

Modernising the company Edison built: Applying innovation and digitisation at GE Appliances

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Bill Good began his career in manufacturing on an assembly line while working his way through college. His experience sparked his passion and interest in manufacturing as a career, and he set a goal to one day lead manufacturing for a large US company. Over the course of Bill's 33-year career, he has honed his knowledge of supply chain management through his various roles of increasing responsibility at Tri-Glass, Charbroil, Whirlpool and now in his dream job as the vice president of manufacturing at GE Appliances, a Haier company. Bill holds a BS in operations management from Auburn University and an MBA and a MS in human resources from Troy State University. Bill is a certified Six Sigma Black Belt, with expertise in Theory of Constraints, HOSHIN Planning and the Toyota Production System. He places a high value on employee engagement, building relationships and leading transformational change. Currently, Bill and his team are focusing on expanding plant capacity, increasing automation in the supply chain, and implementing new digital tools to create a Zero Distance approach with consumers.

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Abstract

GE Appliances (GEA), a Haier company, has implemented new, innovative strategies as part of its five-year transformation goal of knowing and serving consumers better and creating a winning culture where employee entrepreneurs thrive. Through implementing a new microenterprise business model with a 'Zero Distance' philosophy and creating a digital supply chain, GEA has become the fastest growing appliance company in the US. A summary of the company's new business model, including details on the microenterprise structure and new House of Brands, is presented in this paper, as well as several key components of the digital supply chain implementation. In addition, the company has a bold philosophy on upskilling its workforce, and this paper shares several examples of talent development programmes GEA has implemented to develop the digital supply chain leaders of tomorrow.

Keywords

digital supply chain, transformative leadership, business model, Zero Distance, company transformation, entrepreneurship, microenterprises

COMPANY OVERVIEW

Since 1907, GE Appliances (GEA) has built innovative, quality products that can be found in half of all US homes. In 2016, GEA became part of Haier Smart Home, owner of the world's largest

appliance brand. Today, GEA sells appliances under the Monogram, Café, GE Profile, GE, Haier and Hotpoint brands. GEA is headquartered in Louisville, Kentucky, and employs more than 15,000 people.

INTRODUCTION

In 2016, General Electric (GE) sold its appliance business to Haier Smart Home after being up for sale for many years. Prior to the sale, there was limited investment and little autonomy to drive change. The company mindset was risk-averse, and more about ‘playing not to lose’, which made the business slow to react to the competition.

The US-led executive leadership team remained in place after the sale and sought to reinvent the company. With a ‘Zero Distance’ philosophy, a new business model, enhanced brand segmentation and a digital supply chain, GEA has become the fastest-growing appliance manufacturer in the US. This transformation has allowed our manufacturing teams to connect with consumers throughout the entire life cycle of the appliances we produce, and it has fuelled growth for our company and our employees.

NEW BUSINESS MODEL

At the core of GEA’s transformation is a strategic shift that builds a unique connection with our consumers. This Zero Distance philosophy means eliminating the distance between what we make and what our consumers need; it means eliminating the distance between idea and innovation, and it means developing and manufacturing products close to our customers in the US. For GEA’s supply chain, this means a reduction in lead times through localisation of our manufacturing operations and our supply base.

Zero Distance also plays a key role in GEA’s commitment to increasing investment in US manufacturing (see Figure 1). Since 2016, GEA has announced investments of more than US\$2bn in the US — in new products, technology, and the creation of more than 3,000 new jobs across the country. GEA has also accelerated its

