



DHL

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THE GLOBAL LOGISTICS MAGAZINE

ISSUE 01/2018

BUSINESS

GERMAN EFFICIENCY

Unlock the secrets of the world's fourth-largest economy

SOLUTIONS

INSIDE JOB

Discover why organizations are embracing intrapreneurship

VIEWPOINTS

FAILURE IS AN OPTION

Find out how companies can best learn from their mistakes

FOCUS

POWER GRAB

Will digitalization create a manufacturing revolution?



DEAR READER,

How well is your business tuned into digitalization? Our focus article **The seismic potential of digitalized manufacturing** explains why Engineering and Manufacturing is one of the sectors at the forefront, as well as examining a future where manufactured objects and all the corresponding data are perfectly connected.

One industry that has eased into the world of engineering products for advanced analytics and digital capabilities is agriculture. Innovations in satellite imaging, drones and tractor technology have made today's farming more precise than ever – and the commercial potential is huge. Find out more in **Agri-tech: outstanding in its field**.

What drives Germany, the economic powerhouse of Europe? In our search for answers, we look beyond the numerous global corporate giants based in the country to the "Mittelstand," the term given to the 3.6 million companies that account for 60 percent of German jobs and 52 percent of its economic output.

Logistics has often been considered a male-dominated field – but that is about to change. Our essay **Leave that comfort zone – why we need more leading women in logistics** explains why gender equality is essential to pushing businesses to new heights of productivity.

I hope you enjoy the read!

Sincerely,

Bill Meahl
Chief Commercial Officer, DHL

Cover photo: Ikon Images/Getty Images



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www.delivered.dhl.com





WIRED TO HELP

Day in, day out, our postal workers never stop moving – all the while heaving a heavy mail bag on their rounds. Surely there must be an easier way? Well, if a new trial by Deutsche Post is successful, there just might be. Deutsche Post is set to test a new self-driving robot designed to follow a postal worker on

their rounds to take some of the strain out of the job. The PostBOT, as it's been dubbed, can carry up to six post trays with a total load of 150 kilograms and has been ergonomically designed to not place extra stress on a worker's back and joints.



FLOATING TURBINE FIRST

Scotland has scored a world first with the powering up of a floating wind farm. The Hywind Scotland facility, 15 miles (25 kilometers) off the Aberdeenshire coast, can supply 30 megawatts of clean electricity – enough to power about 20,000 homes. Traditional wind turbines need shallow water so they can be sunk into the sea bed, but the floating turbines – tethered using 1,200 metric ton chains – can operate in water up to 800 meters deep, opening up previously inaccessible sites.

bit.ly/floating-wind-farm

MOVING PARTS

In December 2017, DHL commenced distribution of Ford Motor Company's more than 260,000 shipments of prototype parts from more than 8,000 suppliers to 300 worldwide R&D destinations. Ford's suppliers are managed with cutting edge digital platforms, including the DHL Resilience360 technology for safety and security. "We are delighted to have been appointed as Ford Motor Company's single provider of global freight management services," says Todd Starbuck, Global LLP President at DHL Supply Chain.



HUB EXPANSIONS

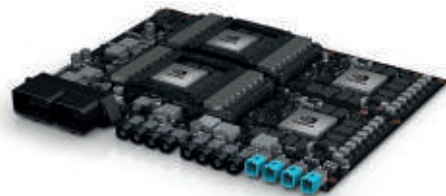
DHL Express has opened a €15.5 million (\$18 million) state-of-the-art facility at Dubai International Airport, strengthening the site's position within the global DHL network. The new installation doubles the hub's capacity, enabling it to handle more than 5,000 shipments per hour. It is designed to provide express delivery services to nearly 70,000 DHL customers across the Middle East and North Africa region. The new hub will consolidate export, transit and import operations, and will feature an automated conveyor system that will make it possible to deliver more than 120,000 shipments daily. Similar technology is set to be deployed in a €335 million expansion of DHL Express Central Asia hub in Hong Kong, which will boost annual throughput by 50 percent. The expanded hub is expected to begin operating in early 2022.



H.H. Sheikh Ahmed bin Saeed Al Maktoum greets Ken Allen, CEO DHL Express and Nour Suliman, CEO DHL Express MENA at the Dubai launch

CHIPS WITH EVERYTHING

Deutsche Post DHL and automotive parts expert ZF have announced plans to deploy a fleet of self-driving delivery trucks using revolutionary technology from graphics chipmaker NVIDIA. The Silicon Valley company has unveiled the third generation of its multi-chip Drive PX platform, code-named Pegasus and the size of a car numberplate, which can handle a staggering 320 trillion opera-



tions per second. The deal between Deutsche Post DHL, ZF and NVIDIA to use Pegasus, which will be available by the middle of this year, will include a future model of DHL's StreetScooter delivery truck.

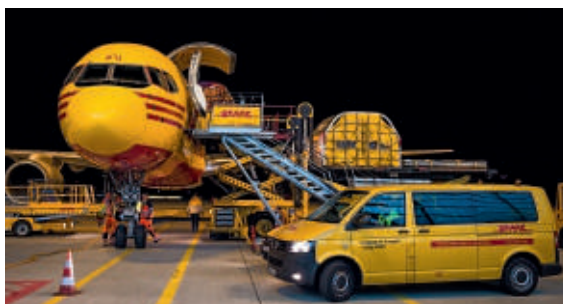


The number of plastic bottles bought around the world every minute. Campaigners believe the surge in plastic bottle use – and the fact that 91 percent are not recycled – could spell an environmental crisis as serious as climate change



CROSSING BORDERS

"International shipping needn't be a complex task." So says Angelos Orfanos, Executive Vice President Sales and Marketing for DHL Global Forwarding, which has launched a new Online Freight Quotation & Booking service to make the process as painless as possible. DHL's air and ocean freight specialist is offering rapid, competitive customer quotations based on door-to-door, all-in rates. Customers can choose between cost and speed of delivery, with an immediate price for general cargo air freight up to 2,000 kilograms per shipment and two speeds of service on offer. Available in more than 40 countries, the service also links to the online customer portal DHL Interactive, which can provide shipment tracking and customized reports.



 <https://freightquote.dhl.com>

60%

The percentage of deliveries in central London that are personal packages. In an effort to cut congestion on the capital's roads, the Go Ahead bus company is in talks with Amazon to use its bus depots as parcel delivery hubs – with the possibility of buses themselves being used to transport parcels between depots



COMPETITION ON THE CATWALK

Fashion is a notoriously fast-moving industry, never more so than in the digital marketplace: Today's on-trend item can quickly become tomorrow's passé piece, so it's vital for designers to be able to reach their potential customers quickly and efficiently. A new white paper by DHL, the Council of Fashion Designers of America and Accenture, looks at the future of fashion logistics. Despite an increasingly digital marketplace, the study highlights the critical role people will continue to play in the supply chain. And based on the study's insights, a Designer's Playbook has been created, to help budding fashion designers establish their brands in what can be a cut-throat market.

Download the white paper at:



bit.ly/fashion-logistics-study



bit.ly/designers-playbook

RATIONAL HEALTH SERVICE

The healthcare industry is facing a slew of challenges, from the demands of an aging population to increasing pressure on costs. This has led to an ever-greater need to manage inventory better, from small clinics "in the field" to larger hospitals. DHL Supply Chain's newly launched service logistics solution for the medical device sector brings together field inventory into single locations and provides greater control and traceability of valuable products. The service cuts the financial commitment for hospitals, which in the past have had to tie up capital in stocks of medical devices, kept just in case they are needed, but can now rely instead on "just-in-time" availability.



AT YOUR SERVICE

DHL eCommerce has brought its network of handy ServicePoints to online merchants in Vietnam, Thailand and Malaysia. After registering online, sellers can drop off their parcels at DHL ServicePoints, from where DHL eCommerce will offer nationwide delivery in the three countries via its own domestic networks. Plans are in place for a rapid expansion of the DHL ServicePoint network to more than 1,000 ServicePoints in each country in coming months.

1.



REGISTER

Open a DHL eCommerce account, book your parcel online and select your DHL ServicePoint

2.



DROP-OFF

Drop off parcels at your chosen DHL ServicePoint

3.



DELIVER

DHL eCommerce delivers the "smile in the last mile" next day to all major cities in Vietnam

A NEW RECIPE FOR THE COLONEL

Fast food giant KFC has signed up DHL and specialist food service logistics provider QSL to revolutionize its supply chain to more than 850 restaurants throughout the U.K. The bespoke service, tailored specifically to KFC's needs, will see DHL and QSL manage the supply and distribution of food products, packaging and consumables to KFC's outlets. DHL will manage the physical warehouse and distribution service, while

QSL will carry out crucial demand planning and stock management. The partnership will focus on a faster turnaround of orders and greater integrity of food during transportation, as well as carbon-neutral waste management over the life of the contract. John Boulter, Managing Director Retail, DHL Supply Chain U.K. and Ireland, said: "We intend to tear up the rule book."



EASY BEING GREEN

Global power management company Eaton is using its equipment and products to bring its new dedicated Rheinbach, Germany distribution facility to maximum "greenness." Scheduled for completion in 2018 and supported by DHL Supply Chain, Eaton's fully automated facility is an effort to create a more efficient warehousing concept enabled by innovative and sustainable solutions in order to meet increased customer needs.



FUTURE FREIGHT

DHL Freight is making a multimillion euro investment in a state-of-the-art hub at the Hanover Airport Business Park in Germany. The 63,000 square-metre facility will allow about 260 employees to take care of day-to-day scheduling and consolidation for the company's European freight network, for both Less Than Truckload and Full Truck Load transport.



500 MILES

The distance Elon Musk's new electric semi truck can travel on a single charge, carrying more than 36,000 kilograms cargo. The U.S. tech magnate, who unveiled the "Tesla Semi" in November, says the truck will go into production in 2019



www.tesla.com/semi



APRIL

16-18

The date of DHL's 2018 Global Technology Conference – this year in Austin, Texas – with the theme "Pushing the Limits."

It's a chance to share, learn and network with your industry peers.



bit.ly/global-tech-2018

JUNE

26-28

The 18th DHL Global Life Sciences & Healthcare Conference will take place in Milan/Lake Maggiore, Italy, offering the chance to engage with industry peers, leading suppliers and DHL experts.

THE SEISMIC POTENTIAL OF DIGITALIZED MANUFACTURING

As Industry 4.0 moves into the mainstream, manufacturing companies are learning that technology is only part of the challenge.



DIGITAL EFFECTS:

The factories of the future will be places where products, workers and machines exist in a sea of digital data.



Almost five years ago, a German government-sponsored project exploring the implications of new and emerging computer technologies for manufacturing published its final report. Industry 4.0 Working Group presented their paper at the Hannover Messe, where more than 220,000 representatives of the world's engineering and manufacturing industry gather every year to see the latest innovations in production and automation technologies. The choice of location sent a clear message: From its beginnings in an area of speculative research, the term Industry 4.0 was ready for the mainstream.

