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PERSPECTIVES ON RETAIL TECHNOLOGY A BIANNUAL LOOK AT RECENT DEVELOPMENTS

PERSPECTIVES ON Retail technology

About PoRT

Nielsen *Perspectives on Retail Technology* (PoRT) is a biannual publication that tracks technology trends significant to retail. It has a rotating editorship of Nielsen experts who use each edition to showcase a major trend in a series of in-depth articles. These are accompanied by a more diverse set of snapshots on trending or interesting topics.

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FROM THE EDITOR

The world is increasingly complex, instrumented and virtual. There's vast amounts of information about consumers and the factors that influence their behavior that simply didn't exist in the data warehouse era. In this edition of *Perspectives on Retail Technology*, we take a closer look at how all this data will affect retail when it comes together with recent technology trends.

THERE'S VAST AMOUNTS OF INFORMATION ABOUT CONSUMERS AND THE FACTORS THAT INFLUENCE THEIR BEHAVIOR THAT SIMPLY DIDN'T EXIST IN THE DATA WAREHOUSE ERA.

The first of our three in-depth articles, "Fusing Physical & Digital" examines the challenge of integrating this mountain of new data and making it usable for analysis. That's a difficult task, but it's only the first step in addressing the issues facing retail today.

In "Pile It High and Sell It Cheap," we discuss how to use this new data in combination with new technologies to avoid out of stocks and maximize sales. Out of stocks have long been one of the biggest drags on performance. Today, the problem is more acute: retailers now have more stores, more suppliers and much larger inventories than ever before. As the problem of out of stocks grows and changes, our solutions need to evolve to keep pace.

Our final in-depth article, "Getting to Know Your Customers," looks more directly at personalization. E-commerce retailers operate in a virtual world that's instrumented by default, with a huge amount of information about consumers that they can use to personalize their shoppers' experiences. Brick-and-mortar retailers need to match that level of personalization to compete, and technology is ready to help them.

Digital retail's rate of change is ferocious—past retail revolutions, such as the rise of barcodes and POS systems, seem like they took place in slow motion. Keeping pace requires embracing both new data and new technology with open arms.

We're excited to share what we've learned on our journey and where we think the road ahead will take us. I hope you find the articles stimulating and helpful as you work through these questions in your own business.

Julie a Cume

Julie Currie

SNAPSHOTS



MAKING IT PERSONAL

Digital marketing hubs allow online advertisers to personalize their content to individuals in real time and at scale. And because this advertising is carried out by programs, not people, it presents an opportunity for improvement by machine learning. A trained algorithm can help an advertiser adapt to its audience moment by moment based on consumer response to a campaign. The same technology could help an e-commerce retailer react to changes in shopping behavior by adjusting their display creative, online content, mobile content and product recommendations in real time.

It isn't possible to do anything that sophisticated in the real world—yet—but technologies such as smartphones, beacons and smart cities are bringing our understanding of shoppers' behavior in the physical world towards parity with our understanding of shoppers' behavior online. In the near future, a shopper's journey through a physical store could be shadowed by their digital twin's path through a virtual store.

Providing personalized promotions to a shopper's mobile phone is happening today, so you could say shoppers are being shadowed by a primitive digital twin already. But this is really just scratching the surface. How much more is possible?

Today, despite some smartphone-based personalization, in-store trade promotions are predominantly broadcast: seen by everyone passing through the doors, regardless of relevance or benefit. But once the store and the consumer have digital twins, it will be possible to apply e-commerce techniques to brick-and-mortar stores well beyond what's happening today.

The biggest obstacle to this sort of innovation is simply that a store is a physical thing. The consumer's experience of an e-commerce store is already individual; they are shown personalized recommendations and offers, and may even get a tailored price on a product of interest. Meanwhile, giving every consumer a personalized view in a brickand-mortar store is problematic: even if the shelf label is electronic and changes as different people approach, you'd still likely see the price the other guy got, which could drive intense dissatisfaction. The shelf could be left un-ticketed, with product information displayed on the consumer's phone or other personal device, but for retailers who define themselves by the deals and prices they proclaim on signs throughout their stores that would be a huge culture shift.

That's offers; what about product assortment and recommendations? It's a real-world problem, as a simple thought experiment demonstrates: having backroom staff (or even a robot) continuously rearrange the store as each customer enters is clearly a non-starter. Using augmented reality would be the best way to implement this sort of experience, blending the physical store with a personalized digital overlay. The augmented world would be private to the consumer, and so would also work for personalized offers and promotions. It should also, in theory, be much more natural and less intrusive than routing everything through the consumer's smartphone. That's in theory. The consumer would still have to access that virtual world somehow. While gamers don't seem deterred by the clunky headwear required by current virtual reality technology, it's unlikely that ordinary consumers will want to wander around a store encumbered by a helmet like an imperial stormtrooper. On the other hand, some attempts at virtual and augmented reality seem to be based on devices with the same form factor as an ordinary pair of glasses; that sort of technology would probably be unobtrusive enough to achieve widespread adoption.

