

BUSINESS TRANSFORMATION

An Analysis of Case Studies
Relevant to Achieving a Smoke-Free World

Prepared by Framework LLC for the Foundation for a Smoke-Free World



THE FOUNDATION FOR A SMOKE-FREE WORLD

is an independent, philanthropic organization with the purpose of improving global health by ending smoking in this generation.

To learn more about our organization, visit us online at
<https://www.smokefreeworld.org>

All rights reserved including the right to reproduce this report or portions thereof in any form whatsoever. For information contact:

Foundation for A Smoke-Free World
575 Fifth Avenue
14th Floor
New York, New York 10017

Contents

OVERVIEW

4	Abstract
5	Context
7	Research Process
8	Summary of Case Studies
11	Business Transformation: Six Key Takeaways

CASE STUDIES

15	DSM A Coal Miner Pivots Twice
18	Waste Management A Trash Hauler Gets Ahead of Customer Demands
20	IBM Grappling with a New Business Landscape
23	GE A Tale of Two Approaches
25	Interface A Visionary Leader Aims for a Radical Change
28	Ford Racing to Remain Relevant During a Time of Change
31	References



Abstract

The Foundation for a Smoke-Free World aims to foster discussion on the transformational possibilities of achieving a smoke-free world in this generation. Tobacco companies have an opportunity to adopt business models that will lead to a world without the combustible cigarette. There are about 1.1 billion smokers in the world today. Smoking prevalence is declining, but at a rate far too slow to achieve our objectives for smoking cessation and harm reduction. Furthermore, in accomplishing this transition successfully, we must ensure that vulnerable populations, including smallholding tobacco farmers, are supported to find sustainable alternative activities and livelihoods.

This paper contributes to the discussion by presenting six case studies of companies that undertook significant business transformations. The six cases demonstrate varying motivations,

and, as business transformation is not without risk, some of the companies performed better than others.

After decades of independent research, two things are clear:

- The tobacco industry is selling a deadly product.
- Consumers are rejecting that product, but a transformation of the tobacco industry can provide an enormous and crucial accelerant to that process.

We invite all stakeholders to join a conversation that embraces the inevitable outcome of this situation—the elimination of the combustible cigarette—and the adoption of industry transformation sooner rather than later.

Context

STUDYING BUSINESS CHANGE

This paper is intended to provide high-level insights about business transformation. We highlight examples of companies that have pivoted business models by identifying alternative uses of their assets and expertise to deliver long-term value to stakeholders. The paper aims to convey what drove business pivots, how they were conducted, and what factors led to success or failure.

The companies profiled here faced a diversity of issues—such as changes in customer needs, the rise of new competitors, technological shifts, and declining profitability of core products—but what unites them is they all understood the need for change and attempted to respond, often before peers did. In some cases, the transitions are still under way and therefore the final results are not yet visible, but the processes they launched remain instructive.

SMOKING AND BUSINESS TRANSFORMATION

The Foundation for a Smoke-Free World focuses on the smoker and the farmer. First, the Foundation funds research and supports collaborative initiatives to accelerate progress in reducing harm

and deaths from smoking worldwide. Second, as the demand for tobacco declines, the Foundation supports smallholding tobacco farmers in identifying sustainable economic solutions.

We believe the elements are in place for substantial transformation of the tobacco industry:

- **A better understanding of smokers.** The Foundation's global "State of Smoking" survey included more than 17,000 individuals (smokers, ex-smokers, and non-smokers) in 13 countries. The results of this global poll indicate that smokers demonstrate high self-awareness: Most smokers know smoking is harmful to their health, consider themselves addicted to cigarettes, and don't think they are as healthy as non-smokers. A majority of smokers are planning to quit. On the other hand, the survey finds that 30 to 40 percent of smokers offer no indication of a desire to quit smoking—regardless of scenarios such as price increases or a ban of tobacco products.¹
- **Lower-risk products are coming to market.** A diverse class of alternative nicotine delivery systems (ANDS) has in recent years been developed. These products do not combust tobacco and are potentially less harmful than cigarettes. ANDS have the potential to decouple nicotine consumption from the lethal inhaled smoke. A developing harm minimization framework is represented in the chart below.² While it is not the purpose of

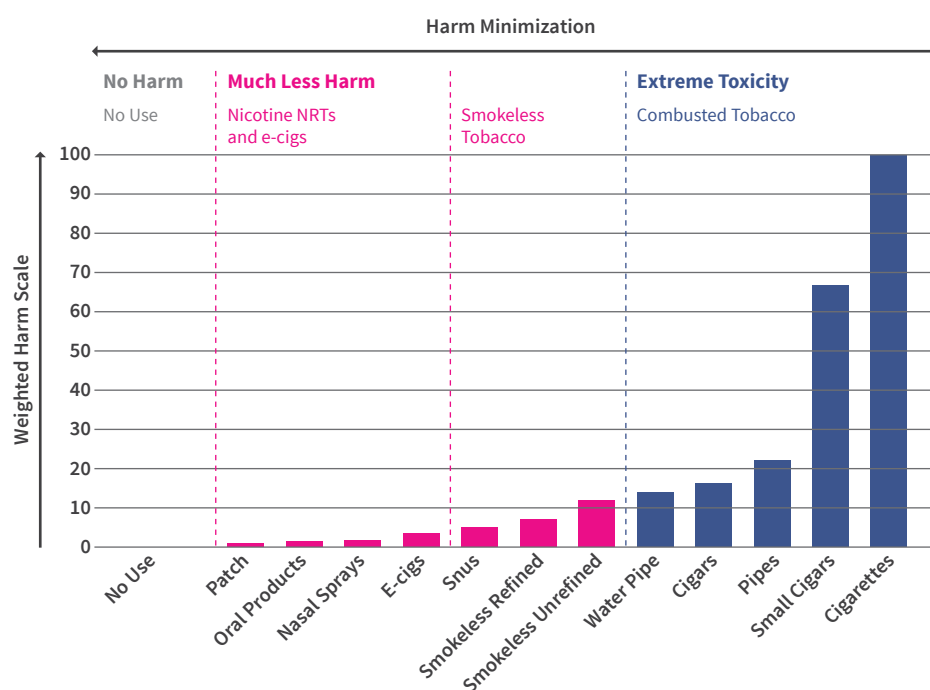


CHART 1
Products along the harm minimization continuum

Source: Abrams et al., "Harm Minimization and Tobacco Control: Reframing Societal Views of Nicotine Use to Rapidly Save Lives."

Between 2012 and 2016, global cigarette retail sales fell from about 6 trillion sticks to 5.5 trillion.

this report to further elaborate on the potential merits of harm reduction, we believe it is appropriate to consider the weighted harm scale of the various products.

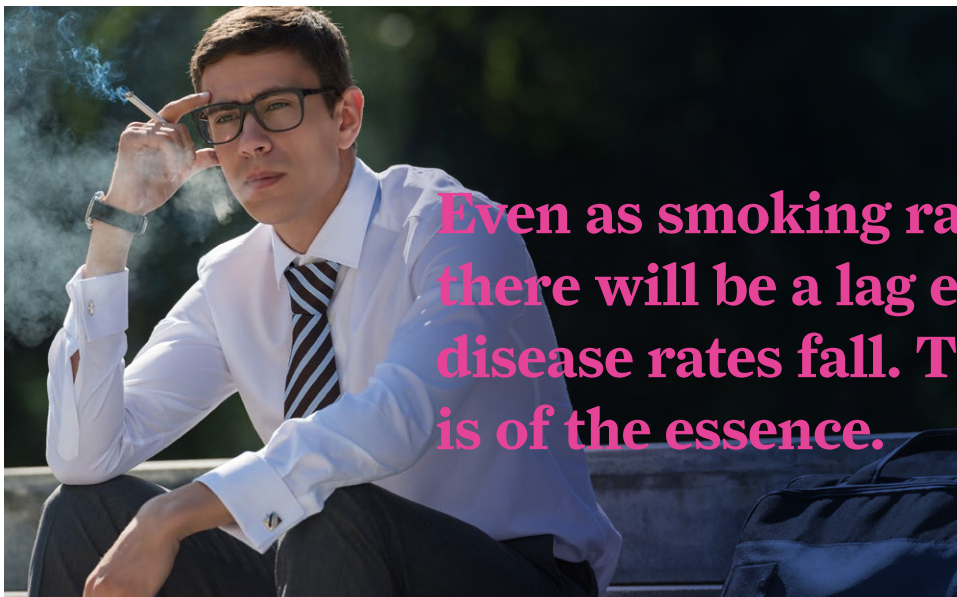
- **Innovation in accelerating smoking cessation.** While nicotine replacement therapy (NRT) smoking cessation aid product sales have been stagnant for years, e-cigarette sales have increased rapidly. On a global basis, as well as in two of the leading vaping markets (the United States and the United Kingdom), we estimate that e-cigarette sales surpassed NRT sales over the 2012 to 2013 period—and the trend continues. Research indicates that in the European Union between 2012 and 2017, use of e-cigarettes for smoking cessation assistance increased, while use of pharmacotherapy and smoking cessation services declined.³ According to the study, younger people were more likely to have reported e-cigarette use for smoking cessation, but less likely to have used a cessation service. We believe it is clear that innovation in the e-cigarette category over recent years has far surpassed that of the NRT smoking cessation aid category pipeline, contributing to the shifting trend. More research on whether e-cigarette use is indeed displacing standard cessation assistance and how this may impact long-term abstinence is needed.

- **Immediate action is warranted.** We must start with the basic

epidemiology of smoking to fully understand what is working and what impact we have experienced to date. Smoking causes disease, with lung, heart, and other cancers being the most common. The diseases become evident after decades of smoking and long after early signs appear. Because of this lag effect, we know that even as smoking rates decline, death and disease rates for many conditions will continue to climb for a time. That is, the positive effects of smoking prevention for today's youth (while absolutely necessary) will only be seen many decades into the future. However, we believe the potential to reduce death rates and extend life expectancy for current smokers through the near-term use of reduced-risk products could offer results that are faster and of a greater magnitude at the societal level. Therefore, time is of the essence.

Call to Action

We invite stakeholders in the business and financial communities, researchers, NGOs, regulators, smokers, and tobacco farmers to join the discussion of the transformational possibilities available to the tobacco industry. We believe the case studies presented in this report will help frame and promote the conversation.



Even as smoking rates decline, there will be a lag effect until disease rates fall. Therefore, time is of the essence.

Research Process

THE RESEARCH FOR THIS PAPER was undertaken by the Foundation's partner, Framework LLC, a consulting firm specializing in business performance improvement through the integration of corporate sustainability and responsibility practices.

1. We identified a cohort of companies that fit three characteristics:

a. They have historically faced significant change. The factors we considered included, but were not limited to:

- i.** Rapidly evolving consumer preferences
- ii.** Technological developments
- iii.** Regulatory and political landscape
- iv.** Environmental concerns
- v.** Composition of product portfolio

b. They have executed a pivot. The nature and success of the pivots varied, and in some cases the companies executed more than one pivot. But in all cases, the company attempted to move toward an alternative operating model.

c. They are large enough to compare to the major tobacco companies. For young, small companies, it is a standard practice to pivot business models. However, for established,

larger companies, business transformation is a very different and rarer undertaking. The top five global tobacco companies have revenue in the range of \$19 billion to \$40 billion.⁴ Of the six case studies chosen, three companies are smaller than that range—Interface (\$1b), DSM (\$13b), and Waste Management (\$15b)—while the other three are larger: IBM (\$79b), GE (\$122b), and Ford (\$157b).⁵

2. For each company, we identified current leaders, former leaders, or outside experts to interview about the company's transformation. In each interview, we aimed to understand the operating context and the levers that led to the company's decision and ability to make changes to its products and/or business model, and the results and impacts of those decisions.

3. To complement our interviews and compensate in cases where no company representative was made available for this paper, we conducted supplementary research using academic journals, news articles, and existing studies to develop the case studies included in this paper.

4. We mapped the common points across the case studies to develop the insights included in the takeaways section.

Summary of Case Studies



DSM

Transformation summary:

Throughout the mid-1900s, the Dutch company DSM gradually transitioned away from coal mining to focus on chemicals, later transforming itself again to become the multinational life sciences, biotech, and materials player it is today. The company's innovation has been driven by a focus on entering high-value, sustainable businesses. It has also leveraged initiatives such as a hunger-reduction collaboration with the World Food Programme to identify and enter new businesses that provide social benefits.

Key insights:

- Investing in new businesses before the existing ones become obsolete due to market changes is key to long-term viability in changing industries.
- A problem in one's core market can be an opportunity: The poor quality of DSM's coal forced it to invest in a coke plant; the phase-out of coal forced it to invest in chemicals; the volatility in chemicals forced it to invest in higher-value businesses.

Business at a glance:

- Revenue: \$13 billion⁶
- Market cap: \$15 billion⁷
- Employees: 21,000⁸
- Headquarters: Heerlen, Netherlands
- Industry: Materials, life sciences

WASTE MANAGEMENT

Transformation summary:

The changes taking place in waste disposal as a result of corporate sustainability initiatives pose a risk to Waste Management's core waste-hauling and landfilling operations. Recognizing that these trends could also present an opportunity, the company created a consulting arm that advises companies on waste reduction and invested in more than 30 start-ups that conduct R&D on new waste technologies. These initiatives are protecting WM's revenues, while also helping its clients reduce costs and environmental impacts by sending less material to landfills.

Key insights:

- When customer needs change, a company has a choice whether to hinder change or support it. Waste Management chose to support its customers' interest in setting zero-waste goals.
- It can be worthwhile to develop new ventures, even if they might threaten the core business. Waste Management's sustainability consulting arm and new waste technology investments could theoretically harm its core waste-hauling and landfilling businesses, but it also prepares the company to take a central place in a changed business environment.

Business at a glance:

- Revenue: \$15 billion⁹
- Market cap: \$36 billion¹⁰
- Employees: 42,000¹¹
- Headquarters: Houston, Texas
- Industry: Waste management



IBM

Transformation summary:

Facing declining market share and margins in the increasingly competitive computer hardware marketplace, this iconic company's bold transformation from hardware manufacturer to software and services innovator in the 1990s is now legend. But the story doesn't end there: In recent years, the company has been undertaking another pivot, this time toward advanced cloud and artificial intelligence services. However, IBM's path to success has been a roller coaster ride, marked by strategic mistakes that nearly bankrupted the company.

Key insights:

- A single strategic miscalculation can have enormous impacts. IBM's misjudgment of the highest-value elements of the budding personal computer market was a huge missed opportunity that has impacted its trajectory ever since.
- A company can be too good at executing on its short-term priorities, if it does so at the expense of investment in its future.

Business at a glance:

- Revenue: \$79 billion¹²
- Market cap: \$146 billion¹³
- Employees: 367,000¹⁴
- Headquarters: Armonk, New York
- Industry: Information technology

GE

Transformation summary:

GE is a cautionary tale of an organization that grew dramatically by acquiring companies that were misaligned with its core industrial business or had technologies that were in decline. At the same time, GE has invested in organic growth and R&D in clean technologies, which have remained a bright spot within its businesses. In particular, its Ecomagination initiative has created solutions for the challenges represented by increasing demand for sustainable technologies and energy, leveraging \$20 billion in clean tech investments into more than \$270 billion in revenue and savings. The results from GE's different approaches to growth provide useful insights into how one company has struggled to navigate a rapidly changing marketplace.