If its aim was to get people talking, the Industry 4.0 project has been a significant success. The concept has spawned hundreds of papers and articles and encouraged equipment makers, software companies and consultancies to launch new offerings, or relabel old ones, with the "Industry 4.0" badge.

Smart machines, flexible factories

Its originators coined the term "Industry 4.0" to suggest a fourth industrial revolution, after mechanization, the introduction of mass production and the development of computer-controlled machines. The difference between the factories of the future and those of the past, the researchers say, will result from the development of new "cyber-physical systems," where products, workers and machines exist in a sea of digital data. Some of that data will be generated during production and use, by embedded, network-connect sensors, and more will be imported from the wider world. Fast, reliable networks,

**60
PERCENT**

Siemens's reported productivity increase after upgrading to Industry 4.0 methods

THE BIG PICTURE:

Digital tech is perfectly connecting products, workers and machines.

based on internet technologies, will allow data to flow freely to wherever it is needed. Powerful computers using smart algorithms will use data to control every step in the production process, and then to optimize the performance of the finished product through its lifespan.

For its proponents, Industry 4.0 promises a world where manufactured objects and their associated data are inextricably linked, allowing companies to reimagine the way manufacturing processes are operated and managed. Speaking in an interview in 2013, Siegfried Dais, Deputy Chairman of the Board of Management at German engineering company Robert Bosch GmbH, described "an extreme vision" for a manufacturing environment in which the unfinished material entering a production process "already knows for which customer it is intended and carries with it all the information about where and when it will be processed. Once the material is in the machine, the material itself records any deviations from the standard process, determines when it's done, and knows how to get to its customer."

Where are we now?

Smart blocks of metal aren't yet directing themselves autonomously through production facilities. In fact, most factories today look and work much the same way they did a decade ago. Real-world examples that show the potential of Industry 4.0 technologies are beginning to emerge, however. Often, these so-called "lighthouse" examples have been developed by the companies that produce those technologies.

Siemens, for example, has upgraded its 80-year-old electric motor manufacturing plant in Bad Neustadt an der Saale, Germany. The digital solutions adopted at the facility include new control interfaces, connections between machines and improvements to the flow of information between design and the computer numerical control (CNC) systems that manage machining operations. The company says that the improvements have increased throughput times by 40 percent and allowed the production rates on new machines to be ramped up 60 percent. It now uses the plant as a showcase "smart factory" for existing and potential customers.

Semiconductor giant Intel aims to play a significant role in the internet of things – the array of connected sensors, displays and other devices that underpin Industry 4.0 technologies. The company has used its own manufacturing plants as a testbed for new technologies. At its factory in Penang, Malaysia, for example, Intel says that the use of sensors and advanced analytics to support the adoption of predictive maintenance practices has saved millions of dollars. The new approach, in

which machines monitor themselves for early signs of wear or developing faults, has cut maintenance time by 50 percent and reduced yield losses due to defects and breakdowns by 25 to 50 percent. An automated system for the classification of defective products has accelerated the process by a factor of ten, speeding up troubleshooting and the root cause analysis of defects.

Industrial giant GE has spent \$4 billion developing digital products, and billions more acquiring startups and established players with technologies that can be integrated into its digital manufacturing offerings. It has also deployed digital systems extensively across its own worldwide network of 500 manufacturing facilities – which it calls “brilliant factories.” Between 2015 and 2016, the company claims that digitalization helped it achieve \$1 billion in productivity gains, with a further \$700 million in savings forecast for 2017.

Are they buying it?

Technology demonstrators are one thing. Asking manufacturers to invest hard cash is quite another. Consultancy McKinsey has surveyed companies in the U.S., Germany and Japan on their adoption of Industry 4.0 approaches. The research revealed broad support for the potential of digitalization. Of those polled, 89 percent said they expected Industry 4.0 to increase their operational effectiveness and 80 percent said the approach would have an impact on their overall business model.

So far, however, implementation of new approaches has proved trickier. Only 37 percent of the manufactur-

ers surveyed said they had made “good” or “substantial” progress with Industry 4.0 in the previous year. There were also considerable regional variations in the results. Companies in Germany were most likely to claim good progress, slightly ahead of their counterparts in the U.S. 84 percent of Japanese firms in the survey, meanwhile, said they had made little or no progress.

Beating the roadblocks

What’s stopping manufacturing companies from fully embracing the digital revolution? Money is part of the answer. The McKinsey survey notes that respondents who claim the most success in the development of Industry 4.0 applications spend a significantly higher fraction of their overall R&D budget on their efforts than those that show less progress. Natural conservatism is

GOING REMOTE:

Thanks to digitalization, industrial equipment manufacturers can offer remote support services.



FUTURE FACTORY:

Industry 4.0 inextricably links manufactured objects and their associated data.



**POWER DOWN:**

Ukraine's electricity system has had blackouts attributed to cyberattacks.

another important issue. Companies are often nervous about redesigning proven products or upsetting finely tuned manufacturing processes.

Even if they have both the will and the cash, however, companies face other important barriers along the road to digitally enabled products and processes. The most important among these is a shortage of skills. Industry 4.0 increases the demand for capabilities that are often in short supply at manufacturing companies, such as people with deep expertise in the management of complex data networks and automation systems. It also requires entirely new skill sets in areas like data analytics or artificial intelligence systems. In its own research, consultancy PwC found that 50 percent of companies saw a lack of digital capabilities as a major challenge to their adoption of Industry 4.0 approaches and 69 percent felt that they needed to develop these capabilities in-house.

The application of internet technologies in the manufacturing space also creates security and privacy concerns. There is growing evidence that cybercriminals see network-connected industrial control systems as valuable targets. Electricity distribution systems in the Ukraine have experienced a number of blackouts attributed to cyberattacks on their control systems, and the U.S. Department of Homeland Security's Industrial Control Systems Cyber Emergency Response Team has warned of a substantial rise in the number of incident reports it receives each year.

It isn't just criminal groups that concern manufacturing organizations, however. As Anton Huber, former CEO, Siemens Digital Factory Division, states in a paper on the topic: "In many cases, [its] industrial data represents a considerable portion of the value of the company." Consequently, many organizations also have

reservations about sharing critical manufacturing and product data with suppliers and partners, especially if they can't agree how that data will be handled or who will profit from any value generated by it. This reluctance to share data could inhibit the development of potentially valuable digital services, like the use of cloud-based services for remote equipment monitoring or the analysis of manufacturing data by third-party specialists to find opportunities for efficiency improvement.

Building new models

While Industry 4.0 technologies offer the potential of entirely new business models, companies still face the challenge of building the processes and infrastructure needed to make those models work. Smart, flexible production systems allow manufacturers to greatly increase the degree of product customization they can offer, for example, but they need to find ways to make that customization accessible and appealing to customers, without adding excessive cost and complexity to their sales and distribution activities.

Servitization is another highly attractive option for many manufacturers of industrial equipment. New service offerings can range from digitally enabled remote support to models in which the customer pays only for the utility provided by the manufacturer's product. Aircraft engine makers, with their "power-by-the-hour" offerings, have shown that these approaches can be a win-win, reducing capital costs for customers while providing predictable long-term revenues for suppliers. The challenge for product companies looking to develop new services often lies not in the technology required to monitor the performance of their assets, but in having the right analysts, support staff and service engineers in place to keep them running smoothly.

\$700 MILLION

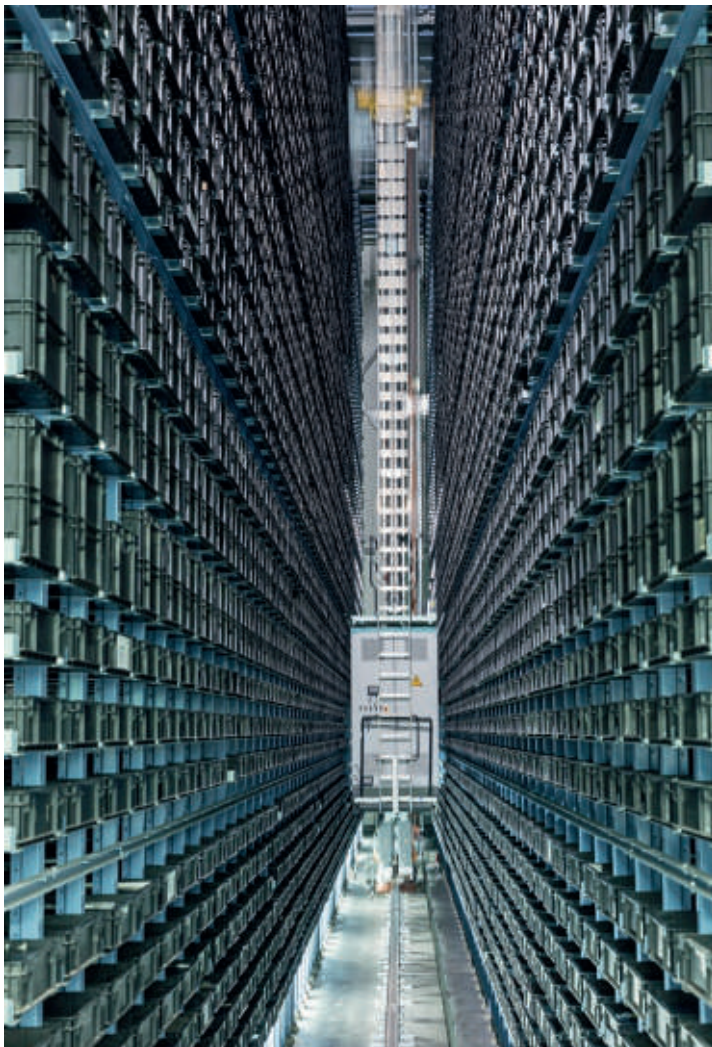
How much GE predicts it will have saved through ongoing digitalization in 2017

In all these models, efficient supply chains and logistics processes have a critical role to play, says Reg Kenney, President, Global Engineering and Manufacturing at DHL: “Servitization models require equipment makers to take responsibility for the uptime and availability of their products wherever they are in the world. They can only do that if they have the right service parts logistics systems in place. And manufacturing supply chain managers are facing greater complexity from flexible manufacturing systems and rising customer expectations.”

In the supply chain, however, digitalization creates opportunities as well as challenges, he adds. “We are seeing a huge amount of innovation in the supply chain, from the use of big data and analytics to increase forecast accuracy and accelerate process improvement, to the introduction of automation and digital tools to improve the productivity of our warehouse operations. And as our customers realize that we have developed these capabilities, they increasingly come to us for ideas about the best way to use these approaches in their supply chains.” ■ *Jonathan Ward*

RACKING UP:

An automated high-rack warehouse facility.



Photos: Alex Koldertsov/Getty Images; Siemens AG; DHL



1. How is the engineering and manufacturing sector responding to digitalization and Industry 4.0 today?

We’ve seen a pronounced shift in thinking over the past two years or so. Today, the potential of digital is uppermost in the minds of engineering and manufacturing organizations. Many of our customers are actually actively shaping the Industry 4.0 future. They are no longer asking if these technologies are relevant to them, they are thinking hard about how best to apply new techniques to transform their processes and, even more significantly, to enable the development of new services and business models.