But that's the far future at the moment. In the meantime, it seems as if the consumer's smartphone is still the best way to provide a personalized shopping experience in real life. Brick-and-mortar retailers could copy their digital rivals by varying prices and promotions according to time of day, activity in the store, promotions in neighboring stores and external circumstances, such as the weather. This data would be combined with information about consumer behavior (browsing products, viewing promotions, purchasing and so on) and fed into autonomous, selflearning systems that could tune the promotion over the course of the day. As we discuss in more detail in "Getting to Know Your Customers," brick-and-mortar retail is about to get personal.

A STORE BY ANY OTHER NAME

You don't hear people say they're going to the store or the mall quite so much these days. They're just as likely to talk about going to a pop-up shop, incubator retail space, grab-and-go, experiential store or some other new format. Do these new trends have staying power? Dictionaries are reluctant to accept new words—they want to put their effort into documenting terms they think will stick around—so the Oxford Dictionary's recent addition of terms like *click and collect, bricks and clicks* and *webrooming* is an indicator of lasting change in retail.

"Go" is the store innovation creating the loudest buzz at the moment, and no wonder: it makes all of the usual pain points in shopping—waiting in the checkout line, unloading your produce, getting it scanned and bagged, searching for your loyalty card, waiting for payment authorizationmagically disappear. The consumer simply walks into the store, takes what they want and walks out.

But the rise of grab-and-go doesn't actually speak to the heart of what's afoot in retail.

The most significant trend is that stores, those quintessential points of sale, are becoming less and less places where things are sold. When consumers have dozens of points of purchase (in store, online, phone apps, TV, automated kiosks and more), it doesn't make sense for brick-and-mortar stores to dedicate themselves exclusively to transacting sales. Sales can be made anywhere, but some things can only be done in a store—things as basic as trying on a shirt before you buy it. This is where brick-and-mortar stores need to focus their efforts.

Gartner believes that trends, such as online shopping and purchasing by internet-connected appliances, will lead to a reduction in store inventories, and may mean that some retailers offer a third of their inventory *only* for purchase online.¹ Not needing to stock these items will free up space to improve customer experience, for example by adding product demonstrations or genius bars ("how do I tell if an avocado is ripe?").

Retailers could also reduce the size of their stores. Many are facing strong competition from hard discounters, who generally have tiny inventories of mostly own-label products. If traditional retailers shrank their stores, they could more easily compete on price as well as differentiate themselves by offering a full inventory of branded goods online.

For non-commodity products, the store will be the place where a brand defines its story to the consumer: the sourcing of its components, the craftspeople that created it, its design philosophy and so on. Consumers will increasingly use these stories to discriminate between brands. And the emphasis on stories naturally leads to experiential retail.

Nike's flagship stores are a great example of experiential retail. They're designed around several sports zones (running, soccer, basketball and so on) where consumers can try out the latest products. They also offer a personal styling service and the Nike equivalent of a genius bar, where consumers can connect with store experts and fellow enthusiasts. The Miami store also contains a multimedia art installation inspired by sports. The store is no longer just a

¹ "Industry Vision: Less Physical Retail Selling Space and Greater Retailer-Manufacturer Collaboration." Gartner. October 19, 2016.

sales space, but an art gallery, spa, game arcade and advice center; experiential retail is a long way from "Pile it high and sell it cheap" (which we discuss later in this issue).

Brick-and-mortar retail isn't going to go away. Despite the huge advances in e-commerce, more than 85% of sales are still transacted in store. But those stores will change, and the change will likely be dramatic.

DIGITAL TWINS & COMPANION PRODUCTS

As we discuss in "Making It Personal," we're starting to see the creation of digital twins—electronic duplicates of realworld things, including consumers.

This is a major advance. Data from sensors is used to create a digital model of the object, which can be used to monitor performance, diagnose problems and plan preemptive maintenance. The first things to be digitally twinned were long-lived, safety-critical assets like jet engines and wind turbines. But twins are slowly becoming more commonplace.

Now consumers have digital twins—avatars that roam social media and online stores, tracked by the smartphones carried by their humans in the real world. Currently these avatars embody limited information about an individual, and this data is fragmented across multiple systems. At present there's not a single entity that aggregates it all; but with the growing popularity and sophistication of digital assistants on your phone, in your car and in your home, personal avatars will likely become very important to retail in the future.

So why has this digitization trend bypassed most fast-moving consumer goods? One of the main reasons is cost: it makes obvious sense to create a digital twin for a jet engine, but not for billions of fast-moving, low-margin goods.

Even if individual FMCG products are unlikely to be digitized in the foreseeable future, many items will be linked to the digital world through companion products. Companion products are things such as internet-enabled coffee machines, printers and washing machines that can order their own consumables. The benefits of companioning are obvious: consumers get convenience, and manufacturers get information about consumption and consumer lifestyle—as well as the "captive" sales of the consumable.