Key insights:

- Companies are not monolithic; GE simultaneously developed a forward-thinking, successful initiative in "Ecomagination," while also pursuing major acquisitions and financial moves that put the company at great risk.
- Transformation doesn't have to be an abrupt pivot; it can consist of a dialing up or down of existing services over a long period of time.

Business at a glance:

- Revenue: \$122 billion¹⁵
- Market cap: \$114 billion¹⁶
- Employees: 313,000¹⁷
- Headquarters: Boston, Massachusetts
- Industry: Diversified machinery



INTERFACE

Transformation summary:

Among companies that have redesigned their products and processes to reduce harm, the Interface carpet company stands apart for having been one of the first and most ambitious. In 1994, founder and CEO Ray C. Anderson realized it would benefit his company's profits, the health of their employees and customers, and the environment if the company transitioned from petroleum-based materials to recycled, non-toxic materials and renewable energy sources. Within a year of implementing the new approach, the company's sales increased \$200 million while material costs dropped by 20 percent. The company continues to work toward a goal of eliminating any negative impacts on the environment by 2020.

Key insights:

- A radical idea will inevitably be criticized and misunderstood, but that doesn't mean it's not right. Interface's sustainability mission was far ahead of its time, but quickly proved to be a success for the company.
- Leadership from the top is essential; the company's founder and CEO decided to make a pivot and drove the company on a massive transformation.

Business at a glance:

- Revenue: \$1 billion¹⁸
- Market cap: \$1.5 billion¹⁹
- Employees: 3,000²⁰
- Headquarters: Atlanta, Georgia
- Industry: Flooring

FORD

Transformation summary:

The Ford Motor Company's business as an automaker is built on a concept developed many decades ago. While electric vehicles (EVs) currently hold only a tiny sliver of the auto market in most countries, recent years have shown clear signs that the internal combustion engine could become a relic of the past. Volvo committed to solely producing EVs and hybrids by 2019, and Toyota made a similar pledge for 2025. GM pledged to launch 20 EV models in the next six years. As individual ownership of vehicles declines, Ford is also increasingly exploring alternative business models that reposition it as a provider of "mobility solutions," rather than relying solely on traditional sales. Taken together, these steps suggest that Ford and other automakers now recognize that the factors at work in their industry require them to "creatively destroy" their core offering before market forces or new players do it for them.

Key insights:

- Customers don't always ask for changes in the products they use, but will accept them if they provide value. Ford's customers didn't ask for the various tweaks that Ford made to the F-150 truck to improve fuel efficiency, but they accepted them over time.
- When the technology shifts, it can force a business model shift. As the technology associated with electric vehicles and autonomous driving has developed, Ford recognized that its survival depends on getting on board, even though its current products are profitable.

Business at a glance:

- Revenue: \$157 billion²¹
- Market cap: \$46 billion²²
- Employees: 202,000²³
- Headquarters: Dearborn, Michigan
- Industry: Auto manufacturing

BUSINESS TRANSFORMATION:

Six Key Takeaways

1

EVEN GIANTS CAN FALL. AND WHEN THEY DO, THEY FALL FAST.

History is full of giants who fell, and their decline is often faster than might have been expected. Successful companies understand this reality and shift their footing to prevent the fall. Perhaps the most well-known example of rapid corporate collapse is Kodak. By the mid-1970s, Kodak controlled 85 percent of camera sales and 90 percent of film sales in the United States.²⁴ By the 1990s, Kodak had invented many new technologies (including, ironically, the digital camera, which it refused to market until it was too late), its revenues were solid, and it was even part of the cultural lexicon (“Kodak moments”).²⁵ However, it chose to not follow the path of its competitor, Fuji, which ventured into adjacent markets, such as copiers and office automation, now earning annual revenues above \$20 billion.²⁶ It also did not anticipate the future value of online photo-sharing platforms like Instagram, now valued at \$35 billion.²⁷ From Kodak’s high point in 1999, with \$16 billion in revenues,²⁸ the company’s moment faded quickly. It is now only a shadow of its former self, with \$1.5 billion in revenues in 2017.²⁹

IBM is another example of how quickly a company can fall. From the 1960s through 1980s, its name was synonymous with success. It dominated the mainframe computer market, its researchers were winning Nobel prizes, and it was known to be one of the best corporate employers. However, in the span of a decade, it went from being the most profitable company in the world to holding two other titles: the largest-

ever corporate loss in a single year, and the largest workforce layoff. It took years of strategic decisions and hard work to get back on its feet.

Other companies foresaw their impending fall before it happened and were thus able to adjust in advance. DSM began as a coal-mining company in 1902, then pivoted to production of various types of chemicals, and then again to advanced materials and life sciences. If DSM had tried to remain a coal company, it almost certainly wouldn’t exist today.

2

SATISFY CURRENT CUSTOMERS, BUT PLAN FOR FUTURE CUSTOMERS.

Companies can become too good at executing on priorities and excelling at short-term wins. During its recovery in the 1990s, IBM fit this mold; it successfully cut costs and continued to move product, but it did so at the expense of investment in exploratory innovation related to the growing personal computer market. Thus, it had to fight for relevance over its next decade of operations.

Ford provides an alternative example: The company decided to make changes to a core product, the F-150 pickup truck, without a strong demand for change from its current customers. The F-150 has been the bestselling truck in the United States for 40 years straight. For F-150 owners, gas mileage is low on their priority list; in fact, a survey showed that there were 27 other factors that ranked higher in importance than gas mileage. Nonetheless, Ford made a series of adjustments to the truck—switching from a steel to aluminum body, offering a V6 model, and developing a hybrid version—to improve the fuel efficiency. It did this because it predicts that fuel efficiency will be an increasingly important issue in the future, and it was able to make the changes without sacrificing the qualities that current customers value.

In the early 2000s, Waste Management saw that some of its customers were starting to set zero-waste goals. Even though their landfilling and waste-hauling services were unlikely to be affected in the near term, the company made the decision to change its strategy. Waste Management collaborated with its customers on

Companies can become *too good* at achieving short-term wins, if it comes at the expense of investment in new areas.

It is far easier to change strategy ahead of a market shift than to rapidly evolve in the face of a crisis.

waste-reduction efforts, began investing in new R&D waste-reduction technologies, and built a new business unit to help customers reduce waste through a variety of services.

3

COMMUNICATION IS ESSENTIAL DURING TRANSFORMATION.

Any large company that attempts to transform its business will inevitably face criticism and misunderstanding from both internal and external stakeholders. They can look to examples of other large companies to see how they communicated with employees, investors, and others during their transformations.

In executing multiple pivots from coal mining to chemicals to life sciences, DSM had to perfect its change-management processes. One aspect of this was to communicate with employees when their jobs were not part of the company's long-term plans. DSM accomplished this by being inclusive during strategic-planning exercises and communicating openly about the direction in which the company was heading.

When Interface proposed that it make a drastic turn toward sustainability, many employees did not understand or appreciate the reasons for doing so. The company's change-management program began at the top of the corporate hierarchy and worked its way down to all employees. The company held educational events and conducted team-building exercises to encourage new and creative thinking by employees. To expand employees' views, Interface brought in "the most outrageous speaker we could find."³⁰

Similarly, when GE announced Ecomagination, investors, customers, and others were not convinced of its value. GE addressed criticisms by being clear about what its transformation would entail (for example, working with third-party groups to develop a consistent product-evaluation methodology) and executing an enormous marketing push to explain and promote the initiative. It used television commercials, advertisements, reports, social media, and even a magazine for the children of employees. Thus,

it was able to effectively spread the message that Ecomagination was worthwhile and that GE was fully committed to the initiative.

4

GRADUAL CHANGES CAN ADD UP TO MAJOR TRANSFORMATIONS.

Most successful transformations of large companies have taken place not over a period of months or years, but a decade or more. While every transformation is difficult, the slow-and-steady approach, if feasible, is much easier than having to rapidly evolve in the face of a crisis.

In DSM's case, the company's various business focus areas overlapped by long periods. It began its move into the chemicals arena in 1919 and steadily diversified its operations over more than four decades while it still mined coal. By the time the Dutch government announced the permanent closure of all mines in 1965, the company had options for how it could proceed during its next phase. Likewise, its transition to advanced materials and life sciences took place over several more decades.

GE took a similar approach, though over a shorter period (about a decade), with Ecomagination. During this era, the company increasingly dialed up its R&D and commercialization of environmentally friendly products, creating a gradual transition that added up to major changes.

Waste Management also took a gradual approach. When its customers started setting zero-waste goals, the company began its transformation by conducting *ad hoc* pilot experiments. It then moved to longer-term partnerships with customers and then built up its sustainability consulting practice. From 2003 to 2016, this practice expanded from 10 to more than 400 employees.³¹ Additionally, the company increasingly invested in smaller start-ups that conducted research and development on renewable energy and recycling technologies. Waste Management is now in a position to scale up its green technologies and services even more over the coming years.

That said, the gradual-change path is not an option in all cases. Some situations warrant immediate action.

5

INVESTMENT IN NEW VENTURES IS KEY, EVEN WHEN IT THREATENS THE CORE BUSINESS.

Transformations often require extremely bold decision making, as the new focus areas put pressure on the company's core business.

For example, Waste Management developed its sustainability-services division to help companies produce less waste, even though its core business at the time was hauling and landfilling waste. Waste Management saw that companies were going in the direction of reducing waste with or without its help. By being part of the process, the company was able to gain revenue from that shift and support its recycling business lines.

IBM also bet against its core products—computer hardware, software, and data center services—when it made its bold investment in cloud technology.³² But it saw the direction in which the market was moving and wanted to ride the wave rather than being buried by it.

Likewise, Ford invested in the development of mobility services, such as ride sharing, which might ultimately lead to fewer vehicles being needed. But again, the company saw that the market was going to change with or without its participation, and it determined it would go along for the ride.

6

SUCCESS IS NOT GUARANTEED.

Business transformation is not without risk, and some of the companies performed better than others.

In strictly financial terms, “success” is measured by the creation of shareholder value. By this measure, since the start of 2000, three of the six companies—DSM, Waste Management, and Interface—delivered long-term stock performance considerably higher than comparable indexes. Two others, IBM and Ford, have performed better than their benchmark indexes (the S&P 500 IT Index and Automobile Manufacturers Index, respectively) but below the S&P 500 as a whole. The final company, GE, delivered long-term stock performance that was well below its benchmark index and the S&P 500. The best performer, DSM, gained more than 800 percent in shareholder value over the period evaluated; perhaps its long history of strategic transformation aided its success in the modern era.

That said, there is a difference between shareholders and stakeholders. Beyond the maximization of shareholder value, many firms broaden their focus to include the interest of various stakeholders: customers, employees, communities, suppliers, creditors, and others who have a direct link to the firm. In the case of the tobacco industry, this leads us to, among others, the smoker and the tobacco farmer. Any measures of the success of the tobacco industry's potential transformation must include the impacts on these groups.



Measuring the success of a potential transformation of the tobacco industry must include impacts on, among others, smokers and tobacco farmers.



Case Studies



A Coal Miner Pivots Twice

A Coal Miner Becomes a Sustainability Leader

Dutch State Mines was founded as a state-owned coal-mining company in the Netherlands in 1902. For more than half a century, the coal it pulled from the ground in the southeastern region of the country powered the growth of Dutch industry. However, by the 1960s, coal mining was no longer the jackpot it once had been for the country. Natural gas from the North Sea represented a serious economic threat to the industry, so much so that, in 1965, the Dutch government ordered the mines to close. For many companies, this would certainly have led to a total collapse. Over the past half century, we have seen many of the world's coal mining regions suffer similar shocks,³³ leading to bankruptcy for many coal companies.

For Dutch State Mines, on the contrary, the closure of the mines accelerated the company's evolution. The company not only still exists, but DSM, as it is known now, is a thriving and diversified company with some \$10 billion in annual revenues,³⁴ whose products are used in everything from golf balls to gummy bears.³⁵ The company's forward-thinking solutions to challenges such as climate change and global hunger led *Fortune* magazine to place DSM in second place on its list of companies changing the world. The case of DSM suggests an obvious question: How does a company operating in one of the dirtiest industries evolve to become a global leader in sustainable commerce?

From Coal to Chemicals

The most notable aspect of DSM's evolution has been consistent investment in the development of new technologies and a continual search for higher-value markets. In this way, the company has prepared for changes in its operating environment before crises become too large to handle. DSM began this way of operating early in its history. In 1919, due to the low quality of Dutch coal, the company opened a plant

to convert the coal into a higher-value product: coke, an industrial fuel.³⁶ In the 1920s, technological progress enabled coal gas, a byproduct from the coking process, to be used to develop hydrogen, an input into chemical fertilizers; thus, in 1930, the company opened a fertilizer plant.^{37 38} Over the next decades, DSM steadily invested in its capacity to produce base chemicals. Thus, when the government issued its fateful order in the 1960s, DSM had a plan for survival.³⁹

In the few years between the order for the mines to close, in 1965, and the shuttering of the last mine, in 1973, DSM invested heavily to scale up its capacity in chemicals production. It was not an easy adjustment; coal mining had accounted for half its revenue and two-thirds of its employees.⁴⁰ By expanding its production of gas-based chemicals (its core specialty) and investing in petrochemicals,⁴¹ the company was able to not only survive, but to grow.

However, while chemicals production had saved the company from collapse, the chemicals industry was highly cyclical, and the companies that were vertically integrated in oil and gas had the competitive advantage.⁴² Thus, toward the end of the century, it was clear to DSM that in order to thrive it would need to transform itself yet again.

Transitioning to a Diverse Portfolio

In 1989, DSM became a publicly listed company,⁴³ and throughout the 1990s, DSM shifted its focus from base chemicals to advanced materials and life sciences. Through a series of acquisitions and divestitures, the company built a diverse portfolio of businesses, including cellulosic ethanol, solar energy, vitamins, and anti-reflective coatings.⁴⁴

In addition to acquisitions, DSM has invested heavily in research and development. It built one of the largest industrial research facilities in the Netherlands.⁴⁵ In the 1990s and early 2000s, it took its R&D a step further by establishing a business unit whose sole purpose is to identify ideas from its researchers that can be developed into new ventures.⁴⁶ Through these efforts, DSM has launched a number of subsidiary companies.

DSM's heavy focus on research had ancillary benefits for the company too. DSM's research organization has served as a training ground for future managers; many of the company's top managers started their careers there.⁴⁷

DSM also developed a culture in which it is able to rapidly evolve its strategy. The company develops a new strategic plan through an organized, inclusive process roughly every 18 months.^{48 49} As it moves into new areas, the company's leadership maintains an open communication style. According to Robert Evans, a former employee of DSM interviewed for this white paper, "If your business wasn't part of the long-term plan, they would tell you."⁵⁰

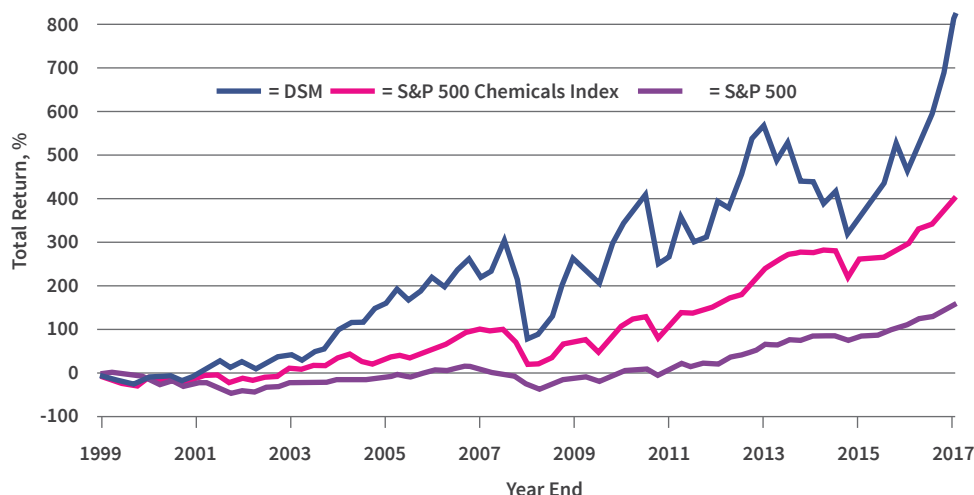


CHART 2

DSM's Total Shareholder Return, 2000-2017

Source: Bloomberg Finance L.P.

