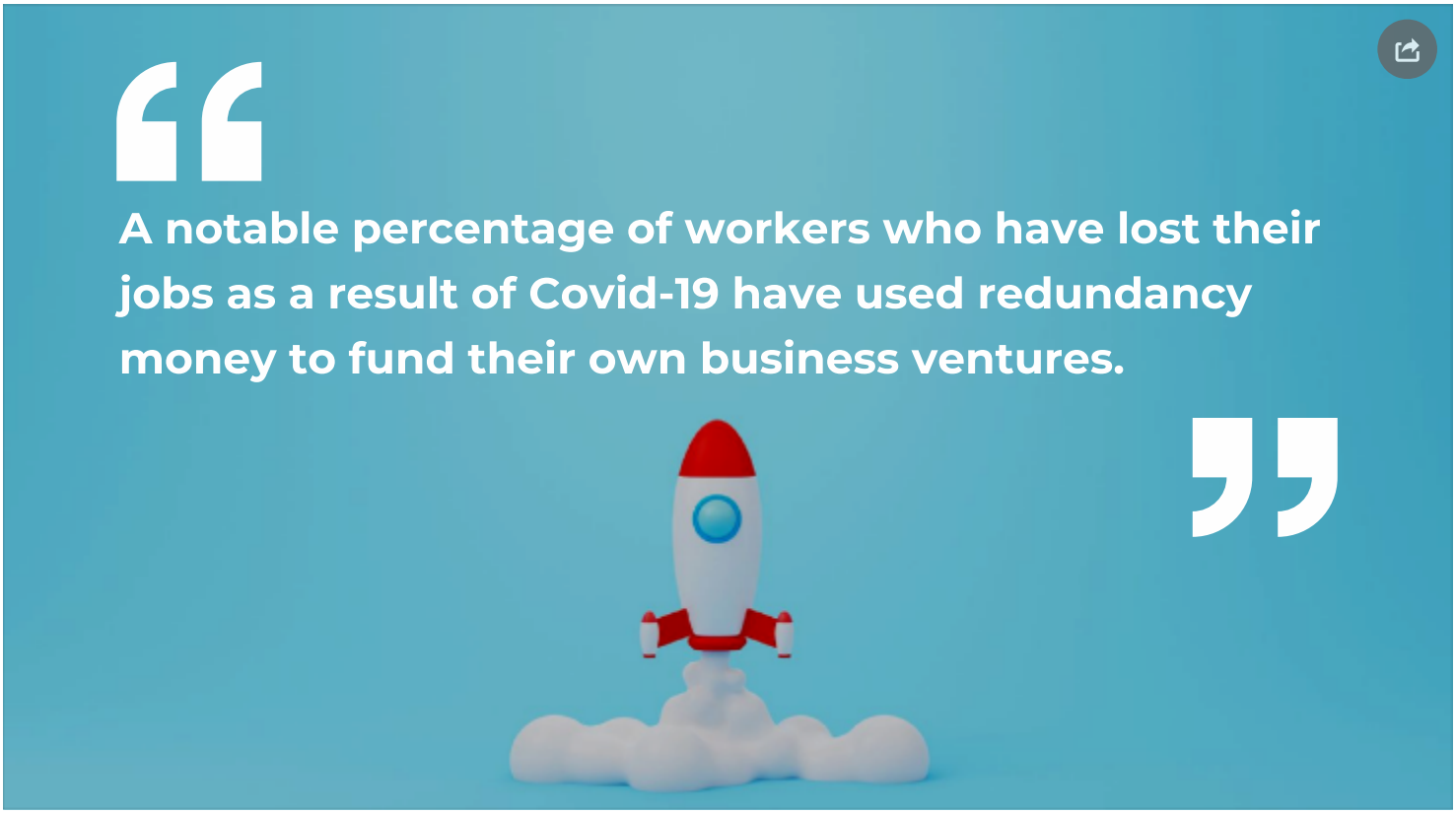
4. Brazil

Brazil’s growing digital textile printing industry has made the most of the country’s taste for bright colours in apparel – the country is full of opportunities for sales of digital inks.