Product digitization is interesting, but on its own it's hardly revolutionary. However, the combined effect of, say, coffee machines ordering their own supplies, coffee subscription services and consumers buying coffee online could have a radical impact on retail. Diminishing in-store sales will disrupt distribution and retail channels. In response, retail may move away from standard pack sizing to customized distribution that's personalized to the consumer's own usage pattern. The supply chain would move from a push model to a pull model; long-term production plans based on forecast models would be replaced with short production runs based on actual measurements of near-term consumer demand.

This would result in a natural shift towards finer marketing segmentations based on households or even individuals, as we discuss in more detail in "Getting to Know Your Customers."

DRIVERLESS CARS COLLIDE WITH RETAIL

Saying that driverless cars will have a huge impact on the automotive industry in the next decade is a truism. Saying that driverless cars could also have an equal impact on retail, however, is not.

Driverless technology will not only make the driver redundant, it will eliminate many of the inconveniences of owning and using a car. For example, instead of searching for parking, the car could Uber itself out for a while, or if it's a pool car it could service another customer. Eliminating downsides like this could make a lot of behaviors that are currently niche, such as car sharing, become mainstream. In car sharing, you need to pick up a car from a designated location and return it there at a set time when you're done. You have a car, but you're hardly less tied to pickup and drop-off points and timetables than if you were using public transportation. A car that could turn up at your door, drive you where you want, drop you back at your door and return

itself to the car pool would give a huge boost to car sharing, and significantly compromise the attraction of the suburbs and the success of suburban malls.

Indeed, widespread adoption of car sharing and self-driving cars could lead to notable shifts in urban populations, to the benefit of city centers and at the expense of suburbs. It would also mean that the large areas of city centers currently set aside for parking will become available for other things, including retail—another blow to the space advantage the suburbs offer to retailers.

Smart self-driving cars—cars that coordinate their activity to maximize traffic flow—will ease congestion. Suburban malls and out-of-town large-format stores are currently attractive not just because of convenient parking, but because you don't have to fight your way through city traffic to get to them. If smart self-driving cars improve city traffic flows and you no longer need to park your car in the city center, the appeal of out-of-town shopping, already under pressure from e-commerce, may ultimately disappear.

Driverless cars also seem like a more practical solution to automated delivery than the drones that many e-commerce retailers are investigating. As an alternative to Uber-ing themselves out, unused cars could be filled with deliveries and drive around the city making drop-offs.

Driverless cars can also function as mini data centers (with access to massive amounts of data and processing power) and mobile, panoptic cameras, and it will be interesting to see how these capabilities play out. Will cars swarm, pooling their data and processing power to solve big-data problems? Or will they collaborate to create a real-time Google street view? We haven't even begun to scratch the surface of this potential.

In the near future, we'll see widespread adoption of technologies that break paradigms (such as "cars need drivers" and "cars must be owned") that have shaped business for several decades.

If there is good news for retail here, it's that Ben Evans of Andreessen Horowitz thinks autonomous cars will create more billionaires in real estate and retail than in tech or manufacturing, just as cars did.² But they will probably be based on city rather than suburban property empires. Retailers should be updating their city-vs.-suburb strategies in line with projections of driverless car adoption—and getting ready to act.

² Evans, Benedict. Twitter post. August 29, 2016, 3:54 pm.

IN FOCUS

FUSING PHYSICAL & DIGITAL

You're in a new city, with an hour before a business meeting. You need to focus on your presentation, but you also need something to eat. Your connected watch finds several local quick-service restaurants and chooses one based on how busy it is, your company expense policy and your dietary preferences—using your vital signs to ensure you're eating a balanced diet. (Did you really have bacon maple pancakes for breakfast?). While you keep working, the watch tells your self-driving car to take you to the restaurant. Based on local traffic, the watch will alert you when it's time to leave for your meeting. And because you're in a hurry, it will pay the bill. Hopefully, it will leave an appropriate tip.

This magical world is closer than you think. There are phone apps to help you get smoothly from place to place, using up-to-date information about passenger loads on public transportation and traffic flows in the city. These apps will alert you to get off the train when you reach your destination, and can even share your progress with the friends you're heading to meet. As for self-driving cars, they're on our roads today, if few in number.

Meanwhile, nothing in the restaurant scenario is remotely difficult; it's just a question of joining the existing technical dots. Data and services—traffic flows, footfall, menus, nutritional information, prices, payment systems and more are freely accessible to connected devices.

The scenario is possible because the interplay between the digital and physical worlds is seamless. We've gotten used to emphasizing the divide between digital and physical, but it's quickly disappearing: when digital data about the physical world is comprehensive, real-time and freely available, the physical and digital augment each other. This is most obvious in the navigation apps we use every day, which

overlay digital maps with information about the physical world to create an augmented view far richer and more useful than either the physical or digital view alone.

