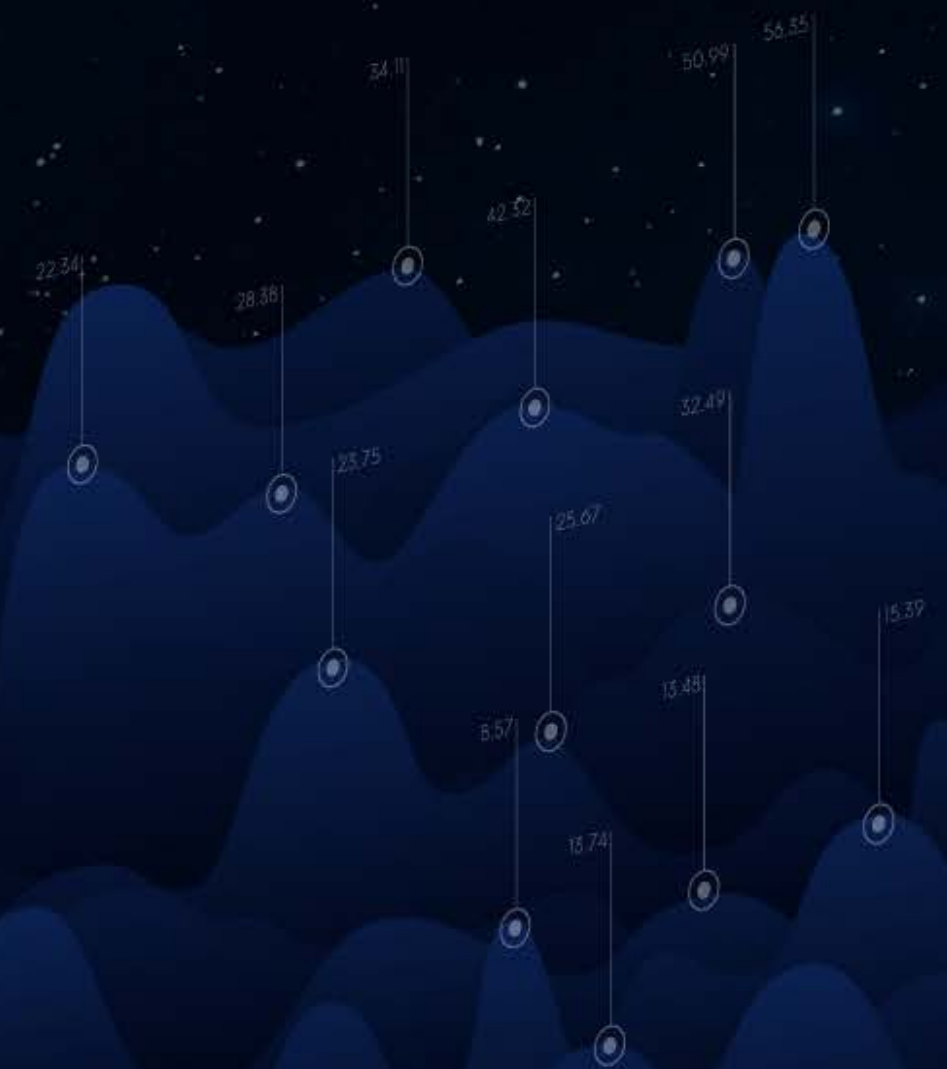


Autonomous decisions in retail: how artificial intelligence is reshaping pricing.



Autonomous decision-making.

**Artificial intelligence
(A.I.) transforms pricing
strategies and levels the
playing field for regional
grocers.**



Today's increased consumer expectations, paired with increased competitiveness, creates a tough pricing environment, one never before seen by grocers.

When it comes to implementing data analytics tools to solve pricing questions, A.I. isn't a "nice to have" but rather, it's become a must.

Artificial intelligence is an approach to solving very complex problems using computer programs that can learn new actions and iteratively adapt when exposed to new data. It continuously improves defined outcomes without human intervention and has the ability to learn without being explicitly programmed.

Advancements in artificial intelligence (A.I.) offer tremendous opportunity for retailers, especially grocers who are looking to transform their pricing strategies and supercharge profits.

In 2018, the number of consumer sources for purchasing groceries items is rapidly expanding, due in large part to digital stores and the increased number of players entering the market. It wasn't that long ago when most Target locations did not offer perishables. And of course, Amazon further turned up the pressure through the purchase of Whole Foods in 2017, positioning a major A.I. power player in the brick-and-mortar space. There's even international pressure as grocers are finding themselves in direct competition with foreign chains entering the market at discount prices – e.g. Lidl and Aldi. Competition is, and will remain, as fierce as ever.