Valuing Long-term Success Over Short-term Returns

DSM takes a long-term view of its business, even when it means sacrificing near-term profits. For example, DSM's Clean Cow feed additive reduces the methane emissions of cattle by more than 30 percent.⁵¹ They developed this technology knowing that it would be difficult, in current conditions, to find customers. Though this technology has the potential to be extraordinarily impactful, individual farmers have little incentive to reduce emissions. However, the company is patient; if governments begin to place taxes on greenhouse-gas emissions, or if customers become more aware of the environmental footprint of their food, Clean Cow could be positioned as a major money-maker for DSM.⁵²

Another example of the company's future-oriented mindset is seen in its venture to improve nutrition in Rwanda. Despite having no experience in Africa, DSM decided to create a public-private partnership with the World Food Programme, the Dutch development bank, the government of Rwanda, and others to produce fortified foods for pregnant women and young children.^{53,54} The consortium oversaw the financing and construction of a modern food production facility, which began operations in late 2016.⁵⁵ The company that was formed from this partnership, Africa Improved Foods, is profitably run entirely by local employees. This venture helps address a major humanitarian issue, while also benefiting DSM. As Hugh Welsh, President of DSM North America, explains, "We are not going to get the same return on capital in a landlocked country such as Rwanda as we would in Denver, but we are learning how to do business on a continent that is going to be critically important in the coming years."⁵⁶

DSM's strategy is driven by both the search for higher-margin markets and the attempt to solve societal challenges, such as hunger, poverty, and climate change. In fact, the company views these two drivers as connected: By addressing key

global challenges, companies position themselves in large markets with long-term growth potential.⁵⁷ According to Welsh, "We start with our competencies, and we look at the world's biggest problems, then we lean hard into them. ... This isn't a nice-to-have, it's a need-to-have. This is future-proofing our organization. We're always trying to figure out the markets to be in in the future. You have to take chances, or you're left behind."⁵⁸

The Benefits of Addressing Societal Needs

As DSM transitioned to its focus on sustainability and societal challenges, not everyone in the company was sold on the new approach. Some investors called for the company to reduce its spending on humanitarian initiatives, such as its longstanding partnership with the World Food Programme.⁵⁹ Others have even called for the company to break itself into pieces.⁶⁰ Within the company, not everyone was convinced either. "The old guard liked the commodity businesses and were not interested in learning new business models," says Evans.⁶¹ To overcome this cultural barrier, in 2010, DSM changed its compensation policy such that half of short- and long-term compensation for all of its 300-some executives is tied to its sustainability goals. Says Welsh, "Suddenly, they were fighting with one another to get the next sustainability-related project at their plant."⁶²

The mindset of seeking to address societal challenges has spread through the company. Even in business lines that could be considered mundane, such as plastics and resins, employees are finding ways to apply their knowledge to sustainability challenges. For example, the company has used such materials to reduce the weight of vehicles to improve fuel efficiency and has introduced a fully recyclable type of carpet.^{63,64}

This culture is also beneficial when acquiring companies.

Says Evans, “The employees of acquired companies were happy to see that they were part of a company that had a clearly articulated vision of where they wanted to go and how they could contribute to society.”

DSM’s unique approach to business led *Fortune* magazine to name it as one of the top companies changing the world. And DSM leads its industry in the Dow Jones Sustainability Index, a benchmark of companies performing well on sustainability indicators. The company has also been widely discussed as a leader across media channels and in venues such as the United Nations.⁶⁵

As of early 2018, DSM’s stock price was at an all-time high,⁶⁶ and the company’s leadership is optimistic about the direction it is heading. There will surely be bumps in the road, as there have been throughout its century of operations. But DSM has the advantage of an agile culture, a willingness to take early action to solve problems, and long experience anticipating and adapting to changing circumstances.

How does a company operating in one of the dirtiest industries evolve to become a global leader in sustainable commerce?



A Trash Hauler Gets Ahead of Customer Demand

Waste Reduction Goals Threaten an Old Business Model

In the early 2000s, Waste Management, the market leader in waste services in North America, was earning a quarter of its revenue from collecting trash and landfilling it for companies.⁶⁷ During this same period, a growing number of Waste Management's customers were changing the way they thought about waste, and beginning to set new waste-reduction targets and even zero-waste goals.⁶⁸ This evolution in the market threatened Waste Management's core business.⁶⁹ Leaders from the company understood that sooner or later its own business could end up in the landfill if they didn't take action. Waste Management decided that the business needed to support its customers' new goals, and not hinder them.⁷⁰

Evolving Toward Waste Services

To address their customers' changing needs, Waste Management began looking at new business models, launching several pilots with select customers. The initial efforts focused primarily on finding new ways to monetize waste materials and byproducts.⁷¹ One early initiative included a partnership with U.S. car manufacturers to capture scrap metal and other waste and have it returned into production.⁷² By 2015, General Motors generated \$1 billion in by-products annually as a result of such efforts.⁷³

Over time, Waste Management's initiatives evolved, focusing further up the value chain. The company began working directly with designers during the product design process to identify

materials that could be more easily recovered.⁷⁴ It wasn't long before Waste Management realized that, as experts in understanding and managing waste, its advice could be offered as a service and new source of revenue.

In 2003, Waste Management's Sustainability Services (WMSS) was born.⁷⁵ As a consulting arm within Waste Management, WMSS works to help companies understand the impacts of its products, find opportunities for material reuse, and implement programs to reduce waste.⁷⁶ From 2003 to 2016, WMSS expanded from 10 to more than 400 employees.⁷⁷ The division operates as a separate organization within Waste Management, allowing the team to focus on consulting services and customer solutions, while also leveraging the expertise and resources of Waste Management.⁷⁸ By 2016, the business unit had generated more than \$165 million in savings for customers.⁷⁹

Challenges During the Economic Downturn

In addition to developing new services for clients, Waste Management also began investing in new technologies to meet customer needs, while making its own operations more sustainable. By 2010, Waste Management owned and operated more than 16 plants that turned waste into energy, enough to power nearly 2 million homes.⁸⁰ The company also oversaw 119 gas-to-energy initiatives that turned methane from landfills into energy.⁸¹

Waste Management invested \$600 million in new technologies in the early stages of its transformation as a means to replace segments of the landfill business.⁸² The investments, such as a process to turn waste into a substitute for coal,⁸³ made a lot of sense when the price of oil was high. However, as the price dropped during the economic downturn, several of Waste Management's new businesses became temporarily unprofitable.⁸⁴

Continued R&D and Investment⁸⁵

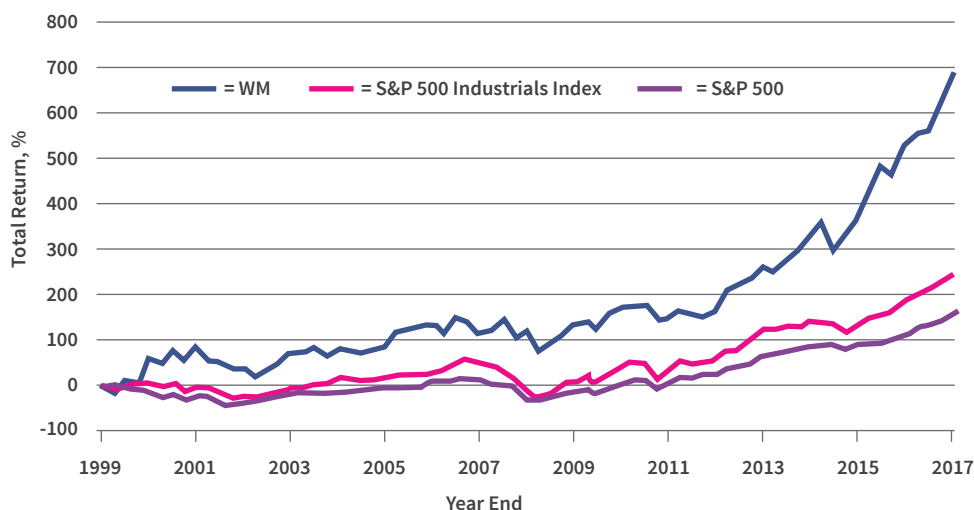
Despite challenges during the downturn, Waste Management continued to double-down on its investments in leading-edge technologies focused on renewable energy and recycling. To support these efforts, Waste Management created a venture investing arm called the Organic Growth group. The team invests in smaller companies that conduct research and development on new waste technologies such as gasification, waste to energy, solar-powered trash compaction, and more. Once the technologies are proven to be successful, Waste Management integrates them into its operations.

Waste Management has not disclosed its investment figures, but it has publicly stated that it is in the "hundreds of millions" and includes investments in more than 30 companies. The goal

CHART 3

Waste Management's Total Shareholder Return, 2000-2017

Source: Bloomberg Finance L.P.



is to own a suite of technologies to extract more value from waste by converting it into energy and other valuable end products.

Green Services Are Now Half of the Picture

By 2017, half of Waste Management's revenue was derived from green services, including recycling and sustainability advisory services. The company has also increased its net income by more than 65 percent over the past decade while weathering a downturn and transitioning to a more sustainable business model.⁸⁶

The success of Waste Management's transition stems from the willingness of its leadership to question the core business in the face of change.⁸⁷ Former CEO David Steiner and other leaders were attuned to pressures they were seeing in the marketplace and decided to experiment, partner, and embark on initiatives that might cannibalize other parts of their business, rather than resist the changes coming their way.⁸⁸ In doing so, Waste Management is now helping its customers save millions of dollars annually, is boosting net income for its shareholders, and is increasingly seen as a leader in corporate sustainability.

A Sustainable Waste Race

Changes in customer preferences created a race among Waste Management and its competitors to evolve. Waste Management's largest competitor, Republic Services Inc., is investing in landfill renewable energy projects that can produce enough power for approximately 14,000 homes.⁸⁹ The company has also expanded its recycling network and is working with municipalities to meet ambitious sustainability targets. For example, Republic Services is partnering with the LA Unified School District to help them divert 70 percent of their waste by 2020.⁹⁰ Further, Republic Services surpassed Waste Management in several public sustainability rankings, including being the only waste company included in the 2017 DJSI Indices.⁹¹

Waste Management also has smaller competitors. The Atlanta-based waste start-up Rubicon Global recently joined the "unicorn club" in 2017 with a valuation of more than \$1 billion. The company has been called the "Uber of Trash" by connecting independent trash haulers with businesses that need waste services. The company is a B-Corp with a social mission supported by ambitious sustainability goals. Rubicon Global is already making a splash by creating strategic relationships with retailers. In 2018, the company announced a partnership with Wegmans Food Markets to oversee their zero-waste initiatives.⁹²

Waste Management was early to invest in waste-reduction technologies and services, but competition has grown as zero-waste initiatives have increased. Waste Management will have to continue to create new business models and invest in research and development if they are to remain competitive.

Despite challenges during the downturn, Waste Management continued to double down on its investments in renewable energy and recycling.



Grappling with a New Business Landscape

The Success of a Corporate Giant

In the middle of the 20th century, no company epitomized success as much as IBM. It hired the best and brightest, who helped put a person on the moon.⁹³ Its researchers won Nobel Prizes. It produced innovations that continue to power our society and economy, including hard drives, barcodes, and the modern ATM.⁹⁴

IBM was known to be a stellar employer, and its 100,000 or so employees⁹⁵ were fiercely loyal to the company. IBM was famous for never laying off employees;⁹⁶ when business lines were transformed or eliminated, the company retrained and found new places for its employees in other divisions.⁹⁷

By the 1980s, IBM had risen to heights rarely seen in corporate history. It was the most profitable company in the world.⁹⁸

Giant Steps Led to Giant Missteps

By foreseeing the importance that computers could play in many industries, IBM was able to pioneer and dominate general-purpose computing.⁹⁹ By 1971, IBM controlled 75 percent of the market for mainframe computers¹⁰⁰ and into the 1980s seemed unstoppable. Yet, soon after, it found itself in freefall.

In 1969, the company made the critically important decision to “unbundle” its hardware, software, and support services. By offering these separately, IBM cleared the way for the massive markets for software and technical services over the coming decades.¹⁰¹ Its presence grew around the globe, as it developed parallel hierarchies in many regions. Each region had its own profit-and-loss statements, human resources teams, finance departments, and so on.¹⁰²

This structure served the company well during a period of rapid growth, but by the early 1990s, Big Blue was starting to overheat. The company’s employee count had ballooned, especially in support functions. The workforce had grown unwieldy and enormously expensive to maintain.¹⁰³

On top of IBM’s growing costs, it also misjudged the value-creation opportunities of the burgeoning personal computer market.¹⁰⁴

The launch of its personal computer in 1981 was a watershed moment in the history of personal computers, as it effectively introduced the standard for nearly all personal computers that would follow. However, in developing its personal computer, IBM made what turned out to be one of the largest strategic mistakes in corporate history: In 1980, it decided to outsource the microprocessors for its personal computers to Intel and the operating system to a young, 32-person company called Microsoft.

IBM’s contracts with the firms restricted neither Intel nor Microsoft from selling their products to competing computer manufacturers.^{105 106 107} Before long, these two companies were generating enormous profits by supplying the “IBM clone” personal computer market, which soon surpassed sales of IBM’s own machines. By 1997, both Intel and Microsoft had overtaken IBM in market capitalization.¹⁰⁸

Ethan McCarty, a former IBM communications director interviewed for this paper, summed up the collapse this way: “IBM missed the boat on software and operating systems. And it was too late when they figured it out.”¹⁰⁹

By 1992, IBM’s bloated workforce and strategic misfires led to a net loss of \$5 billion for the year, which was, at the time, the largest loss in corporate history,¹¹⁰ and the company was very close to running out of cash.¹¹¹

The Giant Gets Back on Its Feet

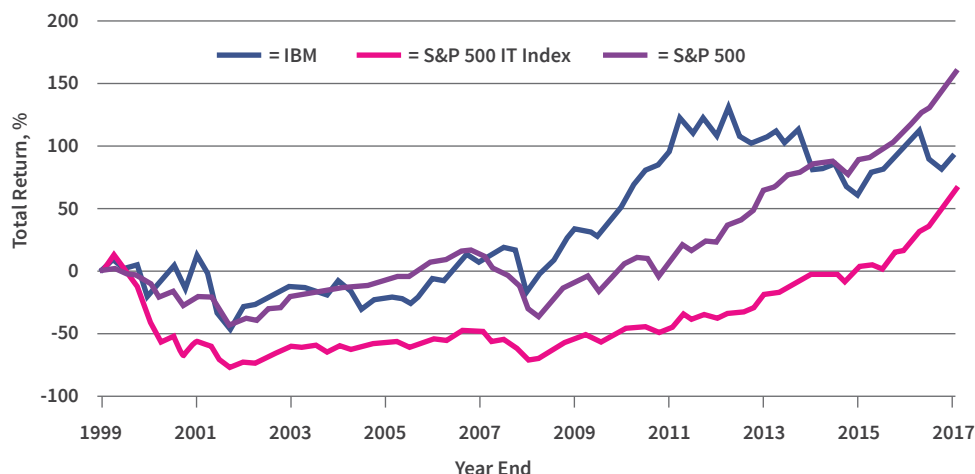
With the company in crisis, IBM recognized it was time to reboot. For the first time, the company brought in an outsider as CEO. When Lou Gerstner joined as CEO in April 1993, he saw a company that had lost touch with customer demands and whose costs were spinning out of control. One of the first steps was to break with IBM’s historical guarantee that employees would have a job for life. In July 1993, 60,000 people were laid off, in what is still the largest layoff in recent history in the United States.^{112 113} IBM moved to a shared-services model, consolidated key activities, and standardized processes.¹¹⁴ This set the company on the path to improved efficiency.