Edri Baggi, textiles sales director for digital ink producer Sun Chemical, highlights that Brazil produces nearly 80% of all digitally printed textiles in Latin America. She references data from testing, research and consulting firm Smithers that states in 2021 Brazilian manufacturers produced 81mn sqm of digitally printed textiles with an estimated output CAGR of 13% between 2021 and 2026.

Baggi adds: “In Brazil, reactive inks are the most popular of the digital ink categories, representing half of all consumption, followed by sublimation inks which commands around 35% of the market.” She explains that reactive inks are very popular in Brazil because of their

integration with conventional printing methods, which are still widely known and used countrywide.



Walter Tolosa, Brazil-based general manager at Wiprime, a Latin American provider of digital printing solutions - including inks and machines – foresees growth of 20% in the digital textile printing industry in Brazil this year (2022). He sees sublimation as offering significant growth, even though the market is warped, with small customers paying up to two or two-and-a-half times more than large customers. The reason is economies of scale, with the average price difference between sublimation inks and conventional inks being 15-20%.

This mismatch in pricing could be a significant issue since many small digital printing businesses have emerged in Brazil during the Covid-19 pandemic. A notable percentage of workers who have lost their jobs as a result of Covid-19 have used redundancy money to fund their own business ventures.

That is why, last year (2021), Epson introduced the SureColor F170 – an A4-format printer – into Brazil. The machine has been bought by many gift-segment textile businesses, according to Fábio Tolosa, Epson business manager in Brazil. He adds: “The country’s digital textile printing market has also benefited from the pandemic, since Covid-19 led manufacturers to produce smaller batches which is more cost effective with inkjet technology.”

Moreover, Wiprime’s Walter Tolosa, says: “80-85% of Brazil’s digital textile inks are imported, mainly from China, Italy, India and Turkey. Brazil is rapidly advancing its manufacturing capacity of sublimation ink, but the offering is still inferior to some imported products.”

Walter Tolosa continues: “Brazilian textile companies are facing a hard time renovating their premises in a sector where machines get old in just a couple of years – banks are currently reluctant to issue loans to growing businesses.”

According to Malcom Nobel, Latin America sales manager at INX International Ink Co – a global manufacturer of printing inks and coatings for commercial, packaging and digital print applications – says: “Ink consumption during the pandemic declined by 50%, but now it is back to normal. Brazilian manufacturers of dye-based inks have claimed almost 40% of the market in the last four years due to the devaluation of the Brazilian Real (BRL). It fell from BRL3.1 for US$1 in January 2017, to BRL5.6 in January (2022). This inflates imported ink prices between 30% and 50% depending on the brand.”

Claudilei Souza, director of O Serigráfico, a specialised Brazilian newsletter focusing on screen printing and visual communication, says imports dropped recently because costs have skyrocketed due to shipment issues: there are no ships, there are severe staff shortages in ports due to Covid-19 isolation and containers cost at least triple what they did pre-pandemic.

Inks that had previously arrived in 15 days are now taking around 50-60 days to reach finishers. But, for the time being, Brazilian digital ink imports will continue to play a key role. Souza says: “We don't have enough technology to have the ink fully developed here.”

Baggi agrees that 2021 was unstable for the textile market due to Covid-19, rising energy prices, and the volatility of the exchange rate, which created some delays in payments. She says: “Due to shipment problems, to respond quickly to the sudden demand for inks, some suppliers had to make air shipments, which consequently increased final costs and reduced sales margins.”

5. Central America

The Central American textile industry has also recovered quickly from the Covid-19 pandemic. According to the Chamber of Apparel Industry of El Salvador (Camtex – Cámara de la Industria Textil), the region has taken advantage of its proximity to the US at a time when other suppliers in Asia could not fulfil their commitments.

Nevertheless, the region is still mainly a ‘confection maquila’ sector, manufacturing apparel rather than being an upstream fabric producer. This explains why digital textile printing is still developing slowly in Guatemala, Honduras and El Salvador – the region’s key textile manufacturing hubs.

And while there are supply and raw materials shortages and freight rate rises, it makes sense to stick to profitable practices, such as cut and sew, rather than adopting new techniques such as digital textile printing.