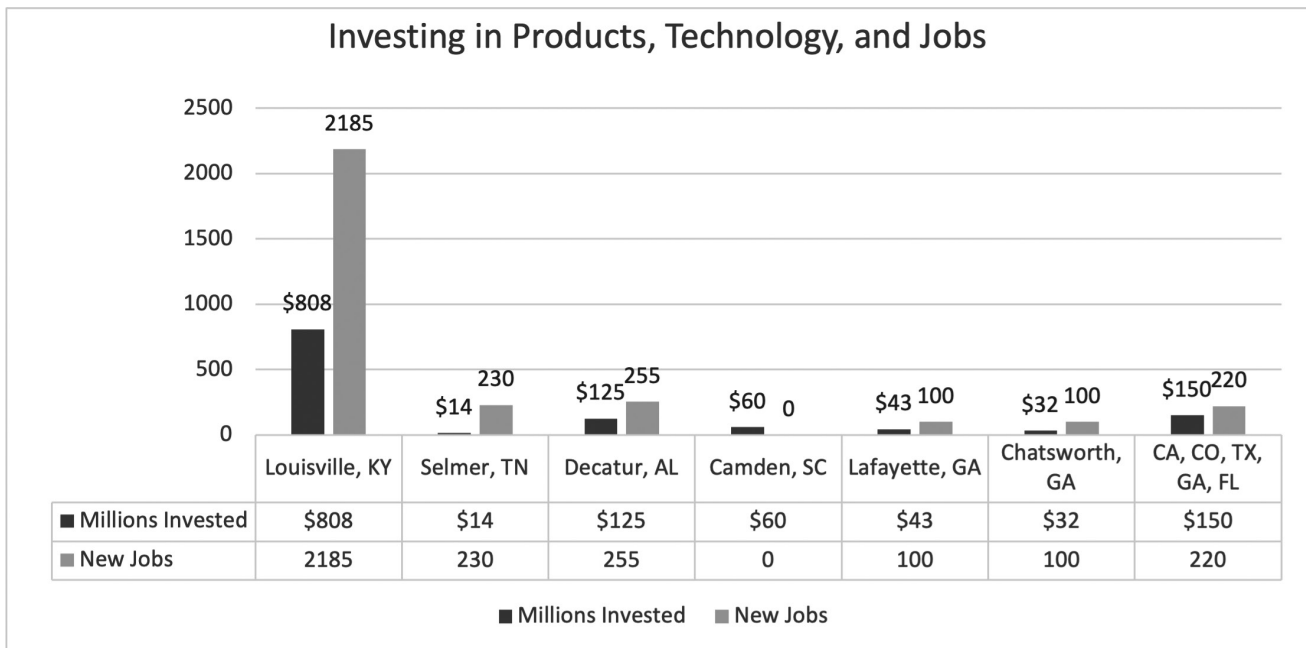


FIGURE 1 Investing in products, technology and jobs

commitment to developing and buying locally to stimulate the US economy, with US\$2.8bn in purchases from more than 5,400 US suppliers.

MICROENTERPRISES

To further break down the distance between our company and the consumer, GEA has also adopted a new consumer-focused operational strategy designed to remove organisational barriers that prevent creativity and collaboration and to encourage teams to think as entrepreneurs. Adopted in 2017, the new model created microenterprises, or independent business units, that are grounded and guided by local markets and the consumers they serve. Examples of GEA microenterprises include commercial air conditioning, laundry, cooking, water filtration, small appliances and several others. These smaller and nimbler business units are empowered to swiftly make decisions and be more responsive to the evolving needs of consumers.

Although each microenterprise is considered its own entity, they all share the same supply chain and platforms, which act as the connectors across the organisation (see Figure 2). The platforms

prevent silos and drive efficiencies across the organisation. It is important that the microenterprises remain adaptable, but still benefit from the cross-unit coordination and resources within GEA.

HOUSE OF BRANDS

In 2018, GEA made a strategic move from being a branded house to becoming a house of brands, giving Monogram, Café, GE, GE Profile, Haier and Hotpoint their own identities among the owner segments they were crafted to serve. Before this change, the GE brand was being stretched too far from the value segment to the high-end. The lack of market segmentation created brand confusion for our customers and consumers.