However, IBM was still held back by its tendency to fight losing battles for some of its products. As an outsider, Gerstner had the advantage of being free of emotional attachments to particular businesses. This is seen in Gerstner’s handling of IBM’s proprietary operating system, called OS/2, which

CHART 4

IBM's Total Shareholder Return, 2000-2017

Source: Bloomberg Finance L.P.



was competing with Microsoft Windows. Computer experts considered OS/2 to be technically superior to Windows, but, given that Windows came pre-installed in new personal computers, IBM was on the losing end of the battle.¹¹⁵ While many in IBM were unwilling to let go of their creation, Gerstner had no qualms about powering down the venture.¹¹⁶

However, even with a disciplined plan to cut costs and focus on profitable ventures, IBM's culture and structure were stifling innovation. For too long, IBM had focused on short-term goals and existing products at the expense of investment in new areas. Good ideas for new ventures were often undervalued, as the mechanisms for funding, cultivating, and integrating new ventures into the company were dysfunctional.¹¹⁷

In the book *Moving to the Innovation Frontier*, Harvard Business School professor William Kerr wrote, "In a very real sense, IBM had become too good at executing, reducing costs, and achieving short-term success. While each of these outcomes is desirable, they placed the company in a position where it struggled to undertake the longer-term exploratory innovation that would be necessary for the company's sustained success."¹¹⁸

Repositioning for the Future

Throughout the 1990s and 2000s, IBM worked to put itself on a more successful path. It had seen that hardware businesses were becoming commoditized, so it decided to double-down on software and especially on services.

"IBM made a very thoughtful decision to rapidly exit low-margin businesses and to communicate that decision to Wall Street and its employees," McCarthy said.¹¹⁹

The businesses IBM shed included products in which the company had pioneered the market. It sold its hard-drive

business to Hitachi in 2002,¹²⁰ its personal computing division to Lenovo in 2005,^{121 122} and its printing-systems division to Ricoh in 2007,¹²³ among other divestitures. It also spent \$30 billion acquiring more than 200 new businesses.¹²⁴

The focus on services was successful. IBM's revenue from services grew from \$6 billion in 1991 to \$33 billion in 2000, and to \$56 billion by 2010.¹²⁵

However, the company has not fully outmaneuvered its problems. IBM's revenues declined for 22 straight quarters from 2011 through 2017 before they saw revenue growth in the fourth quarter of 2017;¹²⁶ 2017 saw its worst annual revenue performance since 1997.¹²⁷ The company's legacy software and hardware businesses are in decline, and investments in newer areas, such as cloud services and artificial intelligence, have not yet made up the difference.¹²⁸

A Focus on Research and Development

Throughout IBM's ups and downs, the company has always placed a strong emphasis on research and development, in contrast to the broader trend of declining corporate research.¹²⁹ IBM's research organization is one of the world's largest, spread across 12 major labs on six continents.¹³⁰ For 25 consecutive years, IBM has received more patents than any other company. In 2017, it collected more than 9,000 patents, granted to more than 8,500 researchers across 47 countries, for inventions in areas such as artificial intelligence, self-driving vehicles, and blockchain.¹³¹

The nature of the company's R&D efforts has shifted over the years. Whereas, IBM's research used to look more like cloistered academic research labs, more than one-third of its researchers now collaborate directly with clients.¹³² Collaborative research has the potential to be innovative and directly useful to a real-world problem; however, it is uncertain. According to IBM's research director, "There is no certainty that what you

Even with a disciplined plan to cut costs and focus on profitable ventures, IBM's culture and structure were stifling innovation.

are working on together is actually going to have a result.”¹³³ However, IBM is betting on the value of such research, believing that the new approach will lead to the creation of new businesses.¹³⁴

IBM's New Direction

While its stock performance remains unsteady, IBM's new direction may be starting to show positive signs for the future. The company is now recognized as a leader in cloud services, which include the delivery of software, storage, analytics, and other functions over the Internet. IBM received more than 1,900 cloud-related patents in 2017,¹³⁵ and its cloud services are used by the 10 largest banks, 9 of the 10 largest retailers, and 8 of the 10 largest airlines in the world.¹³⁶ Writes Bob Evans for *Forbes*, “Over the past couple of years, IBM has pulled off a remarkable achievement by simultaneously getting smaller, smarter, faster, and—most important of all—more relevant. At the center of that transformation has been IBM's decisive and bold pivot to the cloud.”¹³⁷

Perhaps an even more important shift at IBM is the cultural transformation that its current CEO, Ginni Rometty, has led. Whereas IBM historically consisted of siloed business units jockeying for control of accounts, the company has transitioned to a more collaborative integrated offering to customers.¹³⁸ Moving forcefully to the cloud is a bold move, as it has the potential to reduce revenue for its other business areas, including hardware, software, and data centers.¹³⁹ Thus, there is likely to be cultural resistance, both internally from managers protecting their domains and externally from impatient investors. Whether IBM can again adjust to a new cultural and strategic operating model is the key question for the company's future success. But if there's one thing the company has learned over its history, it's that survival depends on continual evolution.



A Tale of Two Approaches

A Century-Old Giant Gets into Trouble

Founded in 1892, General Electric is a technology company that has had to consistently reinvent itself to stay competitive in a changing marketplace. The organization has evolved into a multinational corporation that researches, develops, and manufactures technologies across industries, including aviation, renewable energy, and transportation, among others.

From 1955 to 2015, GE managed to stay in the top 10 of the Fortune 500 list¹⁴⁰ and is the only company that exists today among the original members of the Dow Jones Industrial Average. However, in recent years, GE encountered new business challenges that have seen its stock price drop dramatically and 16-year CEO Jeffrey Immelt step down in controversy. Its market capitalization, once over \$400 billion,¹⁴¹ was down to \$117 billion as of April 2018.¹⁴²

GE is a cautionary tale showcasing how different approaches toward business growth in a changing market played out within one company. One approach was an acquisition strategy that prioritized expansion in areas that didn't always align with GE's core business. The second was an organic growth strategy, which supported R&D and new investments in clean technologies that responded to the changing marketplace while utilizing GE's industrial expertise.

Acquisition Growth

To maintain its position at the top of the Fortune 500, GE had to generate the equivalent of another Fortune 500 company in revenue every year to meet its baseline growth targets.¹⁴³ Throughout the 1980s and 1990s, under CEO Jack Welch, GE

dramatically grew by acquiring companies in areas unrelated to its core industrial business, earning more and more revenue from financial services.¹⁴⁴ These acquisitions served GE's growth targets, yet some would argue they came back to haunt them.

By the 2000s, then under CEO Jeffrey Immelt, GE's financial services arm, GE Capital, had grown into a too-big-to-fail bank within an industrial company.¹⁴⁵ When the financial crisis hit, GE was forced to seek emergency assistance from outside investors.¹⁴⁶ GE ended up selling the majority of its financial services businesses at a low market value in hindsight, while also maintaining many of the liabilities from the crisis.¹⁴⁷

Another problematic acquisition that contributed to GE's recent troubles came from the 2015 purchase of Alstom, a producer of coal- and gas-powered turbines.¹⁴⁸ The \$9.5 billion deal was GE's largest-ever industrial purchase¹⁴⁹ and took place just as the market for turbines was contracting, due in part to the rise of renewable energy alternatives.¹⁵⁰ By 2018, revenue from turbines sank by 29 percent and orders for gas turbines dropped by 40 percent.¹⁵¹

Organic Growth Through R&D and Investment

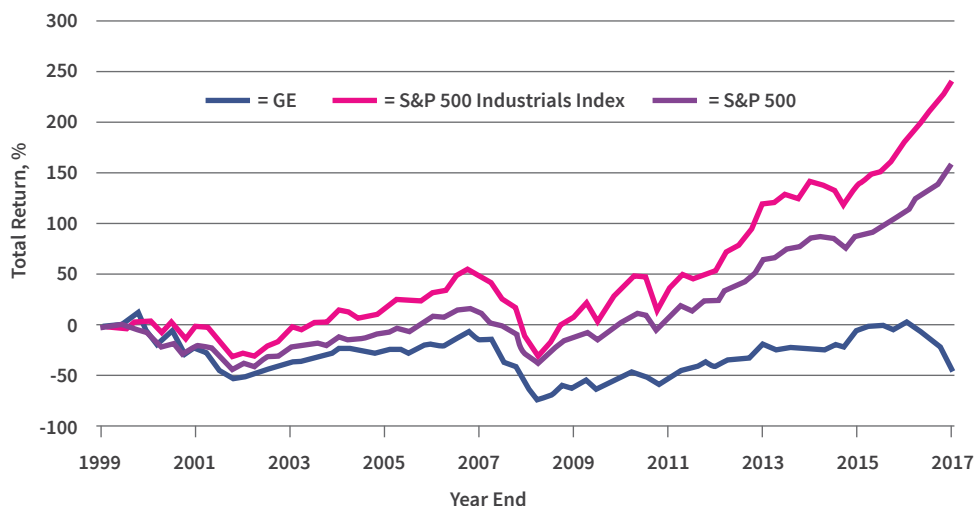
One of the bright spots within GE's business has come from a companywide initiative to expand R&D and investment in clean technologies. Since the early 2000s, GE was hearing concerns over the issue of climate change, including through a shareholder resolution in 2002 that encouraged the company to disclose its greenhouse gas emissions.¹⁵² Signs were emerging that, in the years ahead, regulators and customers would be looking for more sustainable energy sources and manufactured products.¹⁵³ In 2005, the Kyoto Protocol, an international treaty to reduce greenhouse gas emissions, took effect.¹⁵⁴ Places like Europe and Japan were committing to tougher environmental policies than the United States. The possibility of future U.S. regulations was real and GE saw mounting pressure in China and India to clean up their polluted cities and waterways. With half of its revenues coming from international customers, GE did not want to get into the business of designing multiple gas turbines (and other products) for three different markets.¹⁵⁵

GE already had a small set of energy-efficient and renewables-related technologies that they recognized could be grown to tap this budding market.¹⁵⁶ In 2005, GE announced its new business strategy, "Ecomagination," which outlined goals to increase the commercialization of environmentally friendly technologies, including wind power, solar energy, fuel cells, lighting, and more.¹⁵⁷ The plan included a five-year commitment to double GE's annual R&D investment in environmentally friendly technologies to \$1.5 billion, as well as a goal to double GE's annual revenues from

CHART 5

GE's Total Shareholder Return, 2000-2017

Source: Bloomberg Finance L.P.



clean tech products and services to \$20 billion.¹⁵⁸ Within five years, GE not only met these goals but committed to another \$15 billion R&D investment in clean tech products.¹⁵⁹ By 2010, GE realized it would need to expand research beyond its own organization. The solution was the Ecomagination Challenge, an initiative to develop and invest in promising start-up companies focused on solutions related to clean energy, water reuse, efficient lighting, and more. GE committed \$100 million to the initiative and partnered with venture capital firms to bring outside expertise to the evaluation process.

The company was surprised by the early successes of the Challenge. GE and its partners selected 40 finalists and picked 23 winners who collectively received \$140 million in investments. GE hosted an additional nine Challenges since then,¹⁶⁰ each time expanding the portfolio of entrepreneurial businesses in areas such as digitally connected power grids,¹⁶¹ home energy management,¹⁶² and improving the efficiency of Canada's tar sands.¹⁶³

By 2017, GE had parlayed its initial \$20 billion investment in Ecomagination into \$270 billion in revenue and developed 74 qualified products representing 30 percent of their total sales.¹⁶⁴ ¹⁶⁵ The initiative garnered positive feedback from the business, non-profit, and media communities and has been embraced by the start-up community through the Ecomagination Challenges.¹⁶⁶

Imagining GE's Road Ahead

GE will need to make some difficult decisions in the years ahead as it looks to simplify business, sell unprofitable segments, and refocus on core businesses including energy and healthcare. The company now has a new CEO, who is focused on addressing GE's legacy problems and changing the company culture.¹⁶⁷ It remains to be seen whether Ecomagination will serve as a bright spot that helps pull the 120-year-old giant out of its current crisis.

One of the bright spots within the business has come from a companywide initiative to expand R&D and investment in clean technologies.



A Visionary Leader Aims for a Radical Change

The CEO Who Saw Carpet Differently

In the early 1990s, modular carpet manufacturers, like other industries at the time, found more customers were asking about corporate environmental practices. In 1994, Ray Anderson, the founder and CEO of Interface, a large U.S.-based carpet company, began researching environmental strategies to respond to one such request. Reading Paul Hawken's book *The Ecology of Commerce* led Anderson to an epiphany.¹⁶⁸ He couldn't deny the fact that Interface's business model was based on "digging up the Earth and turning petroleum and other materials into polluting products that ended up in landfills."¹⁶⁹ Anderson decided he needed to move the company toward a more restorative business model.

Anderson quickly assembled an external team of leading thinkers in the emerging corporate sustainability space and engaged his internal management team to set a new vision for the company's operation.¹⁷⁰ Over an 18-month period, the teams worked with Anderson to articulate the challenges before them and propose solutions.¹⁷¹ The result was Mission Zero, a detailed plan for Interface to cause zero environmental harm by the year 2020.¹⁷² The plan outlined seven fronts on which Interface would act, including the elimination of waste and toxic substances, the use of renewable energy, and closed loop design and manufacturing.