Mexico has been losing some textile business to Central America. Laura Manrique, a Latin American design creativity and innovation consultant, says: “Mexico is one of the few countries in Latin America where you can find both small and big printing formats. Mexican companies have the machines to print fabrics in three metre rolls or above, which promotes the use of digital printing.”

Still, companies such as Diseri – a Guatemalan manufacturer with a presence in El Salvador, which has in the past used third-party finishers for sublimation and textile screen printing – are buying Epson printers to offer sublimation services to those who might need them.

Their focus is on sublimation, says Manrique, because the technique offers low prices for small producers and fewer requirements regarding textiles and length.

Manrique continues: “Small industries, designers and companies that want to venture on personalisation benefit greatly from sublimation, for they can use all of the colour scheme and request as little as 50cm of fabric.”

6. Colombia

Despite the impact of Covid-19 and the economic ramifications, Colombia hopes its textile industry will fully recover in 2022, with sales exceeding its 2019 levels of US$737m. This is crucial since the sector is responsible for 8% of the country’s GDP.

Nevertheless, the industry is still trying to figure out how to handle the import of digital inks crucial to its increasingly large-scale digital textile printing sector.

Manrique says: “We are a country of great producers, but we do not have supplies or raw materials available. Because of this, the Colombian industry relies heavily on imports of digital inks, mainly from China, India and Africa.

“With Covid-19 damaging supply chains, however, these inks importers have struggled, with local digital textile printing companies also sourcing supplies from Belgium, the Netherlands and Spain, for instance.”

An additional problem for Colombia has been the devaluation of the Colombian Peso (COP). The currency has fallen from COP2,862 in January 2017 to COP4,051 in January (2022), making imports more expensive.

“This has been a disadvantage for Colombia, for the Peso has devalued quickly, making negotiation quite hard for those commercialising inks, solvents and dyes,” Manrique adds.

Therefore, textile finishing companies are still using a crisis approach towards the business: sacrificing profit or choosing to rely on local materials where they can source digital inks in Colombia.

A good example is the production of curtains and veils. Local companies have halted the dyeing of these products. Instead, they have chosen to use fabrics in their natural state, making some minor alterations using techniques such as thermosetting.

Nevertheless, the crisis has pushed some companies to start exploring options to develop dyes locally. Manrique explains: “Prices could be higher, but the environmental impact would be lower; this could be used as a selling point.”

In the meantime, Colombian companies have innovated using sublimation techniques that allow for broader designs and lower costs. This has encouraged printing equipment majors such as Hewlett-Packard (HP) and Epson to offer high-end printers at low prices for large and small finishers.

Textile printer manufacturers, including Epson and Mimaki, participated in Colombiatex – the biggest textile industry exhibition in Colombia and one of the most important in the Central American region – on 25-27 January (2022). The in-person event hosts 400 exhibitors from Brazil, India, Italy, Germany and Turkey, as well as more than 10,000 buyers from Latin America and the US.

7. Sustainability

The digital textile printing industry in the Americas faces complex challenges to become competitive in the actual global market. A clear strategy companies are following is to stress their sustainability to seize sales in developed markets within Europe, North America and Asia, explains Manrique.

That is why a major textile player in Colombia, which requested anonymity, is trying to replicate innovations generated by South Korea’s Advanced Institute of Science and Technology to produce indigo dye using bacteria [20].

While indigo dye was originally extracted from the indigo plant, most of the pigment is chemically synthesised today and is not soluble in water. To be dissolved, it must undergo a chemical reaction called reduction, which uses a corrosive salt that is often released as water waste post-production.

The use of bacteria can prevent such contamination. Currently, the Colombian group is still testing the use of such specimens. Still, there are high hopes the colour can be produced in-house and exported from Colombia to other countries in Latin America.

In addition, companies such as Lafayette and Protela, in Bogotá; Artextil, in Itagüí; and Sutex, in Pereira, have achieved zero water consumption in their digital printing by using sublimation.