After creating our House of Brands and segmenting consumers, we spent time creating brands to serve each of their unique needs. As we learn more about our consumers, we are designing products and experiences that add value well beyond the sale of the appliance. This approach has allowed us to grow our customer base. For example, the revitalised Monogram, Café and GE Profile brands allowed GEA to further expand into the upper

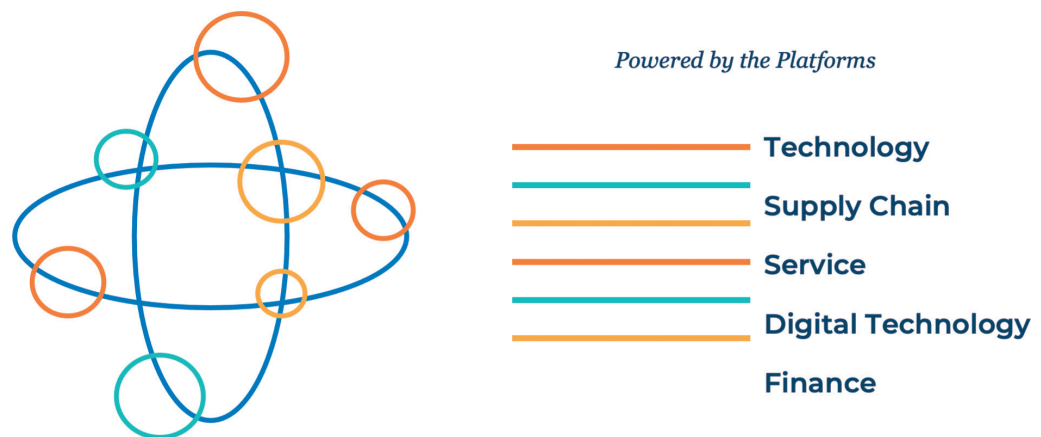


FIGURE 2 Microenterprises

quartile of the appliance industry where technology and innovation are valued. GEA's unique brands provide more choices, making it easier for consumers, designers and builders to determine the products that meet their needs, lifestyles and price points.

Although this adjustment from a branded house to a House of Brands has had a positive impact on GEA's success, it has also created more complexity in our factories. The combination of GEA's House of Brands and the consumer trend towards more personalised products makes the transition to the digital supply chain essential.

CONNECTED OWNERSHIP LIFE CYCLE

At GEA, our relationship with our owners no longer ends with a purchase. Rather, we continuously gain a richer picture of our owners through data and ongoing interactions, which we use to inform all aspects of our products and our company to improve our owners'

experiences. We call this overarching strategy the connected ownership life cycle (see Figure 3).

Just as our relationship with owners is continuous, so is our supply chain. The GEA digital supply chain is a key component of the connected ownership life cycle. It accelerates the innovation cycle, improves product quality, reduces operational waste and increases employee engagement.

With the owner as our focus, we have digitally transformed and interconnected three key areas of the business: the ownership experience, Brilliant Factory and smart distribution. Thanks to these digitisation initiatives, we are building the capability to make exactly what owners want, with the goal of mass customisation.

By creating the digital supply chain, we have unleashed the true power of the connected ownership life cycle, to delight owners and facilitate unprecedented growth. With this strategy, we will serve owners better than ever before, earning us a place in their homes