Retailers know that consumers value great deals and shop at grocers who can meet their budgets. But they also place a large value on accessibility and convenience. This criterion leads grocers into a

vicious cycle: drive more sales to maintain profits, while cutting costs to beat the competition.

So, with giants like these contending for share, the pressure from consumers to keep within a tight budget, and grocery margins hovering around 1%,⁽¹⁾ how can the regional chains, the mid-market and smaller grocery players even compete on pricing and bring in a profit?

This where A.I. comes in. Artificial intelligence is an approach to solving very complex problems using computer programs that can learn new actions and iteratively adapt when exposed to new data. It continuously improves defined outcomes without human intervention and has the ability to learn without being explicitly programmed.

Who is Daisy Intelligence?

Daisy Intelligence is an artificial intelligence software-as-a-service company that analyzes very large quantities of transaction and operational data in order to make automated operational decision recommendations which clients can immediately action to

improve their business.

Gary Saarevirta, CEO of Daisy Intelligence, notes that today's increased consumer expectations, paired with increased competitiveness, creates a tough pricing environment, one never seen before by grocers. When it comes to implementing data analytics tools to solve pricing questions, A.I. isn't a "nice to have" but rather, it's become a must.

What does Daisy offer that's different than what's already out there?

Based on a proprietary Theory of Retail™ designed by Saarevirta, the Daisy A.I. solutions uniquely help retailers choose the correct price for regular or promotional items, in order to better increase margins and incremental sales, and to select the right products to promote at the right time, and in the right channels. In addition, the Daisy system can predict the right quantities to meet demand in each channel with the goal of reducing stock-outs and write downs.

What does autonomous decision-

making of the future look like and how will it drive down prices, benefitting society as a whole?

This does not mean A.I. will put retail merchants and merchandising professionals out of work – it actually drives quite the opposite scenario. When human beings are assisted with A.I.-powered decision-making tools, they're better able to use their time to solely focus on setting strategic priorities and solving problems that exist on a macro scale.

With the ability to offer up the best scenarios based on collected data, and in almost real-time, A.I. unleashes enough computing power to analyze data and run simulations that result in pricing decisions that increase margins by even the smallest amount, making a large impact on profits.

This white paper is intended to offer retail merchandising professionals a starting point to learn how A.I. technology uses math to rapidly calculate and simulate millions of variables – allowing retailers to better predict how to engage their customers.

PART 1

History of artificial intelligence (A.I.)

What is artificial intelligence?

Progressive Grocer's 85th Annual Report on the grocery industry reported that 45% of grocery executives are concerned about the advancements in grocery technology. Fear or not, advanced technology is here to stay, and those retailers that want to remain relevant in the market need to embrace A.I.-powered solutions in order to dominate in the omnichannel environment. A.I. is an especially ideal solution for mid-market and regional grocers in order to compete with the dominant players. Plus, the amount of data that retailers collect and process in 2018 is overwhelming – almost too large for the human brain to undertake – and that is why companies like Daisy Intelligence are successfully offering advanced systems to enable retailers to make data-backed decisions.

Sometimes called machine intelligence, artificial intelligence is intelligence demonstrated by machines, in contrast to the natural intelligence that is displayed by humans and other animals. In computer science, A.I. research is defined as the study of “intelligent agents”: any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals.

Colloquially, the term “artificial intelligence” is applied when a machine mimics “cognitive” functions that humans associate with other human minds, such as “learning” and “problem solving”. Most recently, some of the best uses of A.I. have been seen in retail, using machine learning and reinforcement learning.

Machine learning is where a computer system is fed large amounts of data and then it analyzes this information to learn how to carry out a specific task. The branch of A.I. for autonomous decision-making with the object to achieve a long-term goal is referred to as “reinforcement learning.” A.I. systems based on reinforcement learning can assist retailers with pricing decisions as well as all aspects of merchandise planning, i.e., decisions around what products to promote on any marketing channel, how much inventory to allocate, the optimal assortment, the optimal space plan, etc.

And ultimately, it can make decisions without the help of a human.

“
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Hype versus the actual benefits of A.I. in retail.