Managing Pushback to a Dramatic Shift in Business Strategy

The sustainable vision Anderson outlined is now quite common in the carpet industry; however, in the mid-1990s, it

was radical. Wall Street analysts were concerned about what they saw as a "tree-hugger" business strategy, and several of Anderson's internal managers were skeptical.¹⁷³ CEO Dan Hendrix recalls the day after Anderson brought the company's sustainability message to Wall Street investors: "Our analyst called to say that one of our biggest investors was dumping the stock because Ray had clearly gone 'round the bend.'"¹⁷⁴ Anderson later used this as an opportunity to clarify that his role as CEO required him to look "round the bend" in order to know what was coming.¹⁷⁵ At the time, there were very few corporate sustainability frameworks and green technologies to hold up as successful examples.¹⁷⁶ There was also a general sense that there was not enough of a catalyst internally or externally to justify such a major shift in the business model.¹⁷⁷

Challenges Along the Road to Zero

As Interface's sustainable innovations provided new opportunities, they also created new challenges. One of Interface's biggest disappointments was a program called "Evergreen Lease." The program had the ambitious goal of changing the ownership structure of the carpet industry. Instead of selling carpets to customers, Interface created a model where the company retained ownership of the carpet and leased it to customers as a service. The program would have helped Interface to close the loop on its own recycling operations. However, it did not catch on with customers, who found it difficult to pay for carpet using their operating budgets.¹⁷⁸ Interface also experienced other external challenges, including market volatility. When oil prices were high, recycled nylon became cheaper, supporting their new business model. However, when oil prices dropped, recycled nylon was more expensive.¹⁷⁹

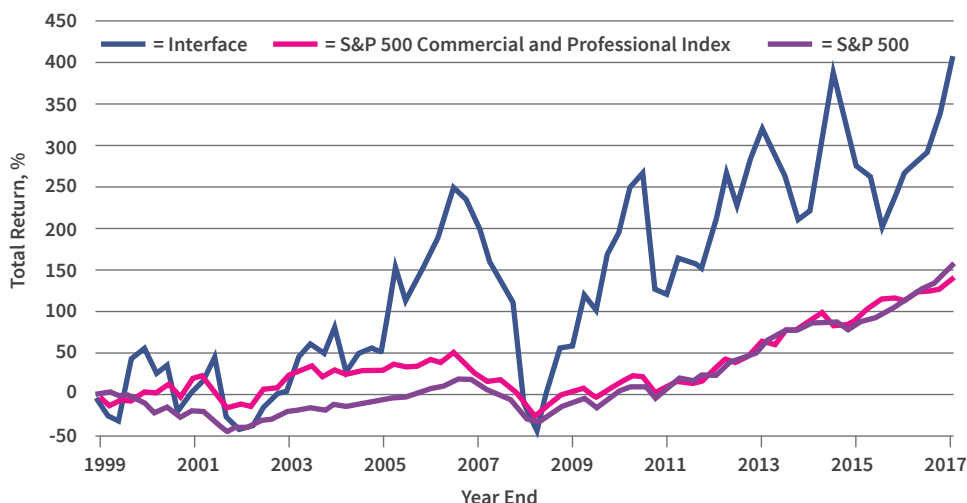
Cost Cutting and New Product Design Lead to Business Success

Confident in both the sustainability and financial benefits of his vision, Anderson persevered, ultimately proving the merits of the strategy on both fronts. Within a year of implementing the new approach, the company's sales increased \$200 million, while material costs dropped by 20 percent. From 1996 to 2010, Mission Zero helped Interface produce more than \$400 million in cost savings¹⁸⁰ and increased their global market share and competitive advantage through sustainable product innovations.¹⁸¹ And, as the company demonstrated the growth opportunities that could be unleashed by sustainable management, it served as inspiration for an entire movement in business, becoming a revered brand and leading

CHART 6

Interface's Total Shareholder Return, 2000-2017

Source: Bloomberg Finance L.P.



voice in its industry and beyond, as its concepts became increasingly adopted by other companies.

As of 2018, the company is on track to meet its 2020 goals to reduce its greenhouse gas emissions by 95 percent, send no waste to landfills, source 95 percent of materials from recycled or bio-based sources, reduce its energy use by half, power 87 percent of its operations with renewable energy, and reduce water use by 90 percent.¹⁸²

This dramatically successful corporate transition was built on a commitment to evolve the company without losing Interface's business-first attitude. Every investment was required to meet traditional business criteria in addition to minimizing environmental impacts.¹⁸³ To address the concerns of stockholders, Anderson focused the company's initial efforts on eliminating waste and other initiatives that saved money right away.¹⁸⁴ Instead of creating add-on programs that might increase costs, Interface focused on core business innovations that reduced costs, while improving its environmental performance.¹⁸⁵

In addition to cost-cutting initiatives, Interface focused on product innovations that added value for customers while also reducing negative environmental impacts. Inspired by asymmetry found in nature, Interface developed a carpet model called Entropy, which could be installed in any direction, minimizing waste and installation costs.¹⁸⁶ Entropy has since become one of Interface's best-selling products of all time.¹⁸⁷ To increase the recyclability of its carpets and reduce toxic chemicals, Interface created TecTiles, a technology that eliminated the need for glue by connecting the tiles to one another instead of adhering them to the floor.¹⁸⁸

Behind all of these initiatives was an early commitment to R&D in manufacturing processes and product innovation. To support this, Anderson reinforced a culture of discovery,

where all employees were tasked with engaging with uncertainty, actively learning, and recognizing and implanting new solutions.¹⁸⁹

Facilitating Change Through External Partnerships

As Interface's expertise grew, it began searching for new ways to create value through external partnerships. In 2012, it launched Net-Works, an initiative that supported Interface's goal to source 100 percent recycled material for its carpet tile while also tackling the environmental problem of discarded fishing nets in poor coastal communities.¹⁹⁰ The program provides an income to coastal communities in the Philippines and Cameroon in exchange for collecting and selling recovered fishing nets for recycling and reuse by Interface.¹⁹¹ To make the initiative possible, Interface partnered with the Zoological Society of London, which connected them to local non-profit partners and community banks.¹⁹²

As of 2018, the initiative has removed 142 metric tons of fishing nets from oceans and created supplemental incomes for more than 1,500 families.¹⁹³ Further, the project has inspired new products at Interface, including Net Effect, an ocean-themed carpet collection that makes the credible claim of making both the oceans and offices more beautiful.¹⁹⁴

The Future of Interface

One of the biggest challenges that Interface has weathered was the loss of their dynamic founder, Ray Anderson, who died in 2011.¹⁹⁵ From 2011 to 2014, earnings stayed flat, and the organization had trouble finding its voice without

Anderson. “We had kind of stopped demonstrating this virtuous business value, which is creating value for our shareowners as well as our other key stakeholders, including the environment,” said Jay Gould, Interface’s president and COO.¹⁹⁶ At the same time, Interface’s biggest competitors had begun catching up, developing sustainability-inspired products and eliminating waste, toxic materials, and carbon from their own businesses.¹⁹⁷ Interface was no longer seen as the maverick leader it once was.

Interface knew it needed to return to the type of radical thinking that Anderson had spearheaded in the 1990s. In 2016, the company brought back their original team of experts, referred to as the “Eco Dream Team,” and began developing a new strategy. Titled “Climate Take Back,” the plan proposes going beyond simply neutralizing harm to the environment to proactively make a positive impact.¹⁹⁸

A key focus of the strategy includes reversing climate change through the sequestration of carbon.¹⁹⁹ Climate Take Back encourages managers to view carbon as a resource and to begin creating new business models to drive change.²⁰⁰ The plan is still in its early stages, and it is unclear if it will have the same transformational effect as Mission Zero two decades earlier. What has become clear is the lesson of Mission Zero’s success in the first place: following a “radical” idea wherever it may lead, especially to places that competitors haven’t yet imagined.

In the mid-1990s, Wall Street analysts were concerned about what they saw as a “tree-hugger” business strategy.



Racing to Remain Relevant During a Time of Change

Riding the Success of the Internal Combustion Engine

Humans have invented many ways to move themselves from place to place—railroad, airplane, and sailboat, among them—but none has so dominated our culture, economy, and landscape over the past century as the automobile powered by the internal combustion engine. There are now more than 1 billion motor vehicles globally,²⁰¹ the vast majority of them powered by gasoline or diesel.

The Ford Motor Company helped create this reality and has ridden this growth for more than 100 years. As one of the pioneers of the industry, Henry Ford's introduction of the assembly line and innovative labor practices revolutionized the auto industry, and manufacturing more broadly. The Ford Model T, introduced in 1908, became one of the best-selling and most famous vehicles of all time.²⁰² Ford is still one of the top five global vehicle manufacturers.²⁰³

However, recent trends are fueling the idea that Ford and its competitors' current model—that of human-driven,

personally owned vehicles powered by internal combustion engines—has run its course. The first of these trends is the rise of the sharing economy; in the transportation sector, this is manifested by companies such as Uber and Lyft, which offer mobility to consumers without the need to own a car. The second trend is autonomous driving, which is currently in the development and testing stages by auto manufacturers (e.g., General Motors, Daimler) and tech companies (e.g., Apple, Uber). The final trend is the electrification and hybridization of vehicles, which reduce the reliance on gas-powered engines.

Judging by recent actions of many of the major automakers, the industry is fully aware that these trends are likely to stall its primary business model in a matter of years, not decades. Ford and its competitors are racing to capitalize on these changes before they go the way of the horse and buggy.

Making Changes Customers Haven't Asked For

Even when future trends are visible, it is no easy task to change one's core product or business model. Aside from the costs of research and development and the difficulty in changing internal culture, there is the challenge of getting consumers to buy into the new model. Ford has had a front-seat view of this challenge in modifying its F-series pickup truck.

The F-series, best known for the F-150 pickup, has been the bestselling truck in the United States for 40 years straight. In 35 of those, it was the bestselling vehicle of any kind in the United States.²⁰⁴ Customers buy these trucks for many reasons, but gas mileage is not one of them. In fact, a survey of F-150 owners' priorities clocked fuel economy at 28th on the list.²⁰⁵

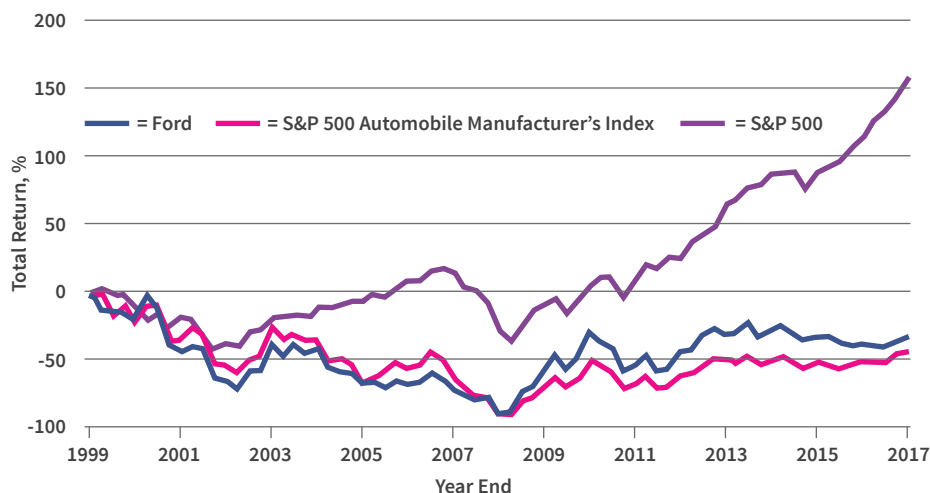
However, the company recognized that it wouldn't be sustainable over the long term to continue producing fuel-inefficient vehicles. In fact, Ford was among those collaborating to design the more-stringent U.S. fuel efficiency standards in 2012. Thus, Ford worked to improve the fuel efficiency of the F-150. In 2011, it introduced a turbo-charged V6 model, which produces more power than the V8.²⁰⁶ This was a bold move, considering the long-held association between the number of cylinders and the capability of the

A business model based on human-driven, personally owned vehicles powered by internal combustion engines may have run its course.

CHART 7

Ford's Total Shareholder Return, 2000-2017

Source: Bloomberg Finance L.P.



vehicle. It took some time for customers to be convinced, but now the V6 engines represent two-thirds of F-150 sales.²⁰⁷

Similarly, in 2015, Ford replaced the F-150's steel body with an aluminum alloy. This reduced the vehicle's weight by 700 pounds and improved fuel efficiency without sacrificing strength.²⁰⁸ Again, this was not an obvious move, as customers hadn't asked for this change, and it opened the company to attack ads from competitors such as General Motors (GM).²⁰⁹

Recently, Ford announced that it is developing a hybrid version of the F-150. The company spent a year on an "anthropological mission of sorts," studying how F-150 owners might benefit from hybridization, beyond the improved fuel efficiency.²¹⁰ They learned that truck owners want a portable power source for power tools and electronics; thus, this design feature will be added to the vehicle and will serve as a key selling point for the next generation of the F-150.

Ford's experience with the F-150 indicates that customers don't usually ask for innovation; it's the job of the company to identify changes that current customers will accept and future customers will want. Even when a company has a "golden goose" product, it is often necessary to risk aggravating the goose in order to ensure a steady supply of golden eggs in the future.

The Trend Toward Electrification

The electric vehicle market has a long history, with very few successes. The best-known attempt to break into that market was by GM, which spent \$1 billion developing its EV-1 line.²¹¹ GM's experiment ended up in a very public failure in the late 1990s, with the automaker repossessing and crushing the vehicles.

Founded in 2003, 100 years after Ford, Tesla was an unlikely

entrant in the electric vehicle market. Founded by Silicon Valley tech entrepreneurs, the company saw possibility where GM and others had failed. The company went public in 2010, the first auto company to do so since Ford in 1956. Seven years later, Tesla pulled ahead of Ford in market capitalization,²¹² despite only having 1 percent of Ford's vehicle sales.²¹³ This gives an indication of investor confidence in the future of electric vehicles. Regardless of whether Tesla ultimately survives and/or thrives as an automaker, it has clearly demonstrated the perception of the role electric cars will play in the coming years.

Over the past few years, many of Ford's competitors have announced major investments and strategies to move toward electrification of vehicles. In the case of Volvo, the company announced that beginning in 2019, all new vehicle models would have an electric motor, either as a hybrid or a fully electric vehicle.²¹⁴

Despite challenges that the whole industry faces—such as shifting priorities from the federal government among hydrogen-, biofuel-, and electric-powered vehicles²¹⁵—the tide seems to be turning toward electric. Thus, to remain competitive, Ford essentially has no choice but to invest in electric vehicles. In 2016, Ford announced that it would invest \$4.5 billion to produce 13 electrified vehicle models.²¹⁶ However, they are behind in the race and will have to play catch-up if they are to outpace the competitors to a prime position in this market. Time will tell how big a risk this delay is for the company.

A Competitor's Cautionary Tale

Ford's path to electrification was much smoother than that of its competitor, Volkswagen. Throughout the 1990s and 2000s, Volkswagen bet big on diesel. The company, among

Ford may be able to build its future success in new markets upon its core competency in research and development.

other European automakers, hoped to convince regulators to view diesel as more environmentally beneficial than gasoline and thus to tax it at a lower rate.²¹⁷ In 2015, this approach imploded for the company when it was revealed that Volkswagen had programmed more than 11 million of its vehicles to deceive emissions testers.²¹⁸ The ensuing controversy led to massive recalls, a nearly \$15 billion settlement,²¹⁹ ongoing lawsuits, and, ultimately, to the company's decision to move away from diesel entirely.²²⁰ In 2017, Volkswagen announced it would shift its focus to electric vehicles, which it had almost entirely ignored previously,²²¹ committing to produce 80 new electric car models by 2025.²²² In the process, Volkswagen lost enormous amounts of money, tarnished its public trust, and arrived late to the electric vehicle market.

Investing in a New Business Model

For its entire history, Ford has essentially had the same business model: to design and manufacture vehicles. As the technology and cultural acceptance of ride-sharing and autonomous driving improve, over the long term, fewer vehicles will be needed, which presents a challenge to Ford's current business model.

In 2016, the company established Ford Smart Mobility LLC, a subsidiary focused on providing "mobility services" beyond the manufacture of automobiles. This subsidiary is working on services such as ride-sharing, non-emergency medical transportation, data analysis for fleets, and connectivity among vehicles.²²³ The company has now conducted more than 30 experiments and pilot projects in this area.²²⁴

One of the projects on which the company is working is a "transportation operating system": an open platform for auto manufacturers, suppliers, cities, and others to manage their interactions.²²⁵

In 2017, Ford partnered with Lyft—itsself built in part on a \$500 million investment from GM—to develop self-driving vehicles,^{226 227} and now has the largest fleet of such vehicles of any automaker.²²⁸ An assessment of the 19 companies working on automated driving systems placed Ford as the fourth-strongest player in the industry.²²⁹

Ford's Ongoing Journey

As a former Ford employee interviewed for this paper stated, "Henry Ford never believed that the internal combustion engine was the only way to propel a 'horseless carriage.'"²³⁰ Thus, with Ford's new endeavors, the company is traveling full circle.