2. What do your customers say are the biggest challenges associated with the adoption of new digital technologies?

It isn’t technology, it’s people. Our customers know that processes, capabilities and culture will be decisive in the success of their digitalization efforts. The implications are wide-ranging, from ensuring they have the right software developers and data analysts to building the skills and attitudes needed for their broader workforce so as to make the best use of new digital tools and business models.

3. What role do logistics and supply chain processes play in digitalization?

Logistics and the supply chain will be both a beneficiary and an enabler of digitalization. The benefits will come from the adoption of new ways to drive up efficiency and streamline processes. At DHL, we are working on the frontline of that wave of innovation, training our people and adopting a host of technologies from advanced analytics in forecasting to drones for warehouse stock control. But smart logistics is also going to be an essential part of the digital manufacturing value chain, whether that’s supplying highly agile production systems or supporting advanced products in the field.

INSIDE AFRICA'S MOBILE MACHINE

What do you do when you know time is running out for your old business? Become a home for thousands of new ones. That's the approach taken by pan-African mobile network, finance system and business platform MTN.

The mobile phone has changed all our lives. In the rich countries of the West, the revolution has largely been one of convenience. Services that were once only available in homes, offices and high streets can now be carried around in your pocket, accessible at a whim.

In much of Africa, however, its impact has been much more profound. There, mobile communications didn't act as a substitute for other offerings, they introduced those services to millions of people for the first time. The impact of that change has been truly transformative, allowing people to talk, text and trade in real time over long distances.

The region's telecoms players grew rapidly on the back of their compelling offering. The largest of them, Johannesburg-based MTN, has 16,000 employees and 240 million customers in 23 countries. To grow from nothing into a \$12 billion multinational in just over two decades is a formidable achievement, but by 2010, MTN had to face an uncomfortable truth: Its basic business model was not growing as fast as previously.

"We built our business on airtime and text, now airtime was exhibiting slower growth and texting was challenged by instant messaging apps like WhatsApp [and other messaging apps]," says Herman Singh, the company's Group Chief Digital Officer. "Looking

around the world, it became clear that there was a very major digital transformation underway. So, as an organization, we made some tough decisions, and one of those decisions was to explore adjacent domains."

The first step in that process, says Singh, was for MTN to review its strengths. "We sat back and asked, 'what competencies do we have that would allow us to go into a new industry?' And we realized that we had several things, including information on a quarter of a billion customers." That information has huge potential value in MTN's main markets, he notes, where many countries have no national identity system. "The only people in the country that have the full identity of the entire population are the telecommunications players, because we have to identify you before we give you a SIM card."

The second key attribute, says Singh, was a payments system. While many of its customers don't have conventional bank accounts, they all have access to an online "wallet" that they use to buy airtime for their devices. When MTN started the search for new services that could be enabled by those attributes, it found no shortage of ideas.

Many of those opportunities, explains Singh, were enabled by the "value chain compression" that has been the key to the digital transformation of numerous sectors. Turning physical objects into digital ones that can be delivered instantly over the network has transformed the sales and distribution of dozens of products from magazines to movies, boosting convenience for customers and cutting costs for producers. "You aren't talking about two-fold or three-fold improvement, this is a 1000 percent improvement," says Singh. "And in Africa in particular, which is very resource constrained, we recognized that to service customers you need a very asset-light model. You have to digitize everything."

As in wealthier markets, that shift started with music. MTN, says Singh, has been instrumental in switching the continent's market for pre-recorded music from compact discs to streamed and downloaded products.

Other sectors quickly followed, including video services, online gaming (playing games, not gambling) and mobile payments. The company's mobile payments system, MTN Mobile Money, currently has 50 million customers and processes around 100 million transactions a month. Its 70 percent annual growth rate, says Singh, is much higher than that of Paypal, a global internet payment solution.

MTN's transformation wasn't all plain sailing, however. While the company could see thousands of digital opportunities, capturing those opportunities was a very different challenge, especially for an organization that knew more about running telecommunications networks than new internet businesses.

100 MILLION

The number of monthly transactions processed by MTN Mobile Money



HERMAN SINGH

Chief Digital Officer at
MTN Group Limited



Its solution to this challenge took advantage of another major trend in the wider digital world – the way digitalization is bringing formerly separate industries together. MTN decided to embrace this collaborative approach. It would obtain a series of platforms, then partner with established players in other industries, as well as new startups, to create an ecosystem of services for those platforms.

The company's first major platform was money. MTN joined forces with a number of organizations to develop a range of financial services that ran on its Money platform, including remittances, loans, savings and insurance. Financial services work very well on its network, says Singh, and not just because the mobile phone and digital wallet provides the underlying plumbing. MTN's banking partners can also collaborate to assess subscribers' creditworthiness by using smart credit scoring algorithms.

Next, the company turned its attention to e-commerce. In partnership with Berlin-based incubator and venture capital company Rocket Internet, it has invested in a number of digital startups, many of them aiming to take proven internet business ideas and adapt them for emerging markets. A part of this platform is dedicated physical fulfillment infrastructure, including warehouses and transportation assets across Africa and the Middle East.

MTN's third major platform is for media. The big Western video and music distribution services don't have

the right offerings for African consumers, says Singh. In part, that's about price. It is difficult to sell services that cost \$10 a month to consumers with an average per capita annual income of less than \$4,000. But it's also about the product. African consumers prefer locally produced content. "Ninety-one percent of all the music listened to in Tanzania is by local artists," he says. "And Nigeria's 'Nollywood' film industry makes 9,000 movies a year." Making all this content available online doesn't just improve access for consumers. It also helps to provide predictable revenues for artists and producers in regions that have struggled to combat widespread piracy.

Finally, – so far, at least – MTN has also developed a special platform for the three-quarters of mobile phones in Africa that don't offer direct internet access. The system, which uses SMS text messaging to send and receive information, currently hosts around 10,000 services, offering everything from English tuition to football scores.

The vast majority of the thousands of companies operating on MTN's platforms are still in the early phases of their development. But the company's Digital Services division already generates value that make up a double-digit percentage of group revenue.

The key point is this: Had we not adopted a disruptive approach, and had we not gone down the route of working with startups who are very agile and very, very smart, we would never have been able to build this business." ■ Jonathan Ward

240 MILLION

The total number of MTN customers

AGRI-TECH: OUTSTANDING IN ITS FIELD

Digital technologies are helping to bring more predictability and precision to the business of agriculture.

Farmers have always sought ways to ensure success in an activity plagued by risks and uncertainties. The ancient peoples of the Nile Valley used the position of the stars and the phases of the moon to determine when crops should be sown and harvests reaped. Planting by the signs still has its adherents today. The Farmers' Almanac, an annual periodical that provides astronomical data and astrological advice to American agriculturalists, published its 200th edition last year.

Most commercial growers have moved on to other methods, however. And increasingly, those methods involve big data, advanced analytics and the internet of things.

Picking the right day to put seeds into the ground is only one of many decisions that determine the ultimate success of a crop. To get food onto our shelves and money in their pockets, farmers must juggle a host of variables, seeking to maximize yields while minimizing the cost of inputs such as water, fertilizers and pesticides. It's a tricky balancing act. Give plants too little and they won't produce, but excess inputs don't just drive up production costs, they can also depress output and lead to lasting damage to soils and the wider environment.

To compound these challenges, the right combination of inputs can vary significantly over time, depending on the weather and the presence or absence of pests and diseases. And within the same crop, variations in local soil and shade conditions, or differences between

PICK OF THE CROP:

Machine manufacturer John Deere makes precision agriculture solutions.





DOWN TO EARTH:

Photographs from space can reveal information about soil condition.

plants, can mean that the right inputs for one individual are too much or too little for another.

Farming from space

Like their ancestors, today's farmers are turning to the sky for solutions to these challenges. But they rely on constellations of satellites rather than stars. High-resolution satellite imagery and GPS are key enabling technologies for the development of precision agriculture, a new approach that allows crop inputs to be tuned to match the needs of specific locations and even individual plants.

Photographs taken from space using multispectral imaging techniques can reveal a lot of useful information about the condition of crops or soils, from coverage density to canopy moisture levels. The latest generation of commercial imaging satellites, like DigitalGlobe's WorldView-3, launched in 2014, can produce images down to a resolution of a third of a meter. That's sufficient to differentiate between crop rows, spot rocks and tree stumps in meadowland or count individual cotton bushes in a plantation. High data transmission rates mean today's satellites also work faster than their predecessors, while advances in automated image processing are reducing the time and cost required for the creation of images. That matters in agriculture, where farmers need to respond quickly to the signs of developing problems.

Back on the ground, tractors and other farm machines equipped with GPS receivers can be guided precisely and repeatably. That allows inputs to be delivered more accurately, for example by preventing overlaps when sprayers pass up and down a field. Integrating geo-location data into the control of implements can ensure that pesticides or fertilizers aren't released close to water courses or ensure that furrows are cut at precisely the right depth and angle to maximize irrigation efficiency.

It is the combination of these technologies that provides the largest benefits, however. With the aid of data from satellite images and other survey tools such

**\$1
BILLION**

The value of the agricultural drone market by 2024

**33
CENTIMETERS**

Accuracy of DigitalGlobe's WorldView-3's satellite imaging system

as drones, farmers can adopt variable rate application techniques, setting machines to automatically adjust the quantity of inputs applied according to the needs of specific parts of the crop. Agricultural technology provider Trimble says that variable rate application can reduce crop inputs by 10 percent, while the combination of accurate land forming and precise irrigation control can cut water requirements by as much as 30 percent.

Precision agriculture

The commercial potential of precision agriculture is attracting interest and investment from many sides. Some of today's major players come from the technology world: Trimble was founded in 1978 by three former Hewlett Packard employees who wanted to develop commercial applications for the then-new GPS system, for example. But big names from the agricultural equipment world are also heavily involved.

John Deere, the long-established U.S. manufacturer of agricultural machines, acquired GPS technology company NavCom in 1999 and has gone on to develop a comprehensive range of software and hardware solutions for precision agriculture. The company also offers remote condition systems and services for its machines, as well as software products designed to help farmers track assets, schedule activities and generally keep their businesses under control.

Across the Atlantic, 365FarmNet, a subsidiary of German agricultural equipment maker Claas, has developed an online platform that allows farmers to integrate and manage data from multiple sources. The system, which integrates with equipment from a number of manufacturers, is designed to simplify and streamline precision agriculture activities. Claas says that the platform will allow farmers to use data from vehicle-mounted crop sensors or satellite imagery to program variable rate fertilizer application systems with just a few mouse clicks, for example.

Agriculture is proving to be fertile ground for further innovation. Drone manufacturers are developing products that can provide more detailed images of crop condition than satellites, for example. The largest models can even carry tanks of fertilizers or pesticides for selective spraying. Research company Global Market Insights believes the market for agricultural drones will exceed \$1 billion by 2024, with more than 200,000 units in operation worldwide.