By now, most of the retail industry has heard the buzz surrounding artificial intelligence, however, there are a number of solutions running on this platform that are not yet quantifiable, making it hard for retailers to spot what is real and what is just hyped-up bells-and-whistles. That is why Saarenvirta says that a “tangible and quantifiable system needs to be put in place” when testing A.I. for a retail need. Simply put – the retailers who adopt A.I. require a way of tracking the actual results. For example, Daisy Intelligence technology was recently deployed to a North Carolina-based organic grocery chain Earth Fare, with verifiable ROI results. Earth Fare reports that the store’s promotion optimization consistently delivers an increase of up to 3% to the grocer’s top line sales, with no margin investment.

And, A.I. has the power to track and make sense of patterns in the product history at certain times of the year, combined with promotions, and along with tracking how one item affects the buying of other products, store placement, etc., says Saarenvirta.

“There are so many possible ripple effects of just one product and brand being put on sale that a human alone cannot calculate them. But that’s where the technology comes in,” he said. A.I. is able to complete mathematical tasks that are nearly impossible for people. It “learns” in an autonomous fashion, delivering decision recommendations.

Daisy argues that retailers of the future need to have A.I. and it will soon completely replace predictive analytics.

Why retailers should consider A.I. over predictive analytics.

So, what really is the difference between traditionally-used predictive analytic tools and A.I. technology for delivering data results?

Predictive analytic tools look at a specific set of defined data inputs in the form of a single-purpose model. While Saarenvirta says it can increase lift on a promotional product, it doesn’t support the long-term lift of store-wide profits. Why? Because this legacy technology does not look at how this one promotion or one effort effects all buying across the entire product spectrum. It overlooks the “ripple effect”. This is because the models aren’t designed

to look at the various “ripple” effects such as cross-category cannibalization and forward-buying that occur across the entire retailer’s product assortment anytime a decision is made in the areas of pricing, promotions, and inventory forecasting. They simply do not have the capability to process that much data.

Plus, the capabilities of an A.I. system are much broader when it comes to analytics. A.I. processes all available data and outputs solutions based on every product. It also takes into consideration merchandise planning, inventory, assortment, space, and other data factors to optimize for long term

profitability. Saarenvirta says that Daisy’s technology is even more unique to traditional tools, in that it was developed using reinforcement learning. “Daisy is one of the only companies using reinforcement learning outside of engineering domains, and certainly the only ones in retail” he added.

Other unique differentiators include the delivery of business decisions to users rather than through data scientists; the ability to measure and deliver significant income growth; and the ability to operate autonomously without human intervention.



TRADITIONAL PRICING TOOLS	VS	A.I.-POWERED PRICING TOOLS
<ul style="list-style-type: none">• Uses old technology.• Helps employees gain retailer insight.• IT warehouse for specific promotional data.• Performs a specific task.• Costly hardware, software licenses.• Makes adjustments based on historical information available.• Short term product / category objectives.		<ul style="list-style-type: none">• Most advanced technology.• Autonomous in producing decisions.• Real-time data feed.• Looks at relationships between promotions over the long term.• Uses SaaS.• Can self-adjust without human intervention and change underlying algorithm.• Long term organizational objectives.



PART 2

Why does pricing matter?

Pricing almost always sits at the top, or close to the top, of every consumer's list of importance when making a purchase.

With the vast number of merchants out there offering products and services that encroach on the grocery categories' traditional space, i.e., C-Stores and drugstores offering fresh products, CPGs building direct connections to consumers, pure-play e-commerce offering groceries, etc., never has it been more important to optimize pricing.

Retail executives are showing concern that the pricing analytics systems are not delivering as expected compared with how they did in the past few decades leading up to 2018. With profitability under constant threat and labor costs on the rise, more retailers are seeking out A.I.-powered technology solutions.

So, given the incredibly competitive retail environment combined with outdated pricing systems, mid-market grocers especially are finding it extremely challenging to keep pace with price discounting. In fact, Saarevirta says that regular pricing is the most common topic of concern raised by Daisy's clients.

Retailers need to be strategic with pricing decisions in order to overcome some of these deficits.

According to a study from McKinsey & Company, "Pricing in Retail: Setting Strategy,"⁽²⁾ when it comes to grocery

items, consumers will typically remember only a few items of importance after a visit to the store. Therefore, which items retailers choose to place value on – or put on promotion – has a great influence on a customer's overall perception of that store. This sets up the retailer's challenge of truly determining key items of value – another strong suit of A.I.

In addition, calibrating the right pricing for promotions is a key strategy in driving store traffic, a huge factor in the success and profits of a grocer. In fact, a study from the University of California, "Supermarket Competition through Price Promotions: A Cross Category Analysis,"⁽³⁾ shows that customers do not necessarily run to a store driven by brand loyalty; and it overall does not contribute to store traffic. Conversely, the promotions within a store build traffic and support overall retail loyalty.