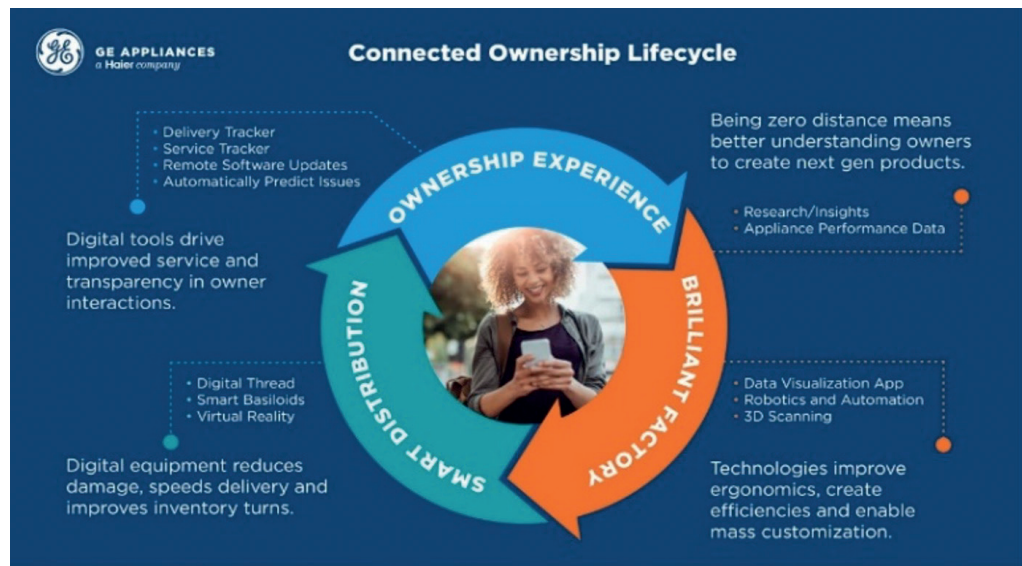


FIGURE 3 Connected ownership life cycle

for a lifetime. We believe the ownership experience is about anticipating what owners need, even before they know they have a problem. This level of understanding takes new tools and processes, and our digital supply chain is the key.

DIGITAL SUPPLY CHAIN

To meet and exceed rising consumer expectations for personalised features and products, and to keep our manufacturing plants efficient and competitive, we needed revolutionary change to transform the way our supply chain functioned. Simply investing more time and money in the same solutions would not address underlying issues or position us for growth. Only through digital technology could GEA gain visibility into supply chain processes to understand areas for improvement.

To drive change, we needed a focused, digital strategy correlated to key problem statements. Recognising that technology has changed the way supply chains function, the digital supply chain no longer has a beginning and an end. Rather, every aspect has an influence on the others. Digitisation efforts are not for the sake of digitisation alone, but to solve key problems that enable substantial business growth. The digital supply chain:

- Improves transparency and consumer interaction to exceed consumer expectations;
- Improves industry-leading fulfilment, on time, in full;
- Improves manufacturing lead time;
- Increases the relevance and speed of new product introductions to meet consumer needs;
- Provides industry-leading inventory turns;

- Improves mix attainment: right product, right quantity, right time;
- Improves factory productivity and velocity;
- Increases data availability to improve shop-floor problem solving.

To earn a place in our owners' homes, we need to provide the best products on the market with exceptional, streamlined service through connected digital technology.

- As we have grown the number of stock-keeping units (SKUs) to support the brands, and at the same time faced supply chain disruptions from the COVID-19 pandemic, digital tools, such as our control tower, have given us critical visibility to materials and components in transit to keep our factories running and orders flowing to customers;
- We use data and insights to advance the next generation of products and improve the ownership experience. With more than 30 million connectable appliances installed in homes across the US, we use our industry-first technology to analyse appliance performance data;
- Our consumers can future-proof their appliance or hardware investments with ongoing software updates, giving them enhanced appliance features and functionality, such as updating a GEA wall oven to include the new air fry and turkey modes;
- We push software updates to connected appliances and predict issues before they become a problem for owners. For instance, the system automatically generates a notification if a refrigerator's temperature is too high. A text notification to the owner suggests they check if the door is closed or request a service technician. If a technician is needed, the owner can contact us their

preferred way — by phone, mobile application or website;

- A service appointment is easy with a reduced two-hour service window combined with the new service tracker that provides real-time updates and GPS tracking of our service technicians. Connected data also allows service technicians to understand the root cause in advance, ensure the right parts are available, and complete service in one visit.

BRILLIANT FACTORY

Throughout GEA's US plants, data visualisation is at the heart of the company's Internet of Things (IoT) transformation, called Brilliant Factory. With Brilliant Factory, our processes are interconnected, creating a smart ecosystem that responds to a continuously changing environment, driving productivity. The technology used in Brilliant Factory democratises the data so business leaders, area business leaders and team leaders can access the production, quality and equipment data in real time.