The sector is also exploring the potential of artificial intelligence technologies. In September 2017, John Deere announced the \$305 million acquisition of California-based Blue River Technology, which has developed computer vision and machine learning technology for agricultural spraying equipment that can identify weeds growing within a crop and target them with herbicides. Even in one of the world's earliest professions, change is afoot. ■ *Jonathan Ward*



GET THE GST

How the Goods and Services Tax is opening new horizons for companies in India.

Truck driver Rakesh Pratap Singh's taut face has fewer trench-like lines since India launched a uniform national sales tax, replacing a complex web of myriad levies. He now takes three days, gaining one whole day, to haul his 23-ton, 18-wheeled, yellow DHL truck nearly 1,350 kilometers (840 miles) from Mumbai on the west coast to Chennai in the south-east.

The only thing the 42-year-old appreciates even more than the time saving is the huge relief from nerve-racking hassles that he had to endure in the past, such as having to stand in queues to take photocopies of documents and join new lines to make payments at each of the dozen entry and exit points at municipal or state boundaries on the route. "Life has become easier for transporters," says Singh, who is

IN THE DRIVING SEAT:

GST has made life easier for truck driver Rakesh Pratap Singh.

usually on the road from 5 a.m. to 11 p.m. “It used to take three to four hours to get past every checkpoint,” he bemoans, remonstrating that most of these outposts had no restaurants in their vicinity where drivers could grab a quick bite after the painstakingly lengthy procedures, which included paying various taxes at different windows, each involving serpentine queues and much paperwork. “Now, you can get through in less than an hour, sometimes in 10 minutes,” he grins.

Vimal Kumar Chaurasia, 25, who also drives a 40-foot DHL container truck, breathed a sigh of relief at the introduction of the Good and Services Tax (GST), which is touted as the biggest tax reform undertaken by India since the country’s independence from British colonial rule in 1947.

Easier for business

The GST, which launched on July 1, 2017, replaced a bevy of complex federal, state and municipal taxes and duties with a consolidated national tax, effectively tearing down trade barriers within India’s 29 states and seven territories where the federal government has greater oversight, and enabling a common market for the subcontinent.

By focusing on digitalization and electronic payments, the GST aims to simplify procedures, bring transparency, improve efficiency and make it easier to

36

The number of different states and territories in India, each of which used to have its own tax regime

CALL TO ACCOUNT:

GST swaps old-style paper returns for digitalization and electronic payments.

do business. It also ensures better tax compliance that would eventually allow for reduced tax rates. The GST works on a concept of “input credits,” where a manufacturer, service provider or exporter can claim refunds on taxes paid on raw materials or costs incurred, forcing all businesses – including the hundreds of thousands of small vendors who have never paid any taxes until now – to register and become GST-compliant.

Like everything in the world’s largest and noisiest democracy, reforms face formidable hurdles and take time to pass muster. The idea of “one nation, one tax” was conceptualized in 2000 and the initial target for rollout was April 1, 2010, but it took another seven years for the government in New Delhi to get it off the drawing board. To reach consensus across the political spectrum in all states and territories, the federal government made compromises, most notably settling



LINE OF DUTY:

Long waits at checkpoints have been reduced thanks to India’s new tax regime.



“We believe that over the next 12 to 18 months quite a lot of FMCG players will go ahead and set up large DCs (distribution centers).”

Vikas Anand, Managing Director, DHL Supply Chain India

for a four-slab system of tax rates – 5, 12, 18 and 28 percent – with some items, such as fuel and liquor, which are taxed at much higher rates, left outside the GST. In most countries, this kind of tax is usually only charged at one or sometimes two rates.

Over the past two months, New Delhi has moved many items from the highest brackets to lower GST slabs, enabling companies to boost sales and cutting prices for consumers. Over time, the number of slabs is expected to be reduced to two.

Gamechanger

Doubtlessly, the GST is a gamechanger for India's \$2.3 trillion economy. It's already Asia's third-largest after China and Japan, is expanding between 6 and 7 percent annually and is expected to accelerate to near double digits in the next two to three years.

The GST is designed to force the country's sizable informal sector, most of which pays no taxes, to come on board and help pave the way for better compliance, improved data collection, upgraded skills and increased productivity. The task is big. As many as 85 percent of the enterprises in India are in the unorganized sector, according to Rana Kapoor, CEO of private sector Yes Bank. The informal sector accounts for almost 40 percent of the Indian economy and employs nearly 75 percent of the workforce. He estimates the GST will bring at least a million new enterprises within its ambit.

Over the longer term, Kapoor wrote in a report, there will be a shift toward better efficiency, brought about through the allocation of productive resources and government facilitation. This will help create globally competitive companies, better-quality jobs and a lower tax burden.

In the World Bank's latest ease of doing business index, released in October, India jumped 30 places from its position a year earlier to enter the top 100, bolstered by a string of reform measures undertaken by New Delhi over the past three years. As the GST rollout

happened after the cutoff date for the study, there will no doubt be further gains in the ranking when its impact is factored in next year. Prime Minister Narendra Modi, whose first term in office ends in 2019, aims to bring India into the top 50.

Rising foreign interest

A simplified tax regime is a huge draw for businesses, particularly large global companies, to invest in India – especially as the country is on course to top the world economic growth rate table for years, like China did over the past two decades.

Foreign direct investment in India grew to \$25.35 billion between April and September last year, up 17 percent from the same period a year earlier, according to official data. More than half of India's 1.3 billion people, the world's largest population after China, are below the age of 25, meaning they have at least three decades of productive work time ahead of them. Rising incomes and lifestyle changes thanks to exposure to cable TV networks are driving demand for everything – from fashionable dresses to high-end mobiles, sporty motorbikes and cars, eating out and foreign travel. Besides manufacturing companies, global insurance and asset management firms are also expanding their operations in India.

Global accounting firms and information technology service providers are in great demand to help companies prepare for GST compliance, and their services will be needed for many months until the system stabilizes. Big businesses are among those who stand to gain the most from the GST. “The GST is helping us tremendously,” says Adi Godrej. Speaking to Indian newspaper *Business Line*, the chairman of the Godrej Group, which has annual revenues of more than \$4 billion, continued: “Our profits are up primarily because GST is helping the economy.” Godrej's businesses include fast-moving consumer goods (FMCG), which compete with the Indian unit of Unilever plc, home appliances, property development and agribusiness.

While the GST would bolster the fortunes of all businesses, the logistics sector is the biggest winner because its growth has until now been stifled by multiple taxes. In the past two years alone, since the Modi administration made GST a priority, foreign investors have moved \$1.5 billion into the warehousing business, according to media reports.

“These are exciting times to be in India,” says Vikas Anand, Managing Director, DHL Supply Chain India, who expects FMCG makers to lead the shift toward building large warehouse clusters in the coming years. “We believe that, over the next 12 to 18 months, quite a lot of FMCG players will go ahead and set up large DCs (distribution centers),” he says, moving to a “hub-and-spoke model” that would help established

\$2.3
TRILLION

The size of the Indian economy in 2016/17

\$1.5
BILLION

The total value of foreign investment in Indian warehousing since the introduction of the GST



CUSTOMER BASE:

Foreign businesses are tapping into consumer demand driven by rising incomes.

operators with the expertise and infrastructure to ride the emerging need for efficient and cost-effective logistics management. DHL Supply Chain has spent €100 million over the past five years to build three million square feet of warehousing space as the company has stepped up its foray into emerging markets. Each “big box” contains more than 200,000 square feet – more than 10 times the average size of warehouses in India.

Speed bumps

One of the downsides of the GST administration has been delays in releasing input credits, affecting cash flows and forcing companies to cough up additional working capital. For any manufacturer or service provider to get his or her refund, all the intermediaries must have filed their GST returns on time. Most experts believe it would take up to a year for the online systems to stabilize and allow smooth functioning.

The biggest stumbling block is the reluctance of the unorganized to register for GST, fearing they may become vulnerable to tax queries on concealed past incomes. The government has promised it will not harass businesses, but it is still a leap of faith for hundreds of thousands of traders and small businesses



EXTRA STORAGE:

Logistics has been boosted by GST, leading DHL to invest heavily in warehouse infrastructure (above).

BUSINESS SENSE:

A simplified tax regime is proving a big draw for companies (top right).

to undertake. “The only complaints to my mind are coming from people who are not used to paying taxes properly,” Godrej was quoted as saying. “They are the only ones affected and they are the ones complaining. Ethical companies will do well and unethical ones will have to get ethical.” ■ *Ranjit Gangadharan*



INDUSTRIAL STRENGTH

Germany, one of Europe's richest and most populous countries, has long been an economic heavyweight. The country's success stems from deep roots, with multinational corporations thriving alongside a diverse ecosystem of efficient smaller companies and dynamic startups.

Size matters when you are competing on the global stage, and Germany has its fair share of business giants. The country is home to the world's largest chemicals company, BASF: Its Ludwigshafen site is the biggest integrated chemical production facility on earth. In 2016, Volkswagen Group

edged ahead of Japanese rival Toyota to become the world's largest automaker by volume. Robert Bosch is the number one supplier of automotive components. Software company SAP is the market leader for the enterprise resource planning systems big companies use to manage their operations.

GOOD CHEMISTRY:

Germany is home to BASF, the world's largest chemicals company.



jobs and contribute 52 percent of the country's total economic output. And that output is formidable. Germany has the largest economy in Europe and the fourth largest worldwide. It is set to grow another 2 percent in 2017 as compared to its 2016 level of €3.14 trillion.

The "Mittelstand" is tricky to define. Most of these companies are small and medium-sized enterprises (SMEs) with fewer than 500 employees and a turnover of less than €50 million. They are often privately owned and may stay in the hands of family owners for generations. The positive connotations associated with the term means some much larger companies also claim to be part of the Mittelstand, aligning themselves with a set of values that includes a long-term strategic perspective and a focus on product quality and process excellence.

While most Mittelstand companies may be small, they are often effective and ambitious. Plenty of them are global market leaders in their chosen niches, and the specialized products they manufacture are sought by customers across the world. Take BOGE, for instance, a firm based in Bielefeld, North Rhine-Westphalia. The company is an archetypal Mittelstand business that celebrated its centenary in 2007. It is run today by the great-grandchildren of its founder Otto Boge, who built the business making automotive tools and motorcycles. By the 1920s, he had moved into the production of air compressors, where the company found its niche. Today BOGE's 750 employees design and make a range of high-performance compressed air systems used by 100,000 industrial customers in more than 120 countries. The company has embraced new technologies along the way: Its latest models come equipped with internet connections that allow remote monitoring and predictive maintenance, for example.

It is thanks in no small part to the efforts of the Mittelstand that Germany has become an export powerhouse. In 2016 the country exported goods worth €1.2 trillion and its 2016 trade surplus of €252.9 billion was the largest on record anywhere in the world.

€3.14
TRILLION

The total size of the German economy

Even if they can't claim the global number one spot, plenty of Germany's other multinationals are among the world's biggest in their respective industries. There's Allianz, the second-largest insurer, for example, and diversified industrial manufacturer Siemens, Europe's largest such company by far. Carmakers BMW and Daimler may be smaller than VW, but they are still major global players. Continental AG holds the number three position in the league table of automotive suppliers.