A.I. for pricing, specifically.

There are so many determining factors that go into pricing retail in general. And the fact that grocery is undergoing some major structural changes and industry-wide disruption means that the best decisions surrounding pricing are becoming harder and harder to determine. So, what are some of these grocery industry changes that are affecting price? For one, the entrance of foreign, discount supermarket chains such as Lidl. The German chain first entered the U.S. market in June 2018 and since then, the brand has had a big effect on the grocers within close proximity.

According to a recent study, "The Competitive Price Effects of Lidl's Entry in the US Grocery Market,"⁽⁴⁾ retailers competing with Lidl have set their prices for individual products substantially lower compared to markets where Lidl is not present. In fact, on average staple items are 9.3% lower. Scott Mushkin, an analyst at Wolfe Research, reported that Walmart cut its prices by more than 20% in areas where Lidl recently opened stores, such as Virginia Beach and North Carolina.

Another change, the emergence of digital grocery delivery, has offset the pricing wars.

Given the rapid consumer adoption of online retail options, grocers are being pressured to join the e-commerce and digital economy, says Saarevirta. While grocery will likely have the lowest online penetration in retail, it is still growing significantly. E-commerce further makes available easier access to competitive price and promotional plans, increasing the level of competitiveness as retailers try to out promote and out price each other. E-commerce however adds yet another dimension to an already complex business model; further justifying the need for A.I.

Yet another recent market trend in grocery is the vast number of mergers and acquisitions taking place. Grocers who have not kept pace with technology investments and price competitiveness are failing and, as a result, being acquired by larger players. Though it seems like the only vertical undergoing this much change, it's just that the grocery industry has been slower to consolidate than other sectors. In other words, many other

industries have undergone consolidation and this has been slow to arrive at the grocery industry... it now has.

Saarevirta believes that consolidation will ultimately benefit the mass market grocery retailers, as bigger parent companies have the money and resources to improve technology, process, pricing, and supply chain efficiency. Overall, the impact of consolidation will be positive for both retailers and consumers. As the population grows, food sales will continue to grow, as will locations in rural areas.

And finally, the grocery vertical has seen a massive increase in private label offerings. According to Nielsen's "Global Private Label Report,"⁽⁵⁾ among a sample of 27,000 consumers, the percentage who agree that "private labels are a good alternative to name brands" jumped from 42% to 75% from 2011 to 2014. And consumers who believe "most private labels' quality is as good as name brands'" increased from 37% to 67% during the same period, according to L.E.K. Consulting, a global management consulting firm.

PART 3 Daisy's Technology

So, what is unique about Daisy's technology?

In a 2018 study by Gartner comparing some of the top software vendors for pricing optimization, "Market Guide for Unified Price, Promotion and Markdown Optimization Applications," Daisy Intelligence was marked as a "key software vendor for several verticals, including grocery."⁽⁶⁾

The Gartner study also explained that the type of optimization can vary from vendor to vendor, depending on customer priority. While the goal is ultimately a unified approach, different software has strengths in different areas. Daisy's solution was noted as strong in supporting initial price, regular price, promotional price, and markdown price optimization. (It does not, however, support competitive and market analysis, unless specifically required by the customer).

Daisy Intelligence helps each client to answer three important questions when it comes to pricing:

- 1

What price should I set for my product assortment in order to exceed my financial goals?
- 2

What price should I set for promotional products?
- 3

What price should I set to markdown and sell-through end-of-season products?

Although Daisy has been working with retailers for over 15 years to deliver data warehouses and merchandise optimization solutions, in 2015 the company started its software-as-a-service approach. Today, Daisy helps clients to analyze all point-of-sale (POS) data in order to create smart pricing strategies with the expectation of exceeding financial goals.

How does Daisy’s technology work?

In order to make the best decisions for individual grocers, Daisy’s A.I. collects initial data from the following sources: transactional data; manufacturer cost data; past promotions; marketing data; geographic location; and loyalty program.

To explain the technology, Saarenvirta says that one must first look at it as stemming from a set of retail rules. Let’s take, for example, the retail rule that discounted products will lead to increased sales for those promoted products. Then, the A.I. assembles these rules into a mathematical equation to determine which pricing scenarios could lead to maximum profit.

Next, the A.I. will analyze data ranging such as price elasticity, price variation, promotional elasticity and displacement. Then, Daisy’s technology will deliver a huge number of scenarios through computer-based simulation, which are actually tested by the machine itself. Finally, the A.I. model makes decisions and delivers specific recommendations to the client on a web portal.