WHEN DIGITAL DATA ABOUT THE PHYSICAL WORLD IS COMPREHENSIVE, REAL-TIME AND FREELY AVAILABLE, THE PHYSICAL AND DIGITAL AUGMENT EACH OTHER.

This is a much greater challenge for brick-and-mortar retailers than for born-digital e-commerce companies. E-commerce retailers' online stores, and the digital environment in which they exist, are instrumented to monitor consumer behavior by default. Their knowledge of the e-commerce retail environment is so granular that (as we discuss in more detail in "Getting to Know Your Customers") they understand the path to purchase and price elasticity at the individual consumer level—something even brick-and-mortar retailers with sophisticated loyalty programs struggle to do.

E-commerce retailers can also track store performance metrics, such as the effect of promotions, in real time. This means that they can continuously tune behavior, for example based on reactions to offers and price changes, to provide the best outcome for consumers—and profits. Unlike most brick-and-mortar retailers, e-commerce retailers are not only born digital, they're born global. Bringing brick-and-mortar retailers to data parity with e-commerce won't be easy. Retailers have been assembling a holistic view of their businesses for decades using data warehouses and business intelligence software. But that view is limited, for example to sales and to in-store observation data: product displays, price banners and so on. Retailers use analytic techniques to infer the extent to which a display affects consumer behavior, but they have no direct, continuous measurement of that effect. This is very different from e-commerce retailers, who only need to add a few lines of code to a website to capture extensive information about consumers and their environment. Gathering the same information in the real world requires installing physical devices to capture the data of interest, in all the right places. These devices must then be connected so that the captured data can be transmitted to a hub for further processing.

The prevalence of digital technologies—including mobile phones, the Internet of Things, wearables and smart objects (from supermarket shelves to entire cities)—now make it possible to address the problem of instrumenting the physical world. We're close to a tipping point; we'll soon be able to record mountains of data about physical consumers and their environment. This will let retailers directly measure consumer behavior that they previously had to infer from secondary signals. So for example, data from beacons, in-store cameras, point of sale and loyalty apps will allow retailers to know whether a consumer actually paused to look at a display before making a purchase.

Instrumenting the physical world is a huge step forward, but it only addresses the problem of data capture. To get a complete picture of the physical retail environment that's equivalent to e-commerce, retailers must assemble and integrate data from many sources at scale and in real time; data has to be fresh and relevant when it's used. Traditional data warehouse ETL techniques can't deal with the variety, volume and velocity of the data involved. Instead, companies are turning to the big-data and streaming technologies used by e-commerce companies to gather data, and to sophisticated algorithms and machine learning to automate the expert clerical tasks of data integration. For example, Walmart ingests over 200 streams of internal and external data, processing 2.5 petabytes of data every hour to create an integrated-reality view of its business.¹ There is a further challenge: traditional retailers not only have to change their technology, they have to change their cultures as well. While a recent survey of data analytics by McKinsey showed that high-performing companies were more likely to have adopted big-data tools than their poorly performing rivals, the difference was not large;² buying and installing software is easy. But some behaviors were much more prevalent among high performers: making data accessible across the whole organization, providing business users with self-serve analytics, and making sure they had the tools and expertise to work with unstructured and real-time data. In other words, although underpinned by technology, a lot of the success of companies with the best analytic and data practices comes down to having the right expertise, processes and attitudes.

TRADITIONAL RETAILERS NOT ONLY HAVE TO CHANGE THEIR TECHNOLOGY, THEY HAVE TO CHANGE THEIR CULTURES AS WELL.

How do brick-and-mortar retailers develop the capabilities and culture to make the necessary leaps? The most important thing they need to do is change the way they think about and manage data. That will make data integration easier—but it will also create demand across the organization for the tools and expertise needed to work with data like leading companies do.

Most established companies are still in the world of the highly structured enterprise data warehouse, rather than the "no schema" world of the digital titans. The enterprise data warehouse tried to model the business in a neutral and open-ended way, but most models were strongly influenced by the business's operating practices and its view of the world. That's not a bad thing during times of business stability. But in a world increasingly defined by volatility, uncertainty, complexity and ambiguity, it can be a liability.

By conforming to the business's unique view of itself, enterprise models create inertia that works against change

¹ Marr, Bernard. <u>"Really Big Data At Walmart: Real-Time Insights From Their 40+ Petabyte Data Cloud."</u> Forbes. January 23, 2017.

² "The need to lead in data and analytics." McKinsey & Company. April 2016.

and constrains people's ability to think creatively. Any uniqueness in the model also makes it harder for the company to share its information with third parties, or to incorporate data from third parties into its integrated reality. That's an important consideration when you need over 200 sources of data to get a complete view of your business.