The "Mittelstand" model

The big names are important, but focus too hard on them and you miss half the picture. According to Germany's Federal Ministry for Economic Affairs and Energy, the 3.6 million companies that make up the country's "Mittelstand" provide more than 60 percent of German

CRAFTWORK:

Small and medium-sized companies provide more than 60 percent of German jobs.





MEETING OF MINDS:

A brainstorming session at online retailer Zalando. Online retail is growing fast in Germany.

jobs have been created at companies such as Zalando, Awin, Delivery Hero, Home24 or ResearchGate.

Online retail is growing fast in Germany. Sales of physical goods (not counting digital products and streaming services) grew 9 percent in 2016 to a total of €35.5 billion, according to EHI Retail Institute. “The machine is humming. Germans are spending money and the majority of our eCommerce customers are reporting double-digit growth,” says Markus Reckling, Managing Director, DHL Express Germany. “The sheer size and economic power of the country make it very attractive for logistics providers.”

Long-established Mittelstand companies are getting in on the action too. Benefiting from the 9 percent annual growth rate in online sales, Otto is Germany’s second-largest online shop after Amazon, with 50,000 employees and a turnover of €2.7 billion. The company was founded by Werner Otto in 1949 as a mailorder retailer and is now in its third generation of family ownership.

Germany’s digital transformation is very much a work in progress, however, and accelerating the change is likely to be high on the government agenda in the coming years. The term Industry 4.0 was coined by a German government-sponsored group, but not every company has been as quick to embrace digital opportunities as Otto or BOGE. “We estimate only 5 to 6 percent of companies in Germany are really digitalizing their processes,” says Michael Hüther, an economist and director of the Cologne Institute for Economic Research. According to Rico Barth from the Open Source Business Alliance, it is primarily a few big companies that have embraced digitalization. “The larger part of German business, and especially the very important German Mittelstand, has hardly any experience with the internet of things so far,” Barth told BusinessInsider.de.

Moving ahead

But economic reinvention isn’t just about software. The Ruhr region in western Germany was the country’s first industrial powerhouse, but the heavy coal and steel industries that once dominated the region have faded over the years in the face of declining raw material resources and competition from Asia.

Now the region is redefining itself for a new era. Landlocked Duisburg is now home to the second-biggest port in Germany, for example, handling 133 million metric tons of freight in 2016. Each week, 20 trains transport goods between Chengdu, Chongqing and Ürümqi in western China and Germany’s fast-growing inland terminal. The city is currently developing its sixth logistics area, with 26,000 new jobs generated since 2000.

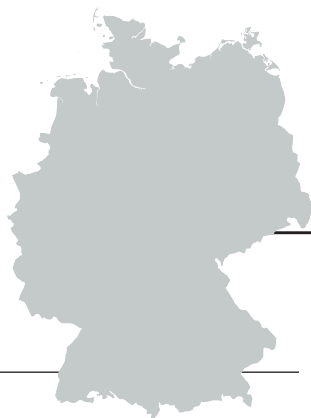
Thanks to its strong exports and wealthy consumers, Germany is an increasingly important center for the

44.8 MILLION

The number of Germans currently in employment, or 94.5 percent of the labor force – an all-time high

Startup culture

Alongside its traditional strengths in physical products, especially sophisticated engineering products ranging from machine tools to medical devices, Germany is embracing the digital revolution. Increasingly, breakthroughs are driven by startups, with Berlin’s status as a hotspot for millennials from all over the world providing especially fertile ground. The German capital hosts the third-largest cluster of IT programmers in Europe and is number two in attracting global talent after the U.K. The country’s universities are another big asset: With Munich, Karlsruhe and Aachen, three of the top 10 European IT faculties are located in Germany. According to the business consultancy EY, growth in Germany has outpaced other European tech regions such as London, Stockholm and Paris and thousands of



GERMANY

Population:
80,594,017 (July 2017 est.)

GDP:
\$3.479 trillion (2016 est.)

World Economic Forum’s Global Competitiveness Index 2017-2018:
5th out of 137

World Bank Group’s Ease of Doing Business Index:
20th out of 190

DHL Global Connectedness Index 2016:
7th out of 140

European logistics sector. The country is also an attractive location for pan-European distribution centers due to its location right in the heart of Europe.

But the 25 percent of European logistics activity the country generates has brought a significant increase in heavy traffic. Following reunification in 1990, the dilapidated former state of East Germany had to be intensively rebuilt. Today, however, infrastructure investment is increasingly concentrated in the west of the country. This will continue in the coming years, with bridges and the Autobahn network undergoing repair and even rebuilding.

In 2017 alone, infrastructure spending was up 10 percent on the previous year, bringing the total to €14 billion. While some critics say this is not enough, the government has repeated that infrastructure spending will be a priority for the years to come and is set to increase spending by an additional 5 percent per year until 2020.

Nor is the startup culture restricted to the co-working spaces of Berlin: It is also helping the country address its logistics capacity challenges. Duisport, for example, just announced the creation of “Startport”: Startups can work there for one year free of charge and develop innovations in logistics. The first company to join the program is looking into the optimization of cranes and storing strategies at container terminals.

Germany must overcome other challenges if it is to continue its seven-year run of strong economic expansion. At 5.3 percent, unemployment is the lowest since reunification in 1990, for example. While that’s good

news for citizens today, it means potential headaches for growing companies in need of new workers. And in the long term, Germany’s aging population is set to exacerbate labor shortages.

Careful navigation

In their annual report to the German Parliament last year, the country’s Council of Economic Experts warned that the current economic boom might cause the economy to “overheat,” as the combination of rapid growth and low interest rates pushes up prices and leads to increased stress on the financial system.

Then there are the neighbors. Germany’s outsized surplus is creating tension with trading partners around the world. Europe, the destination for the majority of German exports, is wrestling with political and economic uncertainty, including the nature and impact of Britain’s exit from the EU.

Karsten Schwarz, CEO, DHL Supply Chain Germany & Alps points out that some of that uncertainty may turn out to favor Germany, with international companies valuing its relative stability, even in turbulent times. “Recently, we’ve seen quite a lot of interest from British companies who have to deal with Brexit,” he says.

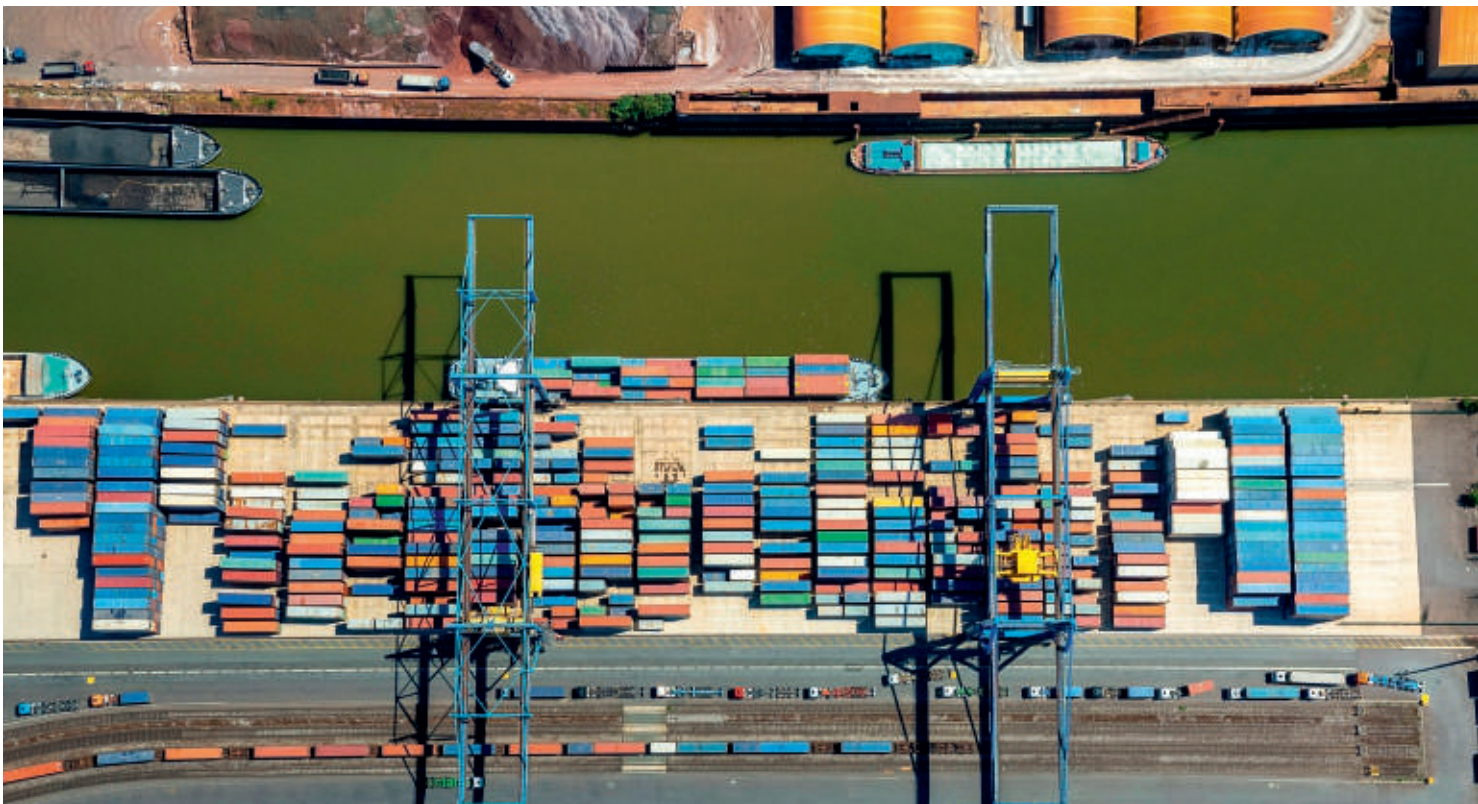
Ensuring the continued smooth sailing of the country’s economy will require careful navigation by Germany’s political and business leaders. But many of the country’s companies, both large and small, have already survived and thrived through plenty of previous economic peaks and troughs. There’s little reason to suspect they won’t do so again. ■ Margaret Heckel

52
PERCENT

The amount of economic activity handled by small to medium-sized companies

PORT OF CALL:

Duisburg in the Ruhr region is home to Germany’s second-biggest port.



THE GREEN MACHINE THAT'S STREETS AHEAD

StreetScooter's electric delivery vehicles made waves when Deutsche Post DHL Group rolled them out across German cities. Now the company is ramping up production with new models and selling to commercial customers.

Achim Kampker was quite frustrated. The engineering professor had brought the shiny prototype of an all-electric car to the International Automotive Exhibition (IAA) 2011 in Frankfurt – the largest automotive show in the world. But nobody really took much note. Then German chancellor Angela Merkel visited the StreetScooter booth. She liked what she saw. “Well done, carry on,” she told the academic.

The professor at RWTH Aachen University had a mission: He wanted to show that it was possible to construct and build a functional and affordable all-electric transport vehicle for city deliveries. But none of the big car manufacturers in Germany was interested.