A grocer may only have a handful of historical data points on a given product to examine in isolation to make a pricing decision and to learn new things they need to execute and collect new data. Simulation provides the retailer the opportunity to create new data, effectively going

places the retailer has never gone and measuring the impact – holistically, factoring in all the ripples. Simulation allows for learning to happen faster than the pace of time.

Key to the A.I. technology’s success is its flexibility to operate in a dynamic marketplace, since online price changes are happening in real-time. Therefore, the traditional methods of a price optimization cycle are obsolete by the time they are completed. And unified price, promotion and markdown optimization (UPPMO) will plateau in the next few years, without solving the problem of real-time pricing, according to Saarenvirta, furthering the need for unified A.I. technology.

Daisy’s founder Saarenvirta is no stranger to the analytics world, as he ran IBM Canada’s data mining and data warehouse practices for retailers and other industries. Prior to IBM, he was also a principal consultant for Loyalty Consulting, a division of the Loyalty Group operator and of the Air Miles Reward Program, a coalition loyalty program. From both experiences, Saarenvirta has advanced data mining-based customer personalization solutions for more than 100 retail loyalty program sponsors.

Saarenvirta has taken this knowledge and applied it to the company’s A.I. platform, now being carried out for more than 20 retailer clients.

Improving promotional product selection to grow sales.

Earth Fare, a North-Carolina based health and wellness supermarket, has a very curated assortment of products that comply with its “Food Philosophy”. According to CEO Frank Scorpiniti, this translates to a product assortment characterized by a heavy selection of fresh prepared foods with a “compelling value proposition, produce that’s 70% organic, humanely raised, antibiotic-free and hormone-free poultry, grass-fed meats and sustainably sourced seafood.”¹

Given such stringent standards, coupled with a multi-year growth pipeline aimed at growing store count by 25% and the standard brutal competition across the industry, Earth Fare was presented with a challenging situation when it came to its promotional activity, which comprises mainly price-based promotion through

weekly ads. Scott Little, Earth Fare’s CFO, noted that the retailer’s merchandising and marketing teams were “spending significant amount of time each week on promotion planning with heavy focus given to the best cadence of promoted products.”

Earth Fare turned to Daisy Intelligence to help them improve their selection of products to promote and the promotional cadence of those products with the goal of increasing shoppers’ trip frequency and grow individual basket size while protecting margins. Daisy’s A.I.-powered solution is nothing short of transformative. Earth Fare increases topline sales by 3% with no added margin investment. Daisy has increased net promotional effectiveness over 28 weeks.

“
Daisy Intelligence has fundamentally changed our promotional planning process by reducing the amount of time required for the merchant team to plan promotions and creating more effective and predictable sales outcomes.

Frank Scorpiniti, Earth Fare CEO

”

¹ STORES Magazine, 1/12/2017 - “Earth Fare goes into the future of promotion optimization.”



PART 4

The future of grocery pricing

The future of successful grocery, online or offline, depends heavily on pricing strategy as grocery wars continue to heat up.

As grocery wars continue to heat up, some retailers are price matching, while others, like Amazon, have introduced more in-house brands, in addition, Amazon, through programs like Prime Pantry, has been able to keep their pricing levels among the lowest one can find online. Therefore, the future of successful grocery, on or offline, depends heavily on pricing strategy.

What role will A.I. have in the future of grocery pricing and beyond?

By using A.I., the merchandiser is better equipped with the proper information when choosing products for weekly promotions. And while some merchandisers actually fear that A.I. will eliminate their jobs, the technology actually increases the value of the decision-making process.

“Without the computational power required to analyze 100% of the raw transaction log