Because the world is changing unpredictably and your data-partner ecosystem is constantly evolving, it makes sense to describe your data in as neutral a way as possible, minimizing the proprietary aspects of the model by using open or industry standards. If nothing else, this will help make data comprehensible to the uninitiated and aid its adoption inside and outside the company. This sort of frictionless data exchange is foundational to initiatives such as Industrie 4.0, which address the digitization of complex value chains through collaboration among enterprises, things and consumers—an "industrial" version of our example of the busy executive in the restaurant.³

One of the best ways to make data comprehensible, useful and flexible is to keep it raw and let the data's consumers decide how best to use it—rather than trying to preempt their needs by providing pre-cooked answers. (Unless, of course, you know your consumers very well and this is a value-added service you provide to them.) Critical to making the data comprehensible and useful is the ability to supplement it with extensive metadata. In the data warehouse world, metadata required strict governance, not least because it cost so much to create and maintain; it usually required a team of subject matter experts as custodians. Machine learning isn't a panacea for metadata management just yet, but it has made it far easier to generate large volumes of high-quality metadata quickly and accurately, with limited need for human input.

ONE OF THE BEST WAYS TO MAKE DATA COMPREHENSIBLE, USEFUL AND FLEXIBLE IS TO KEEP IT RAW AND LET THE DATA'S CONSUMERS DECIDE HOW BEST TO USE IT. At the restaurant the busy executive visited in our earlier example, it's important that his data-consuming device receive useful nutritional information about the available menu items. Classification schemes of the "healthfulness" of food that help an in-store consumer make an informed choice at a glance—a smiley or frowny face, or a red or green flash—don't work in this scenario. Proprietary or semiproprietary indicators make it impossible for the device to compare meals across restaurants reliably. Do three red dots mean the meal is spicy, high calorie, high fat, high salt, high sugar or all of the above?

Attempts to simplify proprietary schemes also break down as the information that consumers want multiplies: allergies, gluten intolerance, dietary preferences, nutritional needs, sourcing and supply chain standards and so on. More importantly, they're simply unnecessary in the digital world; the consumer has a digital assistant that knows their needs, wants, medical history and current physiological state, and is capable of understanding and analyzing a large amount of complex data on their behalf. The best thing is to provide the most complete, unprocessed data possible, and let the machines decide—both on the shelf and at the restaurant.

This doesn't mean that there's no place in this brave new world for proprietary mental models. Each business must identify its own optimum trade-off between proprietary advantage on the one hand and the benefits of a rich partner ecosystem on the other. For some, being completely open and transparent may be best; others will benefit from a walled-garden approach. At the very least, it seems wise to isolate the proprietary parts of the model and ensure they're limited to the minimum necessary for competitive advantage.

Once data is integrated automatically and in near-real time, it can be used to drive brick-and-mortar retail execution in a way that is competitive with e-commerce.

This automation ranges from things such as monitoring the supply chain for potential out of stocks (as we discuss in "Pile It High and Sell It Cheap") to monitoring and tuning promotions (as we discuss in "Getting to Know Your Customers"). It will be a long haul, but it's a necessary one.

4

³ <u>"Industry 4.0."</u> Wikipedia.

PILE IT HIGH AND SELL IT CHEAP

The first true supermarket in the U.S. was opened by former Kroger employee Michael J. Cullen in August 1930 inside a 6,000-square-foot former garage in Queens Borough, New York City.¹ The store, King Kullen, operated under the slogan "Pile it high. Sell it low." Today, we remember it as "Pile it high and sell it cheap."

When you're a supermarket operating that business model, being able to always keep your shelves stocked is critical to your success.

That sounds trivial, but it really isn't. Since that first supermarket opened 87 years ago, we've seen incredible scientific advancements, including the eradication of diseases like smallpox. But despite huge advances in retail technology, empty shelves remain an issue. On average across the globe, 8.3% of products are out of stock at any one time.² More than half the times a consumer goes into a store with a 10-item shopping list, they leave without at least one of the products they want.

Of course, things are better organized in countries where companies have invested more in retail. But even in leading markets, Nielsen estimates that 1.5–2% of items are out of stock at any one time. That's a small percentage, but when stores routinely have inventories of 100,000 items or more some as many as a million different products—that's a huge revenue opportunity. An average out of stock in the U.K.

- ¹ <u>"Supermarket."</u> Wikipedia.
- ² Nielsen proprietary data.
- ³ Nielsen proprietary data.
- ⁴ Nielsen proprietary data.

lasts four days. Nielsen calculates that if the main suppliers of the top four U.K. retailers reduced their out of stocks by an average of just one day, it would generate \$10.5 billion in incremental annual revenue.³

And it's not only a one-time sales loss. Some retailers won't list a supplier that can't meet certain measures of supply-chain effectiveness. And consumers are now less likely to wait until their next shopping trip for an item; e-commerce has made it easy to compare prices and features, and to find other brands that are immediately available in the store or elsewhere. Out of stocks can cause far more damage than the initial loss of a sale, although that alone can be enormous.