Seeing the light

One man, however, took note: Jürgen Gerdes, Board Member, Post - eCommerce - Parcel, Deutsche Post DHL Group. He knew that sooner or later he would need electric delivery vehicles to cope with emissions problems in cities. So why not talk to this professor who was audacious enough to present the prototype at the largest car trade show in the world? “Gerdes liked the general idea but said he needed a different model,” says Achim Kampker. So StreetScooter started to work on a delivery vehicle.

As production engineer, Kampker had a totally different strategy than the car specialists: Instead of starting with the product itself, he



looked around for what was already available and checked how it could be combined to create the delivery vehicle Deutsche Post DHL was interested in. “We didn’t develop a single new part for the planned new delivery vehicle,” says Kampker. “Instead, we bought what was already available on the market – and focused on developing a production strategy that would enable them to produce the van quickly, efficiently and without the huge capital expenditure usually associated with new car models.”

So within just two years and for one-tenth of regular development costs, he managed to present several prototypes to Jürgen Gerdes. The final version was a van named StreetScooter Work and was exactly what was needed. A robust, simple vehicle, constructed exactly to the specifications of efficient mail and parcel delivery – and at a cost comparable to that of a non-electric van.

Win-win

The secret sauce was “close cooperation and invaluable input from all sides,” says Achim Kampker, now CEO of StreetScooter GmbH at Deutsche Post DHL Group. “The first model – the StreetScooter Work – was based on proven electric drive technology and expert insights from Deutsche Post DHL couriers. That way, we not only had a state-of-the-art motor with a maximum range of 80 kilometers, we also had a vehicle that met the precise needs of the people who would be driving it. A win-win situation for everyone.”

Gerdes knew he had a winner: In 2014, Deutsche Post DHL took over the company and its production operation, and developed it into a full-blown van factory. By that time, 50 pilot vehicles had been built and were deployed all over Germany. The results were encouraging, so Deutsche Post DHL decided to switch the whole mail and parcel fleet in Bonn, Germany, to electric vehicles. The goal was to make the city a

model for carbon-free delivery. “It was a world first, and at the time we hoped to serve as a role model for other cities and regions,” says Gerdes. “By the end of 2015, we had over 140 electric vehicles on the road, which lowers our carbon emissions by over 500 metric tons per year.”

So in 2016, the StreetScooter was equipped with a stronger engine and the latest lithium-ion battery technology. Dubbed the Work L model, it has an eight-cubic-meter cargo hold and can handle as many as 150 parcels with a maximum load capacity of 1,000 kilograms. Further complementing its energy capacity, as announced at the end of 2017, StreetScooters will also be partially equipped with batteries from BMW in the future.

Although initially planned to solve the carbon-free transport needs of Deutsche Post DHL, many other companies with goods to deliver soon took notice. Few existing manufacturers produced electric vehicles with the relatively small range but large hold capacity needed for delivery vehicles, and demand from third parties soon started to slowly increase: In 2017, the company decided to double the existing capacity from 10,000 to 20,000, built another plant in North Rhine-Westphalia and began selling to outside companies. “The large demand for the StreetScooter and our own ambitious climate protection goals have encouraged us to further expand our commitment in the area of electromobility and to also make our expertise available to others,” says Gerdes.

Smart cars

To further expand the StreetScooter family, the company also decided to build another model large enough to hold over 200 parcels and deliver them over a range of 80 to 200 kilometers on a single charge. The StreetScooter Work XL, produced in cooperation with Ford, will be used to support the urban parcel delivery service in Germany. Another major step is to move into autonomous trucks: In October 2017, DHL partnered with U.S. chipmaker NVIDIA and German auto supplier ZF to build trucks that can drive by themselves. The goal at first is not to replace the person at the wheel, but to help them work more efficiently. Thus, the delivery truck could park itself once the delivery person has already left to deliver the parcel, and follow autonomously in their tracks while the delivery person is moving to the next door. At first, this would only be tested in special areas where autonomous driving is allowed. After that, it could be rolled out further.

DHL announced that its goal of building 5,000 StreetScooters for 2017 had been reached by November, though it has not said how many of the vehicles will be outfitted with the new self-driving technology.

That will include sensors, video cameras, LiDAR (Light Detection and Ranging) and radar from ZF. The data will be analyzed by NVIDIA’s latest chip and inform ZF’s ProAI self-driving system. The goal is to teach the artificial intelligence embedded in the systems to navigate along the route DHL drivers take each day. But whether the vans are driven by delivery people or not, the road ahead looks interesting for StreetScooter – and free of obstacles. ■ Margaret Heckel



THE TALENT OF TOMORROW

Germany's apprentice training system is one of the keys to its success in delivering quality manufacturing to the world. But how exactly does it work – and can it be replicated abroad?

What we do here is to learn about the interaction between complex technical processes in mechanics, IT and electrical engineering," explains 19-year-old apprentice Alina Heib. She wants to become a "mechatronic technician" – a specialist both in operating machines and dealing with their electronic control systems. Heib has been thinking about her field of specialty since 10th grade: "At that time, I was planning on studying directly after high school. But the more I thought about it, the more I became convinced that it would be better to get practical exposure in my field."

The apprentice is learning and working at German engineering giant Bosch. The conditions of her apprenticeship are state of the art: With the help of augmented reality, she learns how to navigate robots on the factory

floor – though in a special area reserved for apprentices – she is also being trained in more traditional metal-working. Another highlight has been to spend three weeks in another Bosch factory, says Heib: "That really broadened my horizons significantly."

But this German teenager doesn't only spend time at the factory. She also regularly attends classes: All apprentices in Germany spend roughly a third of their apprenticeship at special state-run schools called "Berufsschulen" (vocational colleges).

Embedded learning

"The system is a very good combination of theory and practical work," argues Heib.

This is one of the special features of the German apprenticeship system, which trains young workers for jobs in every sector – from banking to hospitality, and IT to house building. It is also called the "dual system" as it combines schooling and working. In the 2016/2017 school year, almost 550,000 young people in Germany started an apprenticeship, versus close to 510,000 who went to university. The roots of the apprenticeship system go back to the times of the guilds in the Middle Ages, when clusters of tradesmen formed their syndicates and took in young people to teach them the trade. The modern German system was refined in the mid-20th century, when the German government codified training and schooling in close cooperation with business.

Since then, there has been a special training plan for each of the 328 jobs covered by the system: and it has to be followed by every company and every "Berufsschule" in Germany. All the way through the three-year training period, the apprentices complete written exams and provide graded work samples. At the end, they get a special diploma called a "Gesellenbrief" and should be able to perform the same work at the same standard at any comparable company: Though up to two-thirds of apprentices stay at the company where they were trained, they are qualified to work anywhere.

Government and business update the system regularly. As job descriptions change, so does the training: 20 years ago, Alina Heib would have trained to become an electromechanical technician – a job that doesn't exist anymore and has been superseded by that of mechatronic technician.

Many experts see the German apprenticeship system as a crucial underpinning of both Germany's postwar economic miracle and its current status as an industrial powerhouse. "While the apprentice system has been lost

MACHINE LEARNING:

Bosch apprentice Alina Heib completes her traineeship in the summer.





in the Anglo-Saxon world during industrialization and left to expensive state institutions, it was kept intact in Germany to this day and helped to establish an industrial Mittelstand,” write business strategists Heiner Kübler and Carl A. Siebel, referring to the seemingly invincible layer of Germany’s small to medium-sized companies.

While large companies such as Bosch could very well provide first-class training on their own, the thousands of small and medium-sized family firms that make up the Mittelstand both fuel the system and profit from it. These firms often have specialists whose sole job it is to train the young. And by being constantly alert to new training methods, the system also helps to implement the latest technology rapidly, right across industries.

International envy

Interest in the apprenticeship system has been growing all over the world. Austria and Switzerland have long had a similar system, as have India, Australia and Canada. In 2013, Britain’s then Prime Minister David Cameron announced that apprenticeships would be the “new norm” for high-school graduates who don’t go on to university. The success has been sketchy, with the Local Government Association declaring the policy “failing” after just two years, mostly because of different labor relations and cultural forces. “The bedrock of Germany’s apprenticeship system is corporatism and restricted practice,” noted *The Economist* when the policy was first floated. In Great Britain, for example, only some skilled

trades are regulated and need a license to practice. In Germany that is the norm – as is the apprenticeship as a “rite of passage” for a school leaver on their way to establishing an “occupational identity,” argues the Institute for Public Policy Research, a progressive London think tank.

Small wonder, then, that it’s mostly German companies such as BMW who are driving the effort overseas: In August 2016, the car manufacturer announced a \$1 billion expansion at its largest factory globally, which is in Spartanburg, South Carolina – and with it an upgrade of their “BMW Scholars Program,” which will train an additional 40 percent more apprentices there. As there are no “Berufsschulen” in the U.S., BMW is partnering with local technical and community colleges.

While international institutions such as the OECD have for decades been scolding Germany for having too few academically qualified young people, the tide seems to be turning again: In their “Education at A Glance 2017” report, the Paris-based organization acknowledges that job prospects for apprentices are excellent – and on par with those of university graduates.

Alina Heib intends to do both: She’s set to complete her apprenticeship in the summer of 2018, and plans to study later. For her, it’s working out just fine. “You learn about mechanics, electronics and information technology and their interaction. And that enables you to understand complex technical processes. This is especially important for Industry 4.0. It’s the job of the future.” ■

Margaret Heckel



HEAVY LIFTING ACROSS THE OCEANS

A vessel chartered by DHL Industrial Projects China Team is pictured transporting a 2,300 metric ton deep-sea drilling equipment set – an essential component in the construction of offshore oil rigs by Yantai CIMC Raffles Offshore Limited (YRCO). This masterpiece of engineering was delivered from Norway to a Chinese shipyard in less than three months. Located in Yantai, the YRCO shipyard specializes in building offshore drilling rigs. ■



THE SHIP:

Vessel type:	Self-propelled
Length:	243.85 meters
Width:	40 meters
Depth:	13.5 meters
Draft:	8.5 meters
Dead weight :	48183.7 metric tons

THE CARGO:

Haul:	Offshore drilling equipment set (DES)
Weight:	2300 metric tons
Length:	34 meters
Width:	33 meters
Height:	44 meters

LIGHTING UP YOUR INTRAPRENEUR

With all the rags-to-riches stories about entrepreneurs starting blockbuster companies in their garages, entrepreneurship may seem more appealing than working for an enormous and established company. But many large organizations are bringing the innovation, energy and incubation of the startup sector into the HQ by embracing intrapreneurship.

When companies invest millions in an ad campaign, they need to know their marketing will be well received by consumers. A recent startup can also predict how consumers will react to pricing, brands and ideas by measuring their brain waves with a specially wired cap as various stimuli are presented.

The company, called the Deloitte Neuroscience Institute, is not your typical startup. The idea originated with a student – and one of the 264,000 employees of tax auditing giant Deloitte. The pair used resources at Deloitte to move from idea to viable business model. That makes the Deloitte Neuroscience Institute a product of “intrapreneurship”: the insourcing of entrepreneurial energy and ideas into the framework of an established organization.