Ford's new journey is just beginning, so it is not yet clear whether it will be successful. It remains to be seen if the company's adjustments to its core products, experiments in mobility, and investments in electric vehicles will help the company beat its competitors. Investors are not confident; as of March 2018, Ford's stock price was down 7 percent over a one-year period and 21 percent over a five-year period.

Furthermore, since early 2017, Ford has also reportedly lobbied for a rollback of the federal fuel economy standards that it helped shape in 2012,²³¹ placing the company in the crosshairs of environmental groups such as Greenpeace²³² and the Sierra Club.²³³ Additionally, the company was also criticized at its annual meeting in May 2018 about its decision to phase out most of its sedan models in the United States, to focus on sport utility vehicles and pickup trucks.²³⁴

However, Ford may be able to build its future success in new markets upon its core competency in research and development. Ford is 15th on the list of highest R&D spenders across all industries, laying out \$7.3 billion for R&D in 2017.²³⁵ Ford is the only U.S. automaker with a business function devoted to licensing its intellectual property. The company's research often finds a home far from vehicles; for instance, Ford and Coca-Cola collaborated to develop the first plastic bottle made entirely from plants.²³⁶ Furthermore, Ford has worked to instill a culture of invention; the company will provide anyone at the company who has an innovative idea—from an entry-level employee to a managing director—with support to get a patent and, in some cases, to build it into the business.²³⁷ And in 2015, Ford took this a step further by opening its suite of patents related to electric vehicles to the public, including its competitors, to spur outside research and investment in the industry.²³⁸

Ford demonstrates that companies are not monolithic, and the process of getting ahead of market changes is always difficult. Ford is working to adjust its products and business model more drastically than it has ever done before. It remains to be seen whether it is changing fast enough.

References

- "25 Years of IBM Patent Leadership," n.d. <https://www-03.ibm.com/press/us/en/presskit/42874.wss>.
- Abrams, David B., Allison M. Glasser, Jennifer L. Pearson, Andrea C. Villanti, Lauren K. Collins, and Raymond S. Niaura. "Harm Minimization and Tobacco Control: Reframing Societal Views of Nicotine Use to Rapidly Save Lives." *Annual Review of Public Health*, 2018. <https://doi.org/10.1146/annurev-publhealth-040617-013849>.
- Anderson, Ray, Mona Amodeo, and Jim Hartzfeld. "Changing Business Cultures from Within." In *State of the World 2010*, edited by Linda Starke and Lisa Mastny, 96–102. W.W. Norton & Company, 2010. <http://blogs.worldwatch.org/transformingcultures/wp-content/uploads/2009/04/Changing-Business-Cultures-from-Within-Anderson-Amodeo-Hartzfeld.pdf>.
- Anthony, Scott. "Kodak's Downfall Wasn't About Technology." *Harvard Business Review*, July 15, 2016. <https://hbr.org/2016/07/kodaks-downfall-wasnt-about-technology>.
- Anzilotti, Eillie. "This Rwandan Factory Is Revolutionizing How Humanitarian Aid Is Done." *Fast Company*, 2017. <https://www.fastcompany.com/40427006/this-rwandan-factory-is-revolutionizing-how-humanitarian-aid-is-done>.
- Baer, Drake. "The Making of Tesla: Invention, Betrayal, and the Birth of the Roadster." *Business Insider*, November 11, 2014. <http://www.businessinsider.com/tesla-the-origin-story-2014-10>.
- Bennett, Drake. "How GE Went From American Icon to Astonishing Mess." *Bloomberg Businessweek*, February 1, 2018. <https://www.bloomberg.com/news/features/2018-02-01/how-ge-went-from-american-icon-to-astonishing-mess>.
- Bhuiyan, Johana. "Ford's Partnership with Lyft Finally Gives It a Clear Plan for Self-Driving Cars." *Recode*, September 27, 2017. <https://www.recode.net/2017/9/27/16374060/lyft-ford-self-driving-cars-partnership>.
- Bigelow, Pete. "Why Ford Decided to Create a 'Smart Mobility' Subsidiary." *Auto Blog*, March 13, 2016. <https://www.autoblog.com/2016/03/13/ford-smart-mobility-company-technology-transportation>.
- Blackwell, Richard. "Waste Management Looks for R&D Venture Partners." *The Globe and Mail*, April 22, 2012. <https://www.theglobeandmail.com/globe-investor/waste-management-looks-for-rd-venture-partners/article4101728>.
- "Bloomberg Terminal Data (accessed March 29, 2018)."
- Bobkoff, Dan. "IBM Revenue Has Fallen for 20 Quarters—but It Used to Run Its Business Very Differently." *Business Insider*, 2017. <http://www.businessinsider.com/ibm-corporate-america-history-2017-4>.
- Bomey, Nathan. "Volkswagen, Mercedes-Benz Launch Electric Cars: 'Anything Tesla Can Do, We Can Do Better.'" *USA Today*, September 11, 2017. <https://www.usatoday.com/story/money/cars/2017/09/11/volkswagen-mercedes-benz-electric-cars/653903001/>.
- Brown, Marcel. "IBM Signs a Deal with the Devil." *This Day in Tech History*. Accessed April 6, 2018. <http://thisdayintechhistory.com/11/06/ibm-signs-a-deal-with-the-devil/>.
- Brzowski, Aaron. "Sierra Club Slams Ford's Efforts to Roll Back CAFE Standards: Video." *Ford Authority*, January 4, 2018. <http://fordauthority.com/2018/01/sierra-club-slams-fords-efforts-to-roll-back-cafe-standards-video/>.
- Burgess, John. "IBM Reports a Record \$5 Billion Loss." *The Washington Post*, January 20, 1993. https://www.washingtonpost.com/archive/politics/1993/01/20/ibm-reports-a-record-5-billion-loss/9f27cba9-65d7-4f7e-ac4c-869734d4054c/?utm_term=.f9fe09a82b81.
- Byrnes, Nanette. "Does Corporate Research Still Matter?" *MIT Technology Review*, November 23, 2015. <https://www.technologyreview.com/s/543411/does-corporate-research-still-matter/>.
- Caldecott, Ben, Oliver Sartor, and Thomas Spencer. "Lessons from Previous 'Coal Transitions.'" 2017. https://coaltransitions.files.wordpress.com/2016/09/coal_synthesis-report_v04.pdf.
- "Campus Waste Reduction." *Los Angeles Unified School District*, n.d. <http://learninggreen.laschools.org/campus-waste-reduction.html>.
- Chesbrough, Henry. "Case Study: GE's Innovator Community." *Financial Times*, May 14, 2012. <https://www.ft.com/content/7cdb9512-9da7-11e1-9a9e-00144feabdc0>.
- . "GE's Ecomagination Challenge: An Experiment in Open Innovation." *California Management Review*, 2012. <https://doi.org/10.1525/cmr.2012.54.3.140>.
- "Chronological History of IBM." Accessed April 6, 2018. https://www-03.ibm.com/ibm/history/history/history_intro.html.
- "Creating a Climate Fit for Life." *Interface*, n.d. http://www.interface.com/US/en-US/campaign/climate-take-back/Four-Pillars-en_US.
- Cremer, Andreas. "Volkswagen Spends Billions More on Electric Cars in Search for Mass Market." *Reuters*, September 11, 2017. <https://www.reuters.com/article/us-auto-show-frankfurt-volkswagen-electric/volkswagen-spends-billions-more-on-electric-cars-in-search-for-mass-market-idUSKCN1BM296>.
- Davis, Mikhail. "20 Years Later, Interface Looks Back on Ray Anderson's Legacy." *GreenBiz*, September 3, 2014. <https://www.greenbiz.com/blog/2014/09/03/20-years-later-interface-looks-back-ray-andersons-legacy>.
- Dean, Cornelia. "Executive on a Mission: Saving the Planet." *The New York Times*, May 22, 2007. <https://www.nytimes.com/2007/05/22/science/earth/22ander.html>.
- DiCarlo, Lisa. "How Lou Gerstner Got IBM to Dance." *Forbes*, November 11, 2002. https://www.forbes.com/2002/11/11/cx_id_1112gerstner.html#62ce82144257.
- "DSM History: An Evolution of Successful Transformations." Accessed April 6, 2018. <https://www.dsm.com/corporate/about/our-company/dsm-history.html>.
- "DSM Markets and Products." Accessed April 6, 2018. <https://www.dsm.com/corporate/markets-products.html>.
- "Eastman Kodak Company Revenue & Earnings Per Share." *Nasdaq*, 2018. <https://www.nasdaq.com/symbol/kodk/revenue-eps>.
- "Ecomagination Progress." *GE Sustainability*, n.d. <http://www.gesustainability.com/performance-data/ecomagination>.
- Egan, Matt. "How Decades of Bad Decisions Broke GE." *CNN Money*, November 20, 2017. <http://money.cnn.com/2017/11/20/investing/general-electric-immelt-what-went-wrong/index.html?sr=fbCNN112117general-electric-immelt-what-went-wrong-0235PMStory>.
- Ellis, David. "Warren Buffett to Invest in GE." *CNN Money*, October 1, 2008. http://money.cnn.com/2008/10/01/news/companies/buffett_ge/index.htm?iid=EL.
- Evans, Bob. "Inside IBM's Stunning Transformation to the Cloud: 10 Key Insights." *Forbes*, June 15, 2017. <https://www.forbes.com/sites/bobevans1/2017/06/15/inside-ibms-stunning-transformation-to-the-cloud-10-key-insights/#50f6de57ec5>.
- Ewing, Jack. "10 Monkeys and a Beetle: Inside VW's Campaign for 'Clean Diesel.'" *The New York Times*, January 25, 2018. <https://www.nytimes.com/2018/01/25/world/europe/volkswagen-diesel-emissions-monkeys.html>.
- . "Volkswagen Says 11 Million Cars Worldwide Are Affected in Diesel Deception." *The New York Times*, September 22, 2015. <https://www.nytimes.com/2015/09/23/business/international/volkswagen-diesel-car-scandal.html>.
- "Famous Inventions to Come from IBM." *IBM—Big Blue*. Accessed April 6, 2018. <http://www.aboutbigblue.com/famous-inventions-to-come-from-ibm>.
- Filippidis, Filippos T., Anthony A. Laverty, Ute Mons, Carlos Jimenez-Ruiz, and Constantine I. Vardavas.

- "Changes in Smoking Cessation Assistance in the European Union between 2012 and 2017: Pharmacotherapy versus Counselling versus E-Cigarettes." *Tobacco Control*, 2018. <https://doi.org/10.1136/tobacco-control-2017-054117>.
- "Ford Motor Company: Our History." Accessed April 9, 2018. <https://corporate.ford.com/history.html>.
- "Ford Realigns Mobility Group; Acquiring Autonomic, TransLoc to Accelerate Growth." *Ford Media Center*, January 25, 2018. <https://media.ford.com/content/fordmedia/fna/us/en/news/2018/01/25/ford-realigns-mobility-group.html>.
- "Ford Smart Mobility LLC Established to Develop, Invest in Mobility Services; Jim Hackett Named Subsidiary Chairman." *Ford Media Center*, March 11, 2016. <https://media.ford.com/content/fordmedia/fna/us/en/news/2016/03/11/ford-smart-mobility-llc-established-jim-hackett-named-chairman.html>.
- "Ford Unlocks Electric Vehicle Patents for All to See." *CBS Detroit*, May 28, 2015. <http://detroit.cbslocal.com/2015/05/28/ford-unlocks-electric-vehicle-patents-for-all-to-see>.
- "Fortune 500." *Fortune*, n.d. http://archive.fortune.com/magazines/fortune/fortune500_archive/full/1955.
- Fosdick, Howard. "What Ever Happened to OS/2?" *OS News*, February 12, 2013. http://www.osnews.com/story/26780/What_Ever_Happened_to_OS_2_.
- Fried, Kate. "Greenpeace USA Takes Aim at Ford's Clean Car Claims." *Greenpeace*, April 2, 2018. <https://www.greenpeace.org/usa/news/greenpeace-usa-takes-aim-at-fords-clean-car-claims>.
- Fry, Erika. "This Former Chemical Company Went 'Green'—and Its Stock Climbed." *Fortune*, 2017. <http://fortune.com/2017/09/12/dsm-green-company-stock>.
- Gilbert, Russell. "Business—More than Making Money." *Rotterdam School of Management, Erasmus University*, 2017. <https://www.rsm.nl/about-rsm/news/detail/12362-business-more-than-making-money>.
- Glinton, Sonari. "After Diesel Scandal, VW Turns to New Leadership and Electric Cars." *NPR*, April 24, 2018. <https://www.npr.org/2018/04/24/605014988/after-diesel-scandal-vw-turns-to-new-leadership-and-electric-cars>.
- Griscom Little, Amanda. "G.E.'s Green Gamble." *Vanity Fair*, October 17, 2006. <https://www.vanityfair.com/news/2006/07/generalelectric200607>.
- Groeger, Martin. "Cooperation with IBM in the 1980s." *Silicon Valley Story*. Accessed April 6, 2018. http://www.silicon-valley-story.de/sv/intel_cooperation.html.
- Harrington, Sian. "Make a Difference: InterfaceFLOR." *HR Magazine*, January 2, 2009. <http://www.hrmagazine.co.uk/article-details/make-a-difference-interfaceflor>.
- Hart, Stuart, and Mark Milstein. "In Search of Sustainable Enterprise." *Value*, 2006. http://www.stuartlhart.com/sites/stuartlhart.com/files/VALUE_INCLUSIVE_p36-43.qxd_.pdf.
- "Here's Why a Hybrid Ford F-150 Pickup Could Be the Perfect Camping Truck." *Auto Week*, December 1, 2017. <http://autoweek.com/article/trucks/heres-how-ford-hopes-make-buyers-want-hybrid-pickups>.
- Hill, Charles, and Gareth Jones. *Essentials of Strategic Management*. 3rd edition. South-Western College Pub, 2011.
- "How Ford and Lyft Are Teaming Up to Take Self-Driving Cars Mainstream." *Ford Media Center*, September 27, 2017. <https://media.ford.com/content/fordmedia/fna/us/en/news/2017/09/how-ford-and-lyft-are-teaming-up-to-take-self-driving-cars-mains.html>.
- Hower, Mike. "Interface Set to Scale 'Net-Works' Program That Turns Fishing Nets Into Carpet." *Sustainable Brands*, June 10, 2015. http://www.sustainablebrands.com/news_and_views/waste_not/mike_hower/interface_set_scale_net-works_program_turns_fishing_nets_carpet.
- Hughes, Justin. "Ford's Hybrid F-150 Will Keep Your Beer Cold." *The Drive*, November 30, 2017. <http://www.thedrive.com/sheetmetal/16552/fords-hybrid-f-150-will-keep-your-beer-cold>.
- "IBM Research," n.d. <http://www.research.ibm.com>.
- "IBM Revenue Declines for 21st Straight Quarter, Weighed Down by Legacy Businesses." *ET Tech*, July 19, 2017. <https://tech.economietimes.indiatimes.com/news/corporate/ibm-revenue-declines-for-21st-straight-quarter-weighed-down-by-legacy-businesses/59660177>.
- "In a Blue State of Mind—Net Effect." *Interface*, 2018. <http://www.interface.com/US/en-US/about/modular-carpet-tile/Net-Effect>.
- "Interface: The Journey of a Lifetime." *The Natural Step*, 2013. <http://www.biomimicrytaiwan.org/wp-content/uploads/2016/12/130913-Success-Story-Brochure-Interface.pdf>.
- Isidore, Chris, and David Goldman. "Volkswagen Agrees to Record \$14.7 Billion Settlement over Emissions Cheating." *CNN Money*, June 28, 2016.
- Jeannet, Jean Pierre, and Hein Schreuder. *From Coal to Biotech: The Transformation of DSM with Business School Support*, 2015. <https://doi.org/10.1007/978-3-662-46299-7>.
- Kerr, William (Harvard Business School). "Innovation and Business Growth." In *Moving to the Innovation Frontier*, edited by Christian Keuschnigg, 41–53, 2016. http://www.wpz-fgn.com/wp-content/uploads/1460556579_2D5E4CBnDL-NH.pdf.
- Kirschbaum, Robert. "Open Innovation in Practice." *Research-Technology Management*, 2005. <https://doi.org/10.1080/08956308.2005.11657321>.
- Korosec, Kirsten. "Bill Ford: Here's Where Ford Motor Co. Will Be in 5 Years." *Fortune*, May 17, 2016. <http://fortune.com/2016/05/17/bill-ford-brainstorm-e-future>.
- Kralingen, Bridget van. "IBM's Transformation—From Survival to Success." *Forbes*, 2010. <https://www.forbes.com/2010/07/07/ibm-transformation-lessons-leadership-managing-change.html#4f2999e23afb>.
- Kranhold, Kathryn. "GE's Environment Push Hits Business Realities." *The Wall Street Journal*, September 14, 2007. <https://www.wsj.com/articles/SB118973485406827339>.
- "Kyoto Protocol Fast Facts." *CNN*, March 21, 2018. <https://www.cnn.com/2013/07/26/world/kyoto-protocol-fast-facts/index.html>.
- Lampikoski, Tommi. "Green, Innovative, and Profitable: A Case Study of Managerial Capabilities at Interface Inc." *Technology Innovation Management Review*, 2012.
- Langford, James. "GE Profit Surges Despite Weakening Power Business." *Washington Examiner*, April 20, 2018. <https://www.washingtonexaminer.com/business/ge-profit-beats-expectations-despite-weakening-power-business>.
- "Leading Change: 2016 Sustainability Report." *Waste Management*, 2017. http://www.wm.com/sustainability/pdfs/2016SustainabilityReport_WM.pdf.
- "Leading Tobacco Companies Worldwide in 2017, Based on Net Sales." *Statista*, 2018. <https://www.statista.com/statistics/259204/leading-10-tobacco-companies-worldwide-based-on-net-sales>.
- "Lenovo Completes Acquisition of IBM's Personal Computing Division." *Lenovo Newsroom*, 2005. <http://news.lenovo.com/news-releases/lenovo-completes-acquisition-ibms-personal-computing-division.htm>.
- Levine-Weinberg, Adam. "Should General Electric Investors Worry About GE Capital Liabilities?" *Motley Fool*, March 27, 2018. <https://www.fool.com/investing/2018/03/27/should-general-electric-investors-worry-about-ge-c.aspx>.
- Madrigal, Alexis. "IBM's First 100 Years: A Heavily Illustrated Timeline." *The Atlantic*, 2011. <https://www.theatlantic.com/technology/archive/2011/06/ibms-first-100-years-a-heavily-illustrated-timeline/240502>.
- Makower, Joel. "Ecomagination at 10: A Status Report." *GreenBiz*, May 11, 2015. <https://www.greenbiz.com/article/ecomagination-10-status-report>.
- . "Inside Interface's Bold New Mission to Achieve 'Climate Take Back.'" *GreenBiz*, June 6, 2016.