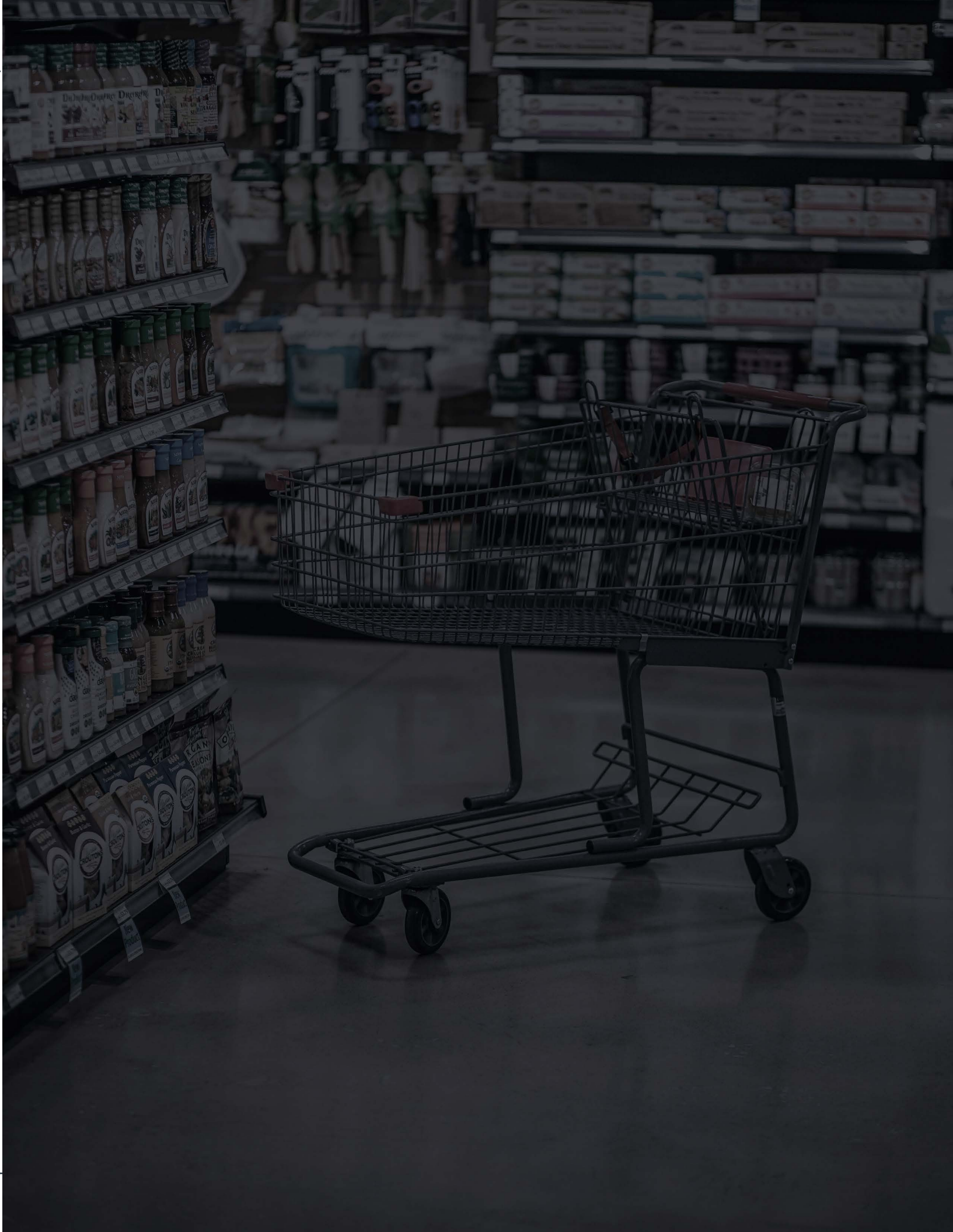
(TLOG) data in real-time, it is nearly impossible to determine whether promotional and pricing merchandising decisions that may look ‘good’ for the brand and/or category actually support long-term profitability for the retailer. When they have access to A.I. to augment their decision-making, their decisions actually have a greater impact on overall store profitability.”⁽⁷⁾

So, in actuality, A.I. makes merchandising decisions more efficient and enables retail professionals to be important agents in other aspects of organization management. Daisy believes that there are some tasks in retail that will forever remain within the domain of humans and outside of the capabilities of A.I. Saarenvirta, calls Daisy’s technology “the best assistant a merchant has ever had” in that it saves merchants time and helps them to deliver a better performance.

However, none of this A.I.

integration is possible unless organizations can get the company to buy into the belief that A.I. will in fact be transformative.

According to a 2008 McKinsey survey of 3,199 executives around the world, “The irrational side of change management,”⁽⁸⁾ only one out of every three management transformation efforts are successful. Therefore, getting total company buy-in and seeing the experience through is important to getting maximum benefit from A.I. In fact, Daisy recommends that executive leadership and directors need to have a clear understand of A.I. solutions before integrating it throughout the organization. Plus, an internal communications effort must be in place.



What about the executives who worry about the cost of implementing A.I.?

Autonomous pricing will interface directly with retail operational systems to collect transaction, promotion, pricing, cost, customer and inventory data, in near real-time. Ultimately, A.I.-optimized pricing will be returned to pricing systems and to in-store POS systems every night, or to online platforms multiple times per day.