OUT OF STOCKS CAN CAUSE FAR More Damage than the initial LOSS OF A SALE, Although that Alone can be enormous.

Why are out of stocks so hard to fix? In stores with large and diverse inventories, one major problem is false stock: the store's internal systems show it has a product in stock when in fact it doesn't. Estimates show that false stock accounts for nearly half of all out of stocks.⁴ This usually results



from a delivery being incorrectly entered in the system; for example, a pallet with different flavors of yogurts is recorded as all strawberry, the flavor that happened to be on top. Errors like this create cyclical and enduring problems that can only be fixed by addressing the root cause.

To make matters worse, the recent proliferation of niche brands has created new negative effects. Niche brands' *raison d'être* is that they have no acceptable alternative. When they encounter an out of stock niche brand, consumers are more likely to switch retailers than they are to switch brands—especially if the retailer regularly suffers out of stocks. Not only do the retailer and manufacturer lose money, but the retailer may also lose a loyal customer.

In the long run, the difference between commodity product out of stocks and niche product out of stocks is the difference between bad news and very bad news. Most large manufacturers have achieved retail saturation—their products are listed in almost all the stores able to sell them—and the only way to increase sales is to reduce out of stocks.

MOST LARGE MANUFACTURERS HAVE ACHIEVED RETAIL SATURATION, AND THE ONLY WAY TO INCREASE SALES IS TO REDUCE OUT OF STOCKS.

How can the out of stock problem be solved? The most reliable way to spot any out of stock is by walking the store aisles regularly—a costly thing to do that does not sit well with the pile-it-high-sell-it-cheap business philosophy. Thirty years ago, using a combination of electronic pointof-sale data, new business intelligence tools and analytic techniques, we could infer out of stocks from anomalous sales patterns. Those techniques didn't suddenly stop working, but they're reliant on expert analysts running the numbers. In the intervening decades, retailers have added more stores, increased their inventories by orders of magnitude, taken on more and smaller suppliers, and been forced to maximize their cost efficiency due to competition from hard discounters. Expert analysts running numbers don't scale in that environment.

Cloud computing platforms, combined with big-data technologies, can process data for thousands of stores and hundreds of thousands of items in a timely manner and at an acceptable cost. However, this sort of brute-force attack on the problem still results in old-style reports that data analysts must interpret. It removes the data-processing bottleneck, but doesn't address the reliance on resourceconstrained analysts.

That problem is ripe for an automated solution based on analytic algorithms or machine learning. Machines can be taught to look for out of stock patterns and identify the ones that would generate the most value if they were put right an important function when the cost of sending someone to the store to fix the problem is so high. Processing can also aggregate data to look for clusters of out of stocks among particular geographic regions or store types. These may have a common root cause, such as a problem in a shared distribution center.

Further, machine learning isn't just useful for identifying where out of stocks have occurred; it can also be used to forecast out of stocks. By using historic sales, promotions, weather, seasonal trends and other relevant factors, retailers can predict and thus address out of stocks before they arise, adjusting their reorder levels continuously.

There are different business models for applying out of stock smarts. Some retailers prefer to create a "single version of the truth" that they can share with their suppliers. They'll often share their data with a measurement company and subcontract the out of stock analysis to them. Having a single version of the truth makes it easier to optimize stocking across the whole store, applying the learnings from one supplier or product category to the others.

As long as the supplier of the retail execution analysis continually improves and innovates, there's no downside to this approach. But some retailers prefer to use competition; they make their data available to their suppliers, who may use it with a third-party vendor of their choice. This leads to multiple versions of the truth (at least one for each vendor), but it has the advantage of promoting innovation. The disadvantage is that the different versions of the truth can

generate more heat than light, with people obsessing over the differences in the models rather than resolving the out of stock issue.

Whichever approach a retailer chooses, success hinges on the retailer's willingness to share their data in depth. If a third-party vendor has access to point-of-sale data, stock data, distribution center data and other information, it will be in a much better position to accurately predict out of stocks.

SUCCESS HINGES ON THE RETAILER'S WILLINGNESS TO SHARE THEIR DATA IN DEPTH.

There are some high-tech innovations, such as smart shelves and item tagging, that could in theory drastically reduce out of stocks, without the need for store visits and complex analyses of sales patterns. Although RFID is cost prohibitive for tagging individual fast-moving consumer goods, it has been used for items such as clothes: U.K. retailer Marks & Spencer was able to reduce out of stocks even while reducing backroom stock levels by 50%. Other retailers showed a lift in sales in RFID stores compared to equivalent non-RFID stores.⁵ However, these technologies alone aren't a silver bullet. Being able to track individual items and create alerts doesn't deliver any business benefit; that only comes from engaging partners in the process. If the retailer can't "sell" their collaborators (manufacturers, suppliers, brokers, etc.) on the importance of the alerts—especially if the retailer wants to literally sell their out of stock solution—then the benefits of the technology will remain unrealized.