Complementary innovation

Andy Goldstein is a partner at Deloitte and is Co-Founder and Executive Director of the Entrepreneurship Center at Ludwig-Maximilians-Universität in Munich. In his class on intrapreneurship, he brings people from the private sector together with students, including the duo behind the Neuroscience Institute. Goldstein believes intrapreneurship has clear benefits. “Entrepreneurship is not for the faint of heart. It’s not all about being cool and wearing jeans,” he says. Intrapreneurs, he points out, have substantially less risk than those who go it alone.

Yet it takes more than founding an internal incubator and throwing money at it to get intrapreneurship right. Companies should use the strengths that are readily available to them, namely knowledge of the customer and experience in project management. They should also recognize how intrapreneurship and entrepreneurship differ and adapt their methods and strategies accordingly.

Professor Lars Persson, deputy director of the Research Institute of Industrial Economics in Sweden, studies the roles of institutions and how they impact incentives for young firms to grow and develop. He recommends that established companies that buy start-

ups for their patents work to keep key people from the startup on board during integration.

He also suggests not trying to beat startups at their own game. “It would be wise to pursue complementary innovation. You don’t necessarily need to try something that a startup is already doing. As the big incumbent firm, you can always buy the startup anyway,” Persson says.

According to Persson, intrapreneurship is relatively common in Sweden, partly due to the strong trust culture there. “Employees within firms don’t worry about not being acknowledged for their ideas or that managers will claim them as their own, and this helps foster new ideas,” he adds.

Tracy Stanley, an expert on intrapreneurship based in Nice, has studied where and how new ideas are generated. Compared to classical startups, she says, existing companies have huge bodies of knowledge within them that are often ready and waiting to be tapped, regardless of whether that knowledge comes from customer data or the extensive experience of their employees. As Stanley sees it, “Good innovation responds to customers’ pain points and emerging opportunities.”

Another strong point lies in project management skills, which are useful for incremental innovation. Also, the resources of huge companies can often provide more flexibility and options to scale than bootstrap operations. Deutsche Post DHL Group recently demonstrated this principle when it decided to support the eight winning teams among the 150 contestants for the internal incubator pilot program Startup Lab. “Large organizations have processes that can be put to good use,” Stanley argues.

That doesn’t mean it’s always plain sailing. Goldstein, who is also an entrepreneur and the managing director of Deloitte Digital Ventures in Germany, warns of the many pitfalls that are part of innovating within. Often, programs don’t generate value because they do not have the support of top management and firms fail to fund the good ideas they generate. Companies must also keep in mind that a person with ideas who seeks to make them happen within a large company has different needs than someone who is willing to go it alone.



“Whereas an entrepreneur has to deal with his or her own company and the market, the intrapreneur must also deal with the corporation itself,” he says.

Risking it all?

Intrapreneurs are also likely to have a different relationship to risk than entrepreneurs.

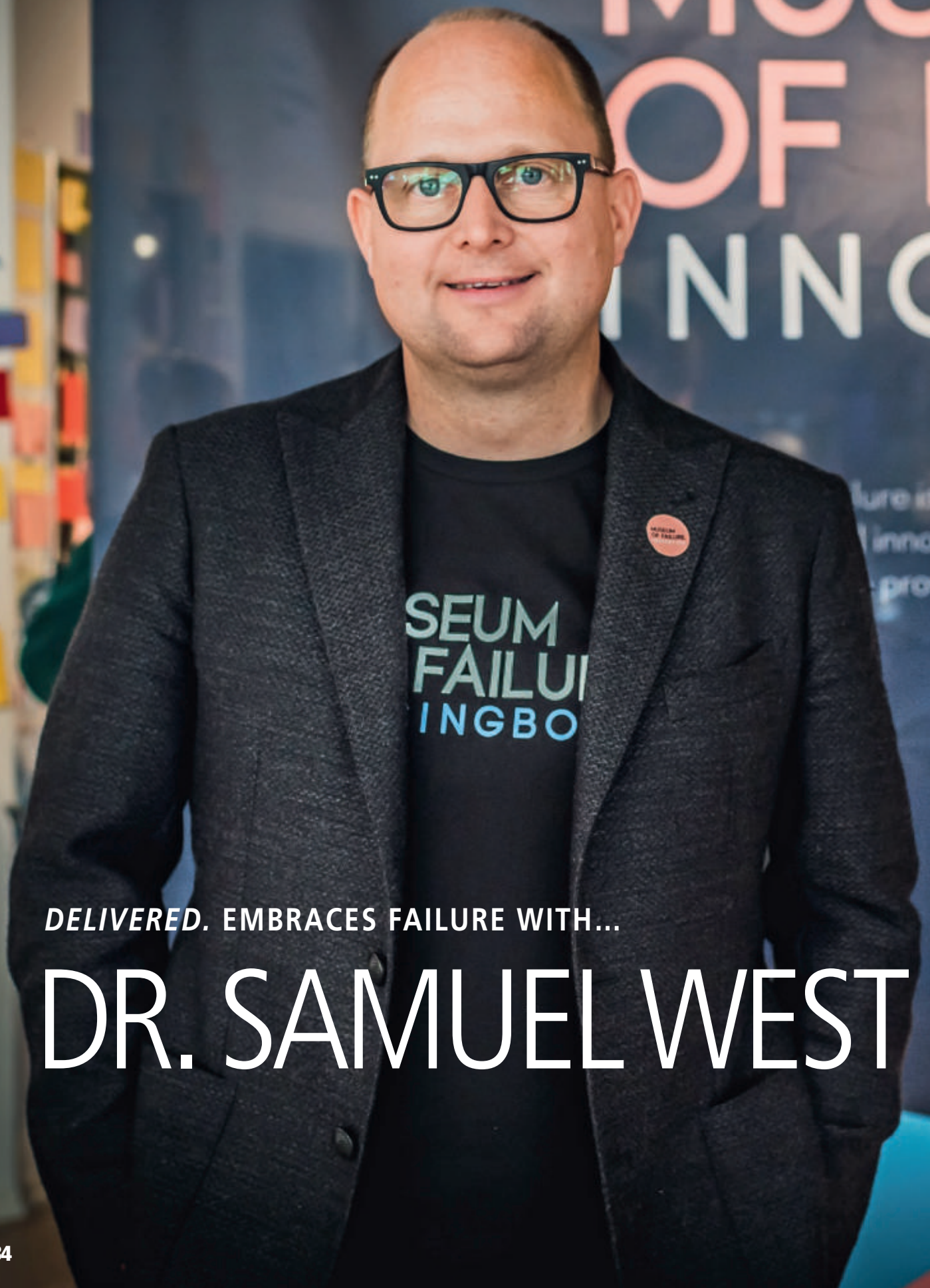
At Deloitte, employees who develop ideas have a clear, well-moderated process that allows them to progress their ideas and projects through various milestones in order to develop new business models. If the idea does progress, innovators will get additional time and money to pursue it. And, perhaps most significantly, the person is allowed to return to his or her old position if the idea does not take off.

That’s exactly what happened for Nadine Galandi, Head of the Neuroscience Institute at Deloitte. A colleague of Galandi, David Pistor, built up the internal business case and started the first market analysis together with two students. They had been working on the business model for about five months when they got the OK – and funding – to move ahead. That’s when Galandi took over the project with the mandate to turn the idea into a product and revenue streams.

Galandi, a biochemist, left her post in the life sciences division of Deloitte to lead the internal startup. “Since my job was to build client relationships, it was risky to leave it. If things hadn’t worked out at the Neuroscience Institute, I would have returned to my old job and had to start building relationships from scratch.” That was about two years ago, and Galandi isn’t looking back. The Neuroscience Institute has nine employees and a stable number of clients. Galandi says it was worth the gamble and the role has taught her the importance of finding practical solutions. “You have to be open for solutions that are not typical at consulting companies,” she says.

For those who love to pursue a good idea, having that opportunity is a critical part of job satisfaction. From the beginning, the team at Deloitte was highly motivated, says Galandi: “They really wanted to turn scientific knowledge into a business model.”

According to Goldstein: “If an intrapreneur wanted to start their own company, the person would have left and done it already. The fact that they haven’t left the company shows they want something new to work on. If you don’t give them something new to work on and support them, then they are going to leave the company – and they’re going to the competition.” ■ Rhea Wessel



DELIVERED. EMBRACES FAILURE WITH...

DR. SAMUEL WEST

The founder of the Museum of Failure reveals why being unsuccessful can have a definite upside.

Dr. Samuel West makes it very clear from the outset: He's not trying to glorify failure or promote it in any way, and he certainly doesn't recommend it as a corporate objective. "But everyone has to accept failure because it's going to happen to them," he reasons. "In every area of our lives, we have to be less fearful of it."

Which is why, last June, West – a clinical and organizational psychologist – decided to open an entire museum dedicated to the subject. Welcome, he says, to the Museum of Failure, an antidote to what he sees as "a relentless round of sugar-coated corporate success stories." Inside, visitors will find a range of commercial products, inventions and services that bombed spectacularly with consumers. "I wanted to uncover the real stories of companies developing unsuccessful products," he says. "I thought they should be heard too, because it's OK to fail. It's human to fail."

The museum in Helsingborg, Sweden, has been closed for the last few months but reopens in April, and reactions from the press and the public since its launch have been "overwhelming." It prompted West to begin a U.S. pop-up tour of the Museum of Failure, which started in Los Angeles in December. The LA pop-up is scheduled to run until February, but he hopes it will ultimately become a permanent fixture in the city. Both locations feature a range of different artifacts.

Alongside some famously failed products such as the Betamax video cassette and the DeLorean DMC-12 sports car, there are also some highly unusual ones, such as the eau de toilette fragrance from a motorbike company or the pens developed "especially for women." Some are strange, such as a "rejuvenating" mask that delivered electric shocks to the wearer's face and others are just plain surprising. The Newton digital assistant, for instance, was a rare failure for Apple (it launched in 1993 but was cancelled in 1998); but, says West, lessons were learnt from it and it did, ultimately, lead to the development of the iPhone. Google Glass, a more recent, wearable tech innovation, is also on display after failing because it fell foul of privacy issues – although it's been reported that Google is now in the process of reinventing it.

Before the opening, West found most of his artifacts online, but the success and publicity the museum has generated means he's now often given donations from the public. Recently, for instance, he received a parcel containing cappuccino-flavor potato chips. "Every week, someone sends me another bad product idea," he says.

There was, however, a nagging doubt in West's mind before the museum's launch. What if no one came?

What if, ironically, it was a total failure? "I was terrified initially," he says, admitting that there would have been a bizarrely pleasing circularity to the whole enterprise if it hadn't been a success. "But I calmed down later when companies started visiting with their teams. That's gone crazy, actually: I've had so many requests for tours from businesses – particularly ones in France, U.K. and Germany. I think they see that it isn't just a funny and quirky museum, but a place where they can really learn something."

What's your criteria for displaying a product in the museum?