According to Saarenvirta, on-premise A.I. software typically requires expensive hardware, software and data scientist – which can seem unattainable by smaller retailers. Plus, implementation time can be lengthy. And many retailers rely on data scientists to translate technical output into actionable decisions.

However, Daisy has overcome some of these disadvantages by delivering as-a-service, meaning it does not require any hardware, software or expensive systems integration projects and can be up and running very quickly.

Moving forward, Saarenvirta says autonomous pricing will interface directly with retail operational systems to collect transaction, promotion, pricing, cost, customer and inventory data, in near real-time. Ultimately, A.I.-optimized pricing will be returned to pricing systems and to in-store POS systems every night, or to online platforms multiple times per day.

Eventually, these systems will operate without any human intervention and will only require control systems to ensure that no pricing mistakes are made, and if they are, autonomously corrected.

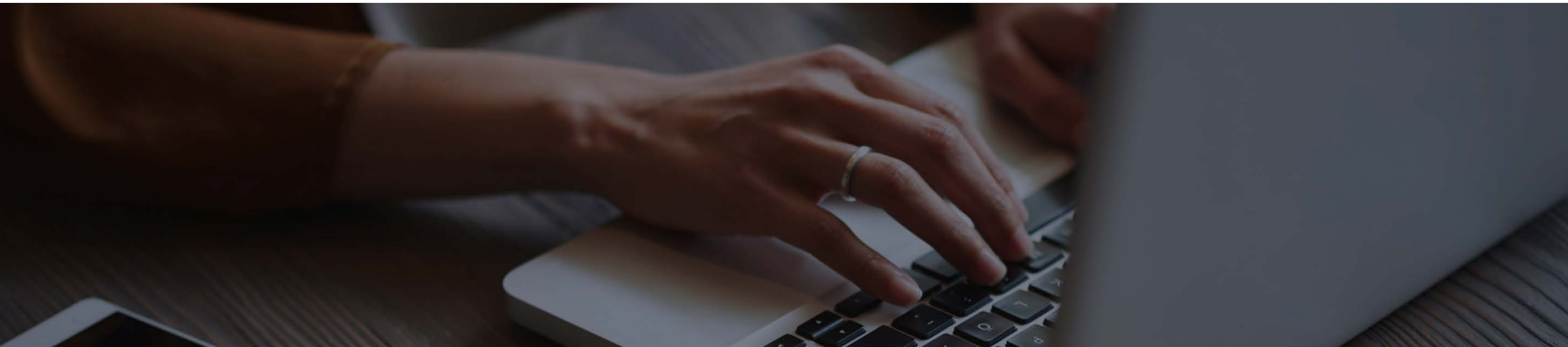
“Autonomous systems based on reinforcement learning for business processes requiring decisions beyond human capability (highly mathematical, highly repetitive, huge volume of decisions required, extremely complex) will proliferate in all industries,” Saarenvirta said. “Autonomous systems will increase the efficiency and, hence, profitability of grocers and all companies in general.”