Nielsen believes the most cost-effective solution is to have a single version of the truth, wherein all the players adopt an ecosystem approach; retailers, manufacturers and brokers collaborate to solve the out of stock problem. This is a coopetition approach: a manufacturer who identifies a problem with a distribution center solves the problem for everyone who uses the center, including their competitors. Welcome to the digital world of ecosystems and coopetition.

Nearly 100 years since it was first enunciated, "pile it high and sell it cheap" is still a winning formula, whether you're looking at innovations in brick-and-mortar stores by hard discounters such as Lidl and Aldi, or at online innovations by e-commerce retailers such as Amazon. But it will become less and less viable unless the out of stock problem is successfully taken on—and probably taken on again and again as the retail environment continues to evolve.

⁵ Kilcourse, Brian. <u>"Comment: Making RFID work in real life.</u>" Essential Retail. May 11, 2017.

GETTING TO KNOW YOUR CUSTOMERS

More than a decade ago, I walked into a large hotel in Kyoto with my family. My experiences in the U.S. and Europe had me primed for a long check-in process, during which I'd explain who I was, that I had a reservation for three nights, that my family was with me and so on. But before I had a chance to speak, the desk clerk smiled at me and said, "Hello Mr. Dudley, I've checked you in. Do you need any help with your bags?"

The hotel knew my family would be arriving that day, and the staff intuited that the Western guy dragging a large suitcase across the hall, accompanied by a woman of approximately his age and two younger women, could only be me. It was my first experience with what the Japanese call *omotenashi*: the way a good host makes a guest feel valued and respected by anticipating their needs.

That sort of personal and personalized interaction is becoming increasingly important to retail. Hyper-connected consumers have access to more than one billion products offered by a myriad of companies, from global behemoths to hip, local start-ups. Empowered by technology, the consumer is redefining the value proposition of goods and services. The traditional characteristics of cost, choice and convenience are still important, but in a world where there are so many good choices, a personalized experience is rapidly becoming the key differentiator. This is especially true for the born-digital Generation Z, which already comprises more than 20% of the European and U.S. populations.

IN A WORLD WHERE THERE ARE SO MANY GOOD CHOICES, A PERSONALIZED EXPERIENCE IS RAPIDLY BECOMING THE KEY DIFFERENTIATOR.

Many suppliers would say they've always put their customers first and given them personal service, and they have—to the extent that they knew and understood their customers. But digitization has made it possible to see a much more complete view of the consumer, and consequently upped the bar for what's considered good service.



Personalization is easy for digital businesses. The instrumentation of the virtual world provides a huge amount of information about consumers: click into an e-commerce store and the site already knows your buying history and browsing habits, the ads you've viewed, your demographic information, your preferences and so on. As a result, the digital retailer has a good individual-level understanding of price elasticity and path to purchase, which in turn means it can optimize offers to individual consumers and maximize profit.

Digital businesses don't do this using human intuition and sensitivity, like the hotel staff—they don't have to. (Nor could they; the scale is too large.) Big data technologies, real-time platforms and machine learning algorithms let retailers crunch data quickly and cost-effectively in a way that wasn't possible before. Traditional business intelligence tools were great for describing what had happened and helping analysts understand why. Modern approaches automate this kind of analysis, and the best analytic models can predict shopper behavior with an amazing degree of accuracy. Trained machine learning algorithms can both diagnose what happened and prescribe the best responsive action. They make it possible to use customer-centric tactics at scale and in real time.

Advertising has been similarly transformed. It's no longer constrained by broadcast media with no feedback loops. Today, it can use instrumented digital campaigns tailored to fine-grained target groups. The campaign is automated, always on, and uses machine learning algorithms to continuously improve its performance. Algorithms can dynamically create advertising content and promotions based on the current context each time a consumer engages. In the course of repeated interactions, consumers reveal ever-increasing amounts of personal information some of it implicitly through their behavior, and some explicitly in exchange for an advantage such as a discount or loyalty points. This information can be used to improve the consumer's personalized experience.

As a result of these innovations, online retail is becoming a war played out by machines using genetic algorithms and game theory. System designers set the rules of the game, configure the business objectives and constraints, and press play. The business monitors whether goals, such as higher loyalty and profit, are trending in the right direction and course-corrects as appropriate.

ONLINE RETAIL IS BECOMING A WAR PLAYED OUT BY MACHINES USING GENETIC ALGORITHMS AND GAME THEORY.

If only it were the same offline. Unlike the hotel in Kyoto, when you walk into a large traditional brick-and-mortar store, it seemingly knows nothing about you. It also looks the same to you as it does to everyone else. It's not a dynamic, changing, reacting thing in the way that an e-commerce store is. Even if you're enrolled in the retailer's loyalty program, they likely won't find out until you get to the register with a purchase—and certainly not if you exit without buying. If you've downloaded and activated the retailer's shopping app and there's wi-fi, beacons or other in-store technology to monitor shoppers, they may find you earlier in your store odyssey. However, this is intrusive and requires consumer's participation in a way that online tracking does not.