8. Conclusion

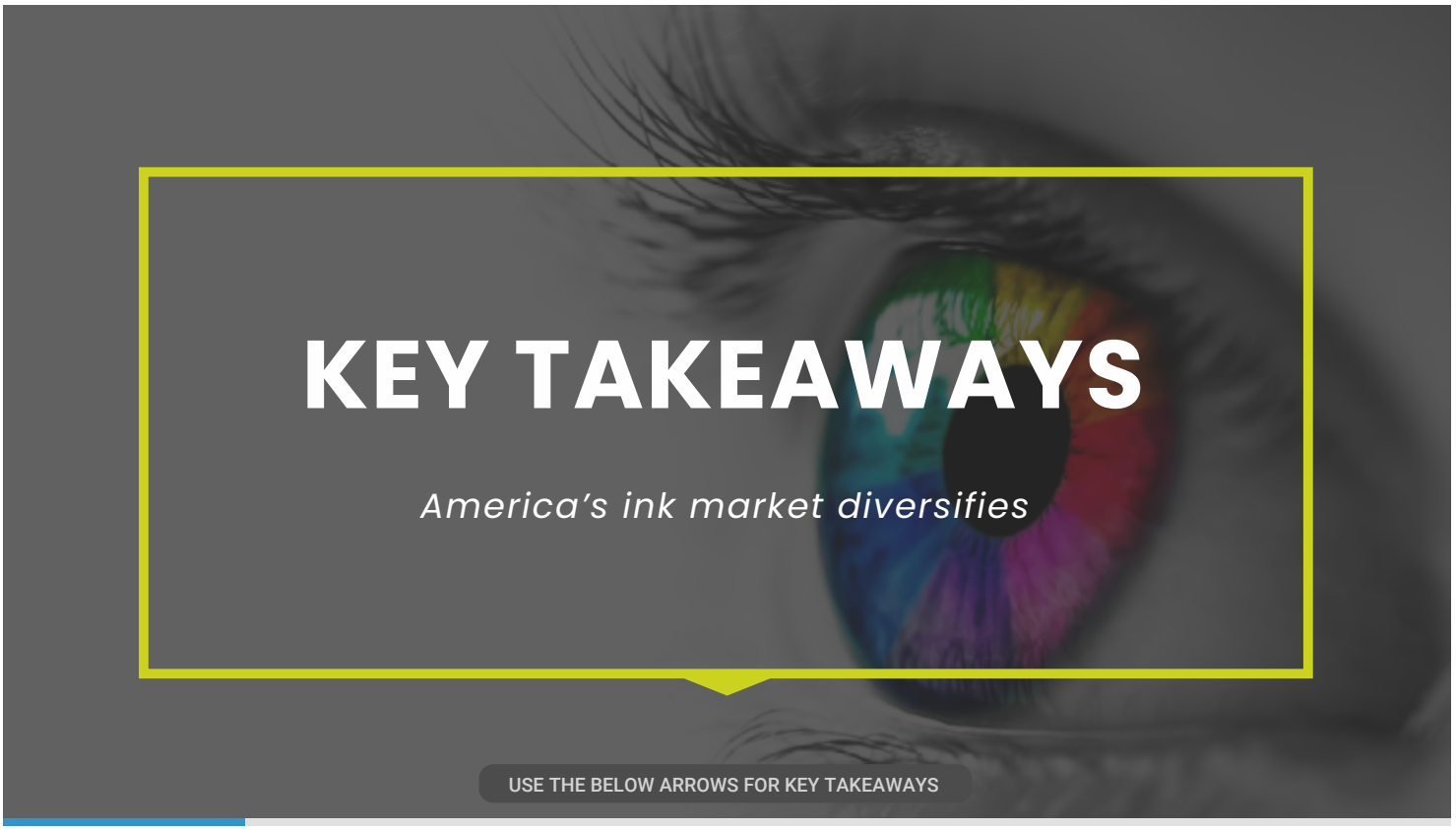
The move to re-shore or near-source fabric close to major clothing and fabric markets has been encouraging the development of digital textile printing in the Americas, given the technology's relatively low capital costs and environmental performance.

The result has been a diversification and intensification of the digital ink market in the Americas, and an exploration of what these inks can deliver to fabric manufacturers over and above traditional printing methods and related inks.

As consumers increasingly demand information about the sustainability of their products, this expansion of digital ink usage will only gather pace. The question is how this technology will be utilised across the Americas?

The US remains a strong fabric producer, meaning that digital textile investments may be as likely in parts of North America as they are in poorer and less-developed Latin American countries.

9. Key takeaways



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