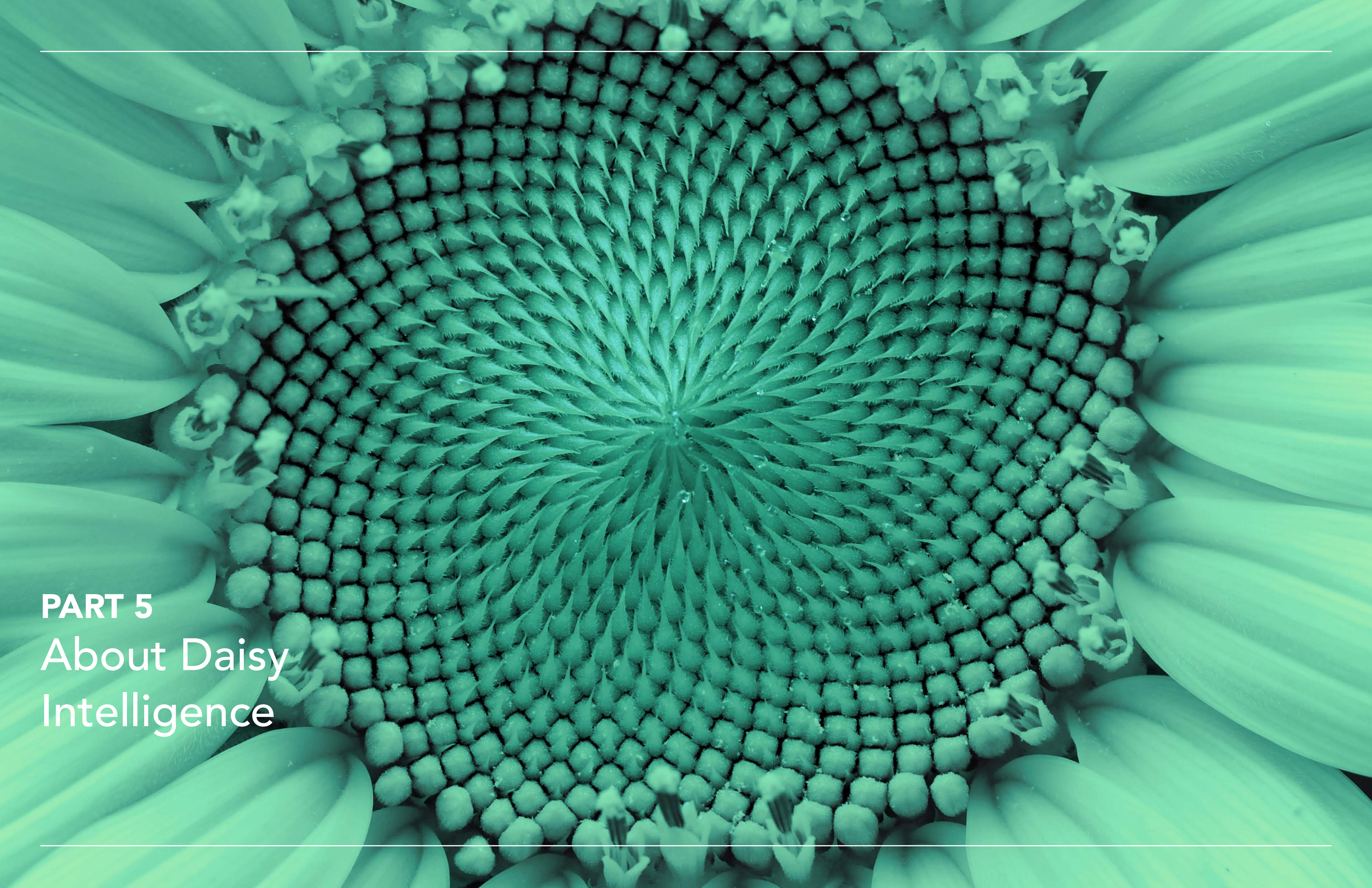
Saarenvirta goes one step further to say that profits earned from A.I. will be available for re-investment into innovation and growing market share. Therefore, the cost of goods and services will decline, ultimately decreasing poverty in A.I.-driven economies.

Plus, he abates worries that autonomous systems will replace humans in the workforce. Instead, he believes it will improve the experience of the employee, taking over tasks that people are not

good at and “unburden us from repetitive type work.” While some unskilled labor will be disrupted, it will be outweighed by more new jobs and employment freedom. Specifically, in the category of retail and grocery, merchants will be freed up to spend more time on product development, vendor negotiation, development of new food solutions and services, digital services and customer service.

Ultimately artificial intelligence will have offered a positive and profound impact on society, above and beyond in the retail industry. Consumers benefit from favorable pricing, higher quality and better service in the coming years, and have more disposable income.





PART 5
About Daisy
Intelligence

See what others don't.



Daisy Intelligence Corporation is an artificial intelligence (A.I.) software-as-a-service (SaaS) company that analyzes very large quantities of our clients' transaction and operational data to make automated operational decision recommendations which they can immediately action to improve their business.

Using our proprietary mathematical solutions and the Daisy A.I. based simulation platform, Daisy analyzes 100% of the trade-offs inherent in any complex business question and provides timely, specific recommendations to help our clients grow total sales, improve margins and delight customers.



Promotional Product Selection

Select the right products to promote at the right time in the right channels to maximize incremental revenue and margins.



Price Optimization

Choose the right price for regular, promotional or markdown items to increase total margin and incremental sales. Dynamic pricing coming soon.



Demand Forecasting

Predict the right quantities to meet demand in each store or channel to reduce stock-outs and write-downs.

We're on a mission to enable organizations to leverage math and science the make smarter and more profitable operational decisions.

We go far beyond human capacity when solving our client's most challenging and complex data problems.

We can help you answer some of these essential questions about artificial intelligence:

- How is it different than predictive analytics?
- How can you grow our business through A.I.?
- How can A.I. help your business be more efficient?
- Where do you begin?

Get in touch with us to find out more and let us help you see what others don't.

Sources:
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² www.mckinsey.com/industries/retail/our-insights/pricing-in-retail-setting-strategy
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