One way to approach the e-commerce retailer's panoptic view of the consumer is by gathering information about shoppers from their devices: for example, many consumers allow apps on their phone to gather information about their location and share it with third parties. Retailers can also instrument their own physical stores by using technologies such as beacons to capture information about the shopper's whereabouts, path through the store, "linger times," return visits to a shelf and so on.

Retailers can use this information in a variety of creative ways. In one campaign, Goodwill leveraged consumer location data to advertise to people whose mobile phones had recently been in thrift shops or second-hand stores. The campaign was designed to convince people to donate their unwanted things and to raise awareness about Goodwill's work-training programs.¹

¹ Kaye, Kate. "Location Data 2.0? How Goodwill and Other Brands Are Ushering It in." Advertising Age. March 2, 2017.

QuickChek is a popular stop for shoppers who need graband-go food, gasoline and lottery tickets. Historically they used billboards, newspaper ads and social media for promotions, but they wanted to see if they could do better by going digital. QuickChek used location data from mobile phones to determine when consumers were last in a QuickChek (or a competitor) and what routes they took to get there, allowing them to identify people who frequently drove near a QuickChek but hadn't visited recently. They targeted these consumers with advertising, and saw a nearly 83% lift in store visits compared to a control group who received no promotions.²

Although mobile phones are currently the best digital avatars for consumers in the physical world, there are other sources of information. Buildings and public spaces can be instrumented, and there are initiatives underway that will connect consumers' exposure to ads on office lobby and elevator screens to store visits during the work day.

Leveraging the location data that a consumer shares with a third-party phone app may be unintrusive, but it doesn't create a strong bond between the consumer and the retailer or manufacturer using the data. This sort of light-touch relationship has many advantages, but some suppliers naturally want a more direct relationship with their consumers. The most common way to do this is through a specialized app on the consumer's phone. App fatigue is a well known phenomenon, however, plus there are other potential pitfalls. The app owner must persuade the consumer to part with a substantial amount of personal information, which the consumer knows will be used to target them directly. Also, because the relationship with the supplier is direct and explicit, the consumer has greater expectations: the app must provide a convenient, useful service that's a fair exchange for the data the consumer has parted with, and that they'll continue to use.

One such app is Basket Savings. It shows consumers nearby grocery stores based on their current location, along with price comparisons for the consumer's shopping list. And as a Nielsen Connected Partner, Basket Savings has additional sophistication: it can reach into Nielsen's point-of-sale data to know what products are available in the store to supplement crowd-sourced information. Consumers can compare prices and receive coupons and other promotional discounts; retailers can see local demand, price appropriately and target the right consumers in the right place at the right time.³

Brick-and-mortar stores have come a long way on the road to personalization. Is it worth the effort for companies born in the pile-it-high-sell-it-cheap supermarket with a one-sizefits-all approach?

The simple answer is yes, because it's bound to deliver more profit. Studies of e-commerce show sites that personalize a user's online experience generate higher-value orders, greater margins and fewer returns.⁴ There's every reason to expect exactly the same effect offline.

SITES THAT PERSONALIZE A USER'S ONLINE EXPERIENCE GENERATE HIGHER-VALUE ORDERS, GREATER MARGINS AND FEWER RETURNS. THERE'S EVERY REASON TO EXPECT EXACTLY THE SAME EFFECT OFFLINE.

In the never-ending race that is modern retail, companies can no longer compete primarily on product or price. Brickand-mortar stores should continue investing energetically in creating individualized digital interactions. These personalized interactions will drive higher satisfaction levels and engagement, and in turn help increase revenue, profit and repeat business—creating an *omotenashi* customer experience.

² Schiff, Allison. <u>"QuickChek Sets Great Store On Location Data."</u> AdExchanger. November 3, 2016; Vachon, Paul. <u>"Harnessing Big Data - Anonymously yet</u> <u>Effectively."</u> National Retail Federation. January 9, 2017

³ "Basket." Nielsen Connected Partners Program.

⁴ "What's Hot in Digital Commerce in 2017." Gartner. January 25, 2017.

ABOUT NIELSEN

Nielsen Holdings plc (NYSE: NLSN) is a global performance management company that provides a comprehensive understanding of what consumers watch and buy. Nielsen's Watch segment provides media and advertising clients with Nielsen Total Audience measurement services for all devices on which content — video, audio and text — is consumed. The Buy segment offers consumer packaged goods manufacturers and retailers the industry's only global view of retail performance measurement. By integrating information from its Watch and Buy segments and other data sources, Nielsen also provides its clients with analytics that help improve performance. Nielsen, an S&P 500 company, has operations in over 100 countries, covering more than 90% of the world's population. For more information, visit www.nielsen.com.

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