<https://www.greenbiz.com/article/inside-interfaces-bold-new-mission-achieve-climate-take-back>.

Martinez, Michael. "Fields' CAFE Claim Comes with an Asterisk." *Automotive News*, February 6, 2017. <http://www.autonews.com/article/20170206/OEM11/302069936/fields-cafe-claim-comes-with-an-asterisk>.

McGregor, Jena. "The Biggest Mass Layoffs of the Past Two Decades." *The Washington Post*, January 28, 2015. https://www.washingtonpost.com/news/on-leadership/wp/2015/01/28/the-biggest-mass-layoffs-of-the-past-two-decades/?utm_term=.def4cdce1a8.

"Mobilizing Bright Science for Project 'Clean Cow.'" Accessed April 6, 2018. <https://www.dsm.com/corporate/science/challenges/climate-energy/project-clean-cow.html>.

Molla, Rani. "Tesla Is Worth More than Ford and GM, Despite Having Just 1 Percent of Their Sales." *Recode*, August 2, 2017. <https://www.recode.net/2017/8/2/16085822/tesla-ford-gm-worth-car-manufacturer-elon-musk-earnings>.

Murphy, Mike. "Ford Is Solving Problems by Getting All Its Employees to Think Like Inventors." *Quartz*, September 11, 2016. <https://qz.com/774651/ford-cars-are-innovative-because-employees-are-treated-like-inventors>.

Naughton, Nora. "Ford Stands by Decision to Cut Sedans." *The Detroit News*, May 10, 2018. <https://www.detroitnews.com/story/business/autos/ford/2018/05/10/ford-motor-annual-meeting-sedans/34755947>.

"Navigant Research Leaderboard: Automated Driving Vehicles." *Navigant Research*, 2018. <https://www.navigantresearch.com/research/navigant-research-leaderboard-automated-driving-vehicles>.

"Net-Works." *Interface*, n.d. <http://net-works.com>.

Newell, Andrea. "Waste Management Exceeds Expectations." *Triple Pundit*, December 22, 2010. <https://www.triplepundit.com/2010/12/waste-management-exceeds-expectations>.

Pham, Sherisse. "Volvo: Gas-Only Cars Are History after 2019." *CNN*, July 5, 2017. <http://money.cnn.com/2017/07/05/autos/volvo-electric-cars-internal-combustion-engine/index.html>.

Phone Interview with Ethan McCarty (January 30, 2018).

Phone Interview with Former Ford Employee (February 2, 2018).

Phone Interview with Hugh Welsh (January 26, 2018).

Phone Interview with Jean-Pierre Jeanett (February 2, 2018).

Phone Interview with Robert Evans (January 30, 2018).

Phone Interview with Thomas Singer, The Conference Board (January 24, 2018).

Pincus, Carolyn, and Katie Ellman. "Philips Lighting, WM Transition to the Circular Economy." *GreenBiz*, December 1, 2017. Philips Lighting, WM transition to the circular economy.

Posner, Bruce. "One CEO's Trip From Dismissive to Convinced." *MIT Sloan Management Review*, 2009. <https://sloanreview.mit.edu/article/one-ceos-trip-from-dismissive-to-convinced>.

Quinn, Gene. "With 9,043 U.S. Patents, IBM Tops for 25th Consecutive Year." *IPWatchdog*, January 9, 2018. <http://www.ipwatchdog.com/2018/01/09/ibm-tops-u-s-patent-list/id=92016>.

"Ranking of the 20 Companies with the Highest Spending on Research and Development in 2017." *Statista*, 2018. <https://www.statista.com/statistics/265645/ranking-of-the-20-companies-with-the-highest-spending-on-research-and-development>.

Redman, Russell. "Wegmans Steps Up Push to Reduce Waste." *Supermarket News*, April 19, 2018. <http://www.supermarketnews.com/retail-financial/wegmans-steps-push-reduce-waste>.

"Republic Services Advances Its Sustainability Commitments." *Business Insider*, August 28, 2017. <http://markets.businessinsider.com/news/stocks/republic-services-advances-its-sustainability-commitments-1002288053>.

"Republic Services Returns to Dow Jones Sustainability World and North America Indices." *Waste360*, September 13, 2017. <http://www.waste360.com/haulers/republic-services-returns-dow-jones-sustainability-world-and-north-america-indices>.

Rooij, Arjan van. *The Company That Changed Itself: R&D and the Transformations of DSM*. Amsterdam University Press, 2007.

Rosengren, Cole. "Waste Management CEO Jim Fish on Rethinking Recycling and the 'Next Generation of Landfills.'" *Waste Dive*, May 9, 2017. <https://www.wastedive.com/news/waste-management-ceo-jim-fish-on-rethinking-recycling-and-the-next-generation/442278>.

Schofield, Jack. "IBM Shows Growth after 22 Straight Quarters of Declining Revenues, but Has It Turned the Corner?" *ZDNet*, January 21, 2018. <https://www.zdnet.com/article/ibm-shows-growth-after-22-straight-quarters-of-declining-revenues-but-has-it-turned-the-corner>.

Sears, Joi. "Waste Management Helps Businesses Turn Waste into Opportunity." *Triple Pundit*, July 31, 2015. <https://www.triplepundit.com/special/roi-of-sustainability/waste-management-helps-businesses-turn-waste-into-opportunity>.

Singer, Thomas. "Business Transformation and the Circular Economy: A Candid Look at Risks and Rewards." *The Conference Board*, 2017. <https://www.conference-board.org/publications/publicationdetail.cfm?publicationid=7481>.

Smith, Aaron. "Ford: F-Series Is Best-Selling Truck for 40 Years." *CNN*, January 4, 2017. <http://money.cnn.com/2017/01/04/autos/ford-f-150-truck-40-years/index.html>.

Staff, Matthew. "Africa Improved Foods." *Africa Outlook Magazine*, April 10, 2017. <http://www.africaoutlookmag.com/outlook-features/africa-improved-foods>.

"State of Smoking." *Foundation for a Smoke-Free World*, 2018. <https://www.smokefreeworld.org/state-smoking>.

Taft, Darryl. "IBM at 100: Big Blue's Top Divestitures and Spinoffs." *eWeek*, June 9, 2011. <http://www.eweek.com/news/sap>.

"Tesla: 7 Years After IPO, More Valuable Than Ford." *Clean Technica*, February 7, 2018. <https://cleantech-nica.com/2018/02/07/tesla-goes-ipo-surpassing-ford-value-just-7-years-infographic>.

Tetzeli, Rick. "9 Ways GE Executed Its Radical Green Reinvention." *Fast Company*, December 10, 2015. <https://www.fastcompany.com/3054441/9-ways-ge-executed-its-radical-green-reinvention>.

"The 5 Things IBM Needs to Do to Win at AI." *Harvard Business Review*, February 3, 2016. <https://hbr.org/2016/02/the-5-things-ibm-needs-to-do-to-win-at-ai>.

"The Carpet-Tile Philosopher." *The Economist*, September 10, 2011. <https://www.economist.com/node/21528583>.

"The Last Kodak Moment?" *The Economist*, January 12, 2012. <https://www.economist.com/node/21542796>.

"The Net-Works Program." *Interface*, 2018. http://www.interface.com/APAC/en-AU/about/mission/Net-Works-en_AU.

Tripoli, Lori. "Interface's Amazing Journey." *Sustainability*, August 2008. <https://www.liebertpub.com/doi/pdf/10.1089/SUS.2008.9949>.

"Two Degrees of Transformation." *World Economic Forum*, January 2018. http://www3.weforum.org/docs/WEF_Two_Degrees_of_Transformation.pdf.

Valdes-Dapena, Peter. "Evolution of the Ford F-150." *CNN*, January 15, 2014. <http://money.cnn.com/gallery/autos/2014/01/13/ford-truck-history/index.html>.

"View from the C-Suite: DSM CEO Feike Sijbesma." *GreenBiz*. Accessed April 6, 2018. <https://www.greenbiz.com/blog/2011/07/05/view-c-suite-dsm-ceo-feike-sijbesma>.

Voelcker, John. "1.2 Billion Vehicles on World's Roads Now, 2 Billion by 2035: Report." *Green Car Reports*, July 29, 2014. https://www.greencarreports.com/news/1093560_1-2-billion-vehicles-on-worlds-roads-now-2-billion-by-2035-report.

"Waste Management Net Income (TTM)." *YCharts*, 2018. https://ycharts.com/companies/WM/net_income_ttm.

Welch, David. "GM Airs Attack Ads That Poke Holes in Ford's Aluminum Pickups." *Bloomberg*, June 8, 2016. <https://www.bloomberg.com/news/articles/2016-06-08/gm-air-attack-ads-that-poke-holes-in-ford-s-aluminum-pickups>.

"Why General Electric Is Struggling." *The Economist*, November 30, 2017. <https://www.economist.com/blogs/economist-explains/2017/11/economist-explains-21>.

"Why the Aluminum F-150 Is Better than Its Steel Counterpart." *Muzi Ford*, n.d. <https://www.muziford.com/2015-F-150/why-the-aluminum-f150-is-better-than-its-steel-counterpart.htm>.

"World Motor Vehicle Production: OICA Correspondents Survey." Accessed April 9, 2018. <http://www.oica.net/wp-content/uploads/World-Ranking-of-Manufacturers.pdf>.

"Yahoo! Finance," 2018. <https://finance.yahoo.com>.

"Yahoo Finance: General Electric Company (GE)." *Yahoo Finance*, 2018. <https://finance.yahoo.com/quote/ge?ltr=1>.

"Yahoo Finance: Koninklijke DSM N.V. (DSM.AS)." Accessed April 4, 2018. <https://finance.yahoo.com/quote/DSM.AS?p=DSM.AS>.

¹ "State of Smoking."

² Abrams et al., "Harm Minimization and Tobacco Control: Reframing Societal Views of Nicotine Use to Rapidly Save Lives."

³ Filippidis et al., "Changes in Smoking Cessation Assistance in the European Union between 2012 and 2017: Pharmacotherapy versus Counselling versus E-Cigarettes."

⁴ "Leading Tobacco Companies Worldwide in 2017, Based on Net Sales."

⁵ "Yahoo! Finance."

⁶ "Yahoo! Finance." Data is rounded, for year ending 12/31/17.

⁷ "Yahoo! Finance." Data is rounded.

⁸ "Yahoo! Finance." Data is rounded.

⁹ "Yahoo! Finance." Data is rounded, for year ending 12/31/17.

¹⁰ "Yahoo! Finance." Data is rounded.

¹¹ "Yahoo! Finance." Data is rounded.

¹² "Yahoo! Finance." Data is rounded, for year ending 12/31/17.

¹³ "Yahoo! Finance." Data is rounded.

¹⁴ "Yahoo! Finance." Data is rounded.

¹⁵ "Yahoo! Finance." Data is rounded, for year ending 12/31/17.

¹⁶ "Yahoo! Finance." Data is rounded.

¹⁷ "Yahoo! Finance." Data is rounded.

¹⁸ "Yahoo! Finance." Data is rounded, for year ending 12/31/17.

¹⁹ "Yahoo! Finance." Data is rounded.

²⁰ "Yahoo! Finance." Data is rounded.

²¹ "Yahoo! Finance." Data is rounded, for year ending 12/31/17.

²² "Yahoo! Finance." Data is rounded.

²³ "Yahoo! Finance." Data is rounded.

²⁴ "The Last Kodak Moment?"

²⁵ Anthony, "Kodak's Downfall Wasn't About Technology."

²⁶ Anthony.

²⁷ Anthony.

²⁸ "The Last Kodak Moment?"

²⁹ "Eastman Kodak Company Revenue & Earnings Per Share."