I have three: It has to be a failure, of course – and the definition of that is "a deviation from expected or desired outcomes." It also has to be a new business model that somehow didn't work. And it has to be interesting or fun. I want it to be entertaining as well as informative.

Why did the artifacts in the museum fail?

The reality is that innovation is risky. Some products – like the pens for women – aren't great ideas to begin with. But others can fail at the design stage, in production, or in delivery – and sometimes for reasons that are totally outside a company's control. For example, there was a popular slimming product in the 1970s called Ayds, whose sales were badly affected in the 1980s because of the AIDS epidemic. That's something the company making the product couldn't have foreseen.

Is failure healthy?

In a way. Innovation springs from failure: You can't have one without the other. If someone in a company wants to try something brand new, I say give them the money, let them try it and if they fail, get them to learn from it and then move on to something new. If they do that, at least one out of 10 initiatives will work and be very profitable.

Are some businesses better at accepting failure now?

Some are. Jeff Bezos from Amazon, for example, has said that he wants his company to be "the best place in the world to fail." To do that, though, you have to be able to adapt quickly – which is what Amazon is good at doing.

Do we have to change our relationship with failure?

That's my personal mission! I want to be part of a movement that destigmatizes failure. Failure is never going to be a positive experience, but it doesn't have to be so negative that it dictates our future behavior and stops us from taking risks. I don't want people to feel better about failure because, by definition, it's uncomfortable. But I do want them to embrace that discomfort because doing so can make us better and wiser. That's the message of the museum. ■ Tony Greenway

90
PERCENT

The approximate number of innovation projects that are thought to fail in industry

1000

The number of times Thomas Edison is said to have failed to invent a commercially viable electric light bulb before finding success



Leave that comfort zone – why we need more leading women in logistics

Leading women in logistics continue to be a minority. That has to change. But change needs courage. Especially in a working environment that experiences disruptive digital transformation, stepping out of old comfort zones is of paramount importance.



AN ESSAY BY SABINE MUELLER

Sabine Mueller is the CEO of DHL Consulting, an independent strategic supply chain and management consultancy of Deutsche Post DHL Group. She is passionate about promoting gender diversity at executive level. Visit her blog, sabinext.com, for her personal views on logistics trends and empowering women in leadership.

The logistics industry is exciting and vibrant, and I have been calling it my home for the past two decades. Big data, artificial intelligence, robotics, drones, and disruptive software such as blockchain, push our industry to constantly evolve and reinvent itself. In order to continue excelling in their jobs, leaders in logistics need to not only adapt but to lead the way.

Of course “leading the way” is more easily said than done, especially when that means truly embracing the paradigm shift triggered by digitalization. One of my most valuable lessons was being able to leave my comfort zone.

Too much comfort zone – too few female leaders

The willingness to question old, comfortable behaviors has helped me greatly throughout my career. I made it a priority not only to think but also to act outside of my comfort zone. I strongly believe this is one of the main reasons why I am who I am today: a leading woman.

Looking back at my professional progression, I held various positions in strategy, corporate organization and consulting. Over time, I have witnessed an increase in gender diversity, but to this day women in leadership continue to be underrepresented.

My personal experience evolving in this type of working environment has triggered my engagement to actively promote a more gender-balanced workforce and inspire women to take charge of their career advancement with confidence. This is no easy ride.

Gender balance has not been achieved – yet

The numbers speak for themselves. At Deutsche Post DHL Group, women make up 35 percent of the total workforce but are confined to only 15 percent of the board of directors. The proportion of women sitting on other supervisory boards has moved from 30 percent to 40 percent in the past five years – an encouraging development. However, this picture shows that gender disparity at higher executive levels is still a reality. And the logistics and supply chain industry is no exception here. The air gets equally thinner for leading women across a large number of middle-sized and large corporations in Germany.

Men and women working together simply make better decisions. This is the reason why I encourage logistics leaders to put women's career advancement on their agenda and make a commitment to promoting diversity throughout their organizations.

I strongly believe that more diversity and gender balance at executive level is a winning recipe for improved business performance, innovation and competitiveness. The same applies to gender parity in the boardroom. Diversity in backgrounds, gender, cultures, perspectives and experiences is a fundamental prerequisite for sustainable business success.

How we get there

While the value of driving a gender diversity agenda is unquestionable, getting it right requires focus. It takes courage, a vision, and a conducive culture that empowers women throughout the organization to voice their needs, take risks, and demonstrate their own capabilities in getting the – any – job done. Business leaders need to take ownership for managing and accompanying this necessary change process. Today, our sustained efforts on achieving greater diversity at DHL Consulting translate into a tangible improvement in customer and employee satisfaction. But a strong long-term strategy needs to be in place to maintain this positive trend.

The most obvious step in this transformational journey is to mirror gender equity goals in recruiting and career advancement processes. The company's recruitment approach remains a particularly crucial building block to be calibrated toward diversity targets. Attracting, retaining and developing a mixed talent pool will help establish the balance needed to capture the related business value.

Networking – nurturing business relationships and exchanging information with peers – has become an instrumental way for women to tap into their potential as leadership personas. Young female professionals in particular need to master networking skills and invest in meaningful professional connections. Social media and other communication channels today provide new opportunities for women who might have found it difficult, or perhaps didn't have the chance, to network proficiently in the past. Part of my commitment to improving gender diversity in the logistics industry is to provide dynamic and ongoing networking platforms that enable women to interact. DHL Consulting's annual women's recruitment event has become a perfect forum for promoting proactive integration and further development in our industry.

Next step: owning the change process

Interestingly, digitalization itself seems to act as a career enabler for women in leadership. Studies show that a large percentage of women believe companies that have gone through digital transformation are more likely to support their career development.

Becoming a female leader in logistics requires dedication, courage and confidence in one's own capabilities. I want to inspire women in this industry to step out of their comfort zones, be vocal about their professional needs and leverage – digital – networking to accelerate their careers. Obviously, it takes more than dedicated women to change the system. Agile organizations need to acknowledge women's positive impact in leadership positions and make progression opportunities for them more visible and accessible. Most importantly, this change has to be embedded in the long-term company culture and strategy.

It requires true leadership skills to turn diversity into an asset for our business. If tackled seriously, gender parity will without a doubt unlock a company's full potential for creativity, innovation and competitiveness.

I look forward to engaging with you on the topic of women in leadership. Share your professional experiences and your perspective on women in the logistics sector. ■

I invite you to connect with me on:



www.twitter.com/MuellerSabine13



www.linkedin.com/in/muellersabine13



www.sabinext.com

WHAT'S THE STORY, MS. LENNARD?

IN A CLASS OF HER OWN



An inspirational teenager from the British Virgin Islands has started her own school after hers was closed due to damage from Hurricane Irma.

My name is Jhadazia Lennard and I'm 13 years old. I live on the North Sound of Virgin Gorda, the British Virgin Islands' third-largest island and one of the areas hardest hit by Hurricane Irma. Virgin Gorda was completely devastated by Irma in September and the schools here have been severely damaged

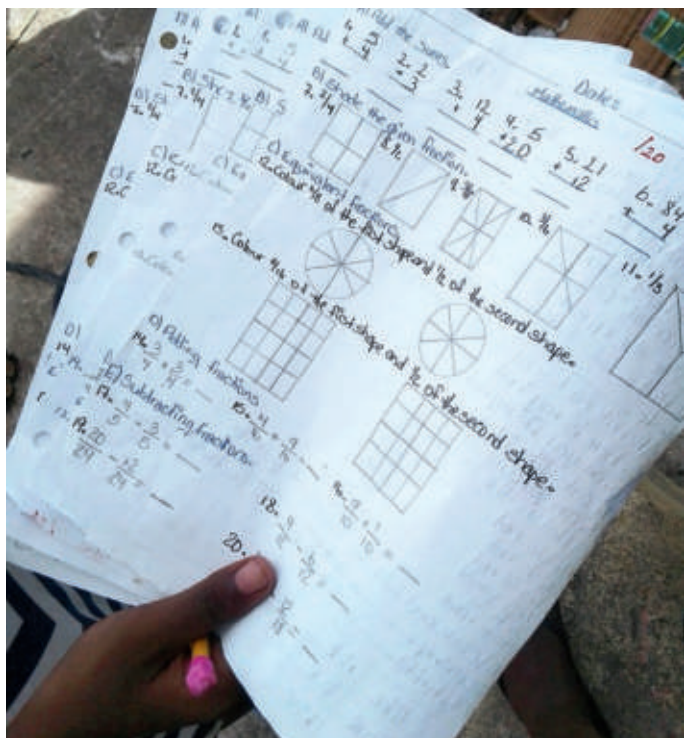
– some of them have closed, including mine. As a result, the pupils have nothing to do and nobody to teach them, and it looks as though it might stay that way for a long time while the buildings are repaired.

I wanted to do something about this because I'm a bit of an education freak and I don't like to be away from school for too long! It's always been my dream to be a teacher too, so I decided to take it upon myself to start up a school for the kids in my community. So that's what I did. Now every night I stay up late with a flashlight and write lesson plans and worksheets for them. In today's lesson, for example, they'll be learning about the solar system. Then they'll play, and I'll give them treats. After that I'll give them some sheets to fill in about nouns, verbs and adjectives. The most challenging part for me is that the children are of all different ages and grades, so I have to create different worksheets for each person.

The first time my school opened I was very anxious, but after a couple of days I settled down as more and more children began to arrive. Now I have approximately 10 students. I love to see them educated and I don't want them to be out on the streets because if you stay away from school for a long time, you forget things. Also, education brings a community together. My advice for anyone would be to help children from their community and do what I've done: Get them together and do some school work! The motto at my school is "We will rise again." I hope one day I'll become a bigger and better teacher, in the name of the Lord. ■ *As told to Tony Greenway*

DONATE: Help rebuilding efforts in the British Virgin Islands by supporting Adopt a Roof, a charity committed to helping get roofs back on people's houses.

www.adoptaroofbvi.com/donate



185

The wind speed in miles per hour of Hurricane Irma, Category 5, which blasted the British Virgin Islands for more than 24 hours – the only Atlantic hurricane to sustain such wind speed for so long

FIRST CLASS:

Jhadazia has created tailored worksheets for her students.



\$31.3 BILLION

The forecast market growth of industrial logistics robots by 2020

As automated processes are increasingly adopted in the production of goods and services globally, the use of robotics in logistics is forecast to grow in every industry segment. According to a report by WinterGreen Research, industrial logistics robotics projects are ongoing worldwide, with the focus on end-to-end process automation. A key objective of industrial robots implementation is keeping costs down, and the adaptation of existing tools, implementation of commercial mechanisms, and loading and unloading of pallets, is often seen as the best way to build viable robots.



bit.ly/logistics-robots

For a DHL view of robotics in logistics, please read DHL's Trend Report:



www.dhl.com/trendresearch



CELEBRATION IS JUST AROUND THE CORNER!

Delivered. will celebrate its fifth birthday soon. Celebrate it with us!
Register in advance to win great prizes and receive a special surprise!

To register, please visit:

www.delivered.dhl.com/birthday