³⁰ Tripoli, "Interface's Amazing Journey."

³¹ "Leading Change: 2016 Sustainability Report."

³² "The 5 Things IBM Needs to Do to Win at AI."

³³ Caldecott, Sartor, and Spencer, "Lessons from Previous 'Coal Transitions.'"

³⁴ "Yahoo Finance: Koninklijke DSM N.V. (DSM.AS)."

³⁵ "DSM Markets and Products."

³⁶ "DSM History: An Evolution of Successful Transformations."

³⁷ Jeannet and Schreuder, *From Coal to Biotech: The Transformation of DSM with Business School Support*.

³⁸ "DSM History: An Evolution of Successful Transformations."

³⁹ "Phone Interview with Hugh Welsh (January 26, 2018)."

⁴⁰ Jeannet and Schreuder, *From Coal to Biotech: The Transformation of DSM with Business School Support*.

⁴¹ Jeannet and Schreuder.

⁴² "View from the C-Suite: DSM CEO Feike Sijbesma."

⁴³ "DSM History: An Evolution of Successful Transformations."

⁴⁴ "Phone Interview with Hugh Welsh (January 26, 2018)."

⁴⁵ van Rooij, *The Company That Changed Itself: R&D and the Transformations of DSM*.

⁴⁶ Kirschbaum, "Open Innovation in Practice."

⁴⁷ van Rooij, *The Company That Changed Itself: R&D and the Transformations of DSM*.

⁴⁸ "Phone Interview with Hugh Welsh (January 26, 2018)."

⁴⁹ "Phone Interview with Jean-Pierre Jeannet (February 2, 2018)."

⁵⁰ "Phone Interview with Robert Evans (January 30, 2018)."

⁵¹ "Mobilizing Bright Science for Project 'Clean Cow.'"

⁵² Fry, "This Former Chemical Company Went 'Green'—and Its Stock Climbed."

⁵³ Staff, "Africa Improved Foods."

⁵⁴ Anzilotti, "This Rwandan Factory Is Revolutionizing How Humanitarian Aid Is Done."

⁵⁵ Anzilotti.

⁵⁶ "Phone Interview with Hugh Welsh (January 26, 2018)."

⁵⁷ "Phone Interview with Hugh Welsh (January 26, 2018)."

⁵⁸ "Phone Interview with Hugh Welsh (January 26, 2018)."

⁵⁹ Fry, "This Former Chemical Company Went 'Green'—and Its Stock Climbed."

⁶⁰ Fry.

⁶¹ "Phone Interview with Robert Evans (January 30, 2018)."

⁶² "Phone Interview with Hugh Welsh (January 26, 2018)."

⁶³ "Phone Interview with Hugh Welsh (January 26, 2018)."

⁶⁴ "Two Degrees of Transformation."

⁶⁵ Gilbert, "Business—More than Making Money."

⁶⁶ "Yahoo! Finance: Koninklijke DSM N.V. (DSM.AS)."

⁶⁷ Pincus and Ellman, "Philips Lighting, WM Transition to the Circular Economy."

⁶⁸ "Phone Interview with Thomas Singer, The Conference Board (January 24, 2018)."

⁶⁹ "Phone Interview with Thomas Singer, The Conference Board (January 24, 2018)."

⁷⁰ "Phone Interview with Thomas Singer, The Conference Board (January 24, 2018)."

⁷¹ "Phone Interview with Thomas Singer, The Conference Board (January 24, 2018)."

⁷² Singer, "Business Transformation and the Circular Economy: A Candid Look at Risks and Rewards."

⁷³ Sears, "Waste Management Helps Businesses Turn Waste into Opportunity."

⁷⁴ Singer, "Business Transformation and the Circular Economy: A Candid Look at Risks and Rewards."

⁷⁵ Sears, "Waste Management Helps Businesses Turn Waste into Opportunity."

⁷⁶ Sears.

⁷⁷ "Leading Change: 2016 Sustainability Report."

⁷⁸ Singer, "Business Transformation and the Circular Economy: A Candid Look at Risks and Rewards."

⁷⁹ "Leading Change: 2016 Sustainability Report."

⁸⁰ Newell, "Waste Management Exceeds Expectations."

⁸¹ Newell.

⁸² "Phone Interview with Thomas Singer, The Conference Board (January 24, 2018)."

⁸³ Rosengren, "Waste Management CEO Jim Fish on Rethinking Recycling and the 'Next Generation of Landfills.'"

⁸⁴ "Phone Interview with Thomas Singer, The Conference Board (January 24, 2018)."

⁸⁵ Blackwell, "Waste Management Looks for R&D Venture Partners."

⁸⁶ "Waste Management Net Income (TTM)."

⁸⁷ "Phone Interview with Thomas Singer, The Conference Board (January 24, 2018)."

⁸⁸ "Phone Interview with Thomas Singer, The Conference Board (January 24, 2018)."

⁸⁹ "Republic Services Advances Its Sustainability Commitments."

⁹⁰ "Campus Waste Reduction."

⁹¹ "Republic Services Returns to Dow Jones Sustainability World and North America Indices."

⁹² Redman, "Wegmans Steps Up Push to Reduce Waste."

⁹³ van Kralingen, "IBM's Transformation—From Survival to Success."

⁹⁴ "Famous Inventions to Come from IBM."

⁹⁵ Madrigal, "IBM's First 100 Years: A Heavily Illustrated Timeline."

⁹⁶ Bobkoff, "IBM Revenue Has Fallen for 20 Quarters—But It Used to Run Its Business Very Differently."

⁹⁷ "Phone Interview with Ethan McCarty (January 30, 2018)."

⁹⁸ Kerr, "Innovation and Business Growth."

⁹⁹ "Chronological History of IBM."

¹⁰⁰ Hill and Jones, *Essentials of Strategic Management*.

¹⁰¹ "Chronological History of IBM."

¹⁰² van Kralingen, "IBM's Transformation—From Survival to Success."

¹⁰³ "Phone Interview with Ethan McCarty (January 30, 2018)."

- 104 Kerr, "Innovation and Business Growth."
- 105 Groeger, "Cooperation with IBM in the 1980s."
- 106 Brown, "IBM Signs a Deal with the Devil."
- 107 "Chronological History of IBM."
- 108 "Bloomberg Terminal Data (accessed March 29, 2018)."
- 109 "Phone Interview with Ethan McCarty (January 30, 2018)."
- 110 Burgess, "IBM Reports a Record \$5 Billion Loss."
- 111 DiCarlo, "How Lou Gerstner Got IBM to Dance."
- 112 McGregor, "The Biggest Mass Layoffs of the Past Two Decades."
- 113 Bobkoff, "IBM Revenue Has Fallen for 20 Quarters—But It Used to Run Its Business Very Differently."
- 114 van Kralingen, "IBM's Transformation—From Survival to Success."
- 115 Fosdick, "What Ever Happened to OS/2?"
- 116 DiCarlo, "How Lou Gerstner Got IBM to Dance."
- 117 Kerr, "Innovation and Business Growth."
- 118 Kerr.
- 119 "Phone Interview with Ethan McCarty (January 30, 2018)."
- 120 Taft, "IBM at 100: Big Blue's Top Divestitures and Spinoffs."
- 121 "Lenovo Completes Acquisition of IBM's Personal Computing Division."
- 122 Madrigal, "IBM's First 100 Years: A Heavily Illustrated Timeline."
- 123 Taft, "IBM at 100: Big Blue's Top Divestitures and Spinoffs."
- 124 van Kralingen, "IBM's Transformation—From Survival to Success."
- 125 Madrigal, "IBM's First 100 Years: A Heavily Illustrated Timeline."
- 126 Schofield, "IBM Shows Growth after 22 Straight Quarters of Declining Revenues, but Has It Turned the Corner?"
- 127 Schofield.
- 128 "IBM Revenue Declines for 21st Straight Quarter, Weighed Down by Legacy Businesses."
- 129 Byrnes, "Does Corporate Research Still Matter?"
- 130 "IBM Research."
- 131 "25 Years of IBM Patent Leadership."
- 132 Byrnes, "Does Corporate Research Still Matter?"
- 133 Byrnes.
- 134 Byrnes.
- 135 Quinn, "With 9,043 U.S. Patents, IBM Tops for 25th Consecutive Year."
- 136 Evans, "Inside IBM's Stunning Transformation to the Cloud: 10 Key Insights."
- 137 Evans.
- 138 Evans.
- 139 "The 5 Things IBM Needs to Do to Win at AI."
- 140 "Fortune 500."
- 141 "Why General Electric Is Struggling."
- 142 "Yahoo Finance: General Electric Company (GE)."
- 143 Chesbrough, "GE's Ecomagination Challenge: An Experiment in Open Innovation."
- 144 Levine-Weinberg, "Should General Electric Investors Worry About GE Capital Liabilities?"
- 145 Egan, "How Decades of Bad Decisions Broke GE."
- 146 Ellis, "Warren Buffett to Invest in GE."
- 147 Egan, "How Decades of Bad Decisions Broke GE."
- 148 Egan.
- 149 Egan.
- 150 Bennett, "How GE Went From American Icon to Astonishing Mess."
- 151 Langford, "GE Profit Surges Despite Weakening Power Business."
- 152 Kranhold, "GE's Environment Push Hits Business Realities."
- 153 "Kyoto Protocol Fast Facts."
- 154 Griscom Little, "G.E.'s Green Gamble."
- 155 Kranhold, "GE's Environment Push Hits Business Realities."
- 156 Hart and Milstein, "In Search of Sustainable Enterprise."
- 157 Hart and Milstein.
- 158 Makower, "Ecomagination at 10: A Status Report."
- 159 "Ecomagination Progress."
- 160 Tetzeli, "9 Ways GE Executed Its Radical Green Reinvention."
- 161 Chesbrough, "Case Study: GE's Innovator Community."
- 162 "The Carpet-Tile Philosopher."
- 163 Posner, "One CEO's Trip From Dismissive to Convinced."
- 164 Anderson, Amodeo, and Hartzfeld, "Changing Business Cultures from Within."
- 165 Anderson, Amodeo, and Hartzfeld.
- 166 Tripoli, "Interface's Amazing Journey."
- 167 Tripoli.
- 168 Davis, "20 Years Later, Interface Looks Back on Ray Anderson's Legacy."
- 169 Davis.
- 170 Lampikoski, "Green, Innovative, and Profitable: A Case Study of Managerial Capabilities at Interface Inc."
- 171 Lampikoski.
- 172 Makower, "Inside Interface's Bold New Mission to Achieve 'Climate Take Back.'"
- 173 Makower.
- 174 Anderson, Amodeo, and Hartzfeld, "Changing Business Cultures from Within."
- 175 Harrington, "Make a Difference: InterfaceFLOR."
- 176 Makower, "Inside Interface's Bold New Mission to Achieve 'Climate Take Back.'"
- 177 Harrington, "Make a Difference: InterfaceFLOR."
- 178 Dean, "Executive on a Mission: Saving the Planet."
- 179 Dean.
- 180 Harrington, "Make a Difference: InterfaceFLOR."
- 181 Lampikoski, "Green, Innovative, and Profitable: A Case Study of Managerial Capabilities at Interface Inc."
- 182 Lampikoski.
- 183 "Interface: The Journey of a Lifetime."
- 184 "The Net-Works Program."
- 185 Hower, "Interface Set to Scale 'Net-Works' Program That Turns Fishing Nets Into Carpet."
- 186 Hower.
- 187 "Net-Works."
- 188 "In a Blue State of Mind—Net Effect."
- 189 Makower, "Inside Interface's Bold New Mission to Achieve 'Climate Take Back.'"
- 190 Makower.
- 191 Makower.
- 192 Makower.
- 193 Makower.
- 194 "Creating a Climate Fit for Life."
- 195 Voelcker, "1.2 Billion Vehicles on World's Roads Now, 2 Billion by 2035: Report."
- 196 "Ford Motor Company: Our History."
- 197 "World Motor Vehicle Production: OICA Correspondents Survey."
- 198 Smith, "Ford: F-Series Is Best-Selling Truck for 40 Years."
- 199 Hughes, "Ford's Hybrid F-150 Will Keep Your Beer Cold."
- 200 Valdes-Dapena, "Evolution of the Ford F-150."
- 201 "Here's Why a Hybrid Ford F-150 Pickup Could Be the Perfect Camping Truck."
- 202 "Why the Aluminum F-150 Is Better than Its Steel Counterpart."
- 203 Welch, "GM Aims Attack Ads That Poke Holes in Ford's Aluminum Pickups."
- 204 "Here's Why a Hybrid Ford F-150 Pickup Could Be the Perfect Camping Truck."
- 205 Baer, "The Making of Tesla: Invention, Betrayal, and the Birth of the Roadster."
- 206 "Tesla: 7 Years After IPO, More Valuable Than Ford."
- 207 Molla, "Tesla Is Worth More than Ford and GM, Despite Having Just 1 Percent of Their Sales."
- 208 Pham, "Volvo: Gas-Only Cars Are History after 2019."
- 209 "Phone Interview with Former Ford Employee (February 2, 2018)."
- 210 Korosec, "Bill Ford: Here's Where Ford Motor Co. Will Be in 5 Years."
- 211 Ewing, "10 Monkeys and a Beetle: Inside VW's Campaign for 'Clean Diesel.'"
- 212 Ewing, "Volkswagen Says 11 Million Cars Worldwide Are Affected in Diesel Deception."
- 213 Isidore and Goldman, "Volkswagen Agrees to Record \$14.7 Billion Settlement over Emissions Cheating."
- 214 Grinton, "After Diesel Scandal, VW Turns to New Leadership and Electric Cars."
- 215 Bomey, "Volkswagen, Mercedes-Benz Launch Electric Cars: 'Anything Tesla Can Do, We Can Do Better.'"
- 216 Cremer, "Volkswagen Spends Billions More on Electric Cars in Search for Mass Market."
- 217 "Ford Smart Mobility LLC Established to Develop, Invest in Mobility Services; Jim Hackett Named Subsidiary Chairman."
- 218 Bigelow, "Why Ford Decided to Create a 'Smart Mobility' Subsidiary."
- 219 "Ford Realigns Mobility Group; Acquiring Autonomic, TransLoc to Accelerate Growth."
- 220 "How Ford and Lyft Are Teaming Up to Take Self-Driving Cars Mainstream."
- 221 Bhuiyan, "Ford's Partnership with Lyft Finally Gives It a Clear Plan for Self-Driving Cars."
- 222 "Ford Smart Mobility LLC Established to Develop, Invest in Mobility Services; Jim Hackett Named Subsidiary Chairman."
- 223 "Navigant Research Leaderboard: Automated Driving Vehicles."
- 224 "Phone Interview with Former Ford Employee (February 2, 2018)."
- 225 Martinez, "Fields' CAFE Claim Comes with an Asterisk."
- 226 Fried, "Greenpeace USA Takes Aim at Ford's Clean Car Claims."
- 227 Brzozowski, "Sierra Club Slams Ford's Efforts to Roll Back CAFE Standards: Video."
- 228 Naughton, "Ford Stands by Decision to Cut Sedans."
- 229 "Ranking of the 20 Companies with the Highest Spending on Research and Development in 2017."
- 230 Murphy, "Ford Is Solving Problems by Getting All Its Employees to Think Like Inventors."
- 231 Murphy.
- 232 "Ford Unlocks Electric Vehicle Patents for All to See."



575 5th Avenue, 14th Floor
New York, NY 10017 USA

info@smokefreeworld.org
smokefreeworld.org