At GEA, we follow the Toyota Production System (TPS)¹ to make our supply chain more efficient and effective. The data available through Brilliant Factory enables problem solving, which is at the core of TPS. The power of readily accessible data on mobile devices and smartboards is making it easier than ever to make quick decisions and improve problem solving. A plant leader and business leader can quickly review where the line is experiencing process interruptions and use the digital problem and action (P&A) matrix to manage maintenance employees' workflows and prioritise where needed.

Another Brilliant Factory application is attendance management. A leader on

the shop floor at any level can easily access employee attendance information to make decisions quickly and efficiently regarding employee placement to ensure assembly lines are fully staffed with qualified employees for an on-time start. Brilliant Factory is allowing our supply chain to become more cohesive, which helps prevent downtime and allows our plant leaders to focus their efforts on improving quality and efficiency.

ROBOTICS AND AUTOMATION

In addition to utilising data to improve problem solving, we are also working to create a great environment for our employees through automation of potentially dirty, dull and difficult tasks, which frees our operators to add more value. GEA is using robotics as a solution as we grow and modernise our factories. Recently, we have been working on more than 100 robotics applications across our nine US plants. For example, by incorporating high-precision, end-of-arm tooling, we can replace immensely inefficient operations that required human dexterity in the past. This tool provides not only the efficiencies our business demands of labour and materials, but also delivers improved quality.

We are also incorporating vision systems into our supply chain. Using 3D and artificial intelligence (AI) vision systems, we can create interoperability between our robots and other automation systems. Our use of automation and robotics allows us to continue putting our people first, upgrading the quality of their work and working environment.

Attracting enough robotics engineers is a hurdle we still face today. Finding the engineering talent we need to expand, and attracting them to some of our smaller manufacturing communities

is still a challenge. To address this, we are working on our own training programme to develop the talent we need, which is discussed in more detail below.

FACTORY MASTER PLANNING PROCESS

To prepare our supply chain for the implementation of robotics and automation, as well as the influx of capital investments, we adopted an initiative that we call Factory Master Planning. This is an iterative ten-step planning process that drives the consistency we need across our plants to ultimately improve speed, better leverage our investments and minimise risk. It is the supply chain version of a new product introduction process in the technology and marketing space, but for physical expansion and growth. First, there is the analysis of volume, key assumptions, plant capacity and available space. This is followed by a phased implementation plan, with execution and tracking. Our digital investments are integrated throughout the planning process.

EMPOWERED AND ENGAGED ENTREPRENEURS

GEA continues to plan for growth. We also continue to invest in talent development. A digital supply chain requires creating a culture of continuous improvement; it means exploring modern technology and finding new ways of applying existing technology, which includes taking risks and experimenting to learn.

At GEA, we foster an entrepreneurial mindset that encourages employees to work across functions and empowers them to introduce innovative ideas that will serve owners better. Beyond product

innovation, our employees are revolutionising supply chain processes through grassroots digital efforts funded with seed money to explore new concepts and develop proof of concepts.

Our advanced manufacturing engineering (AME) team is experimenting in numerous ways. For example, operators moving material is considered waste, or non-value-added work. To increase efficiency, the AME team continues to work with robotics start-ups and established companies to explore all types of autonomous and innovative solutions that could deliver parts to the assembly lines or move material between plants. They are also doing proof-of-concept work for 3D vision systems that scan for quality issues or speed up the replenishment of parts on the lines.

The new Industry 4.0 technology in our supply chain allows us to rapidly innovate new robotics applications, basaloids with sensor technology similar to automobiles and digital twins of our factories. Employees are encouraged to focus on their passions and empowered to take risks and nurture their entrepreneurial spirit.

UPSKILLING THE WORKFORCE TO POWER OUR DIGITAL FACTORIES

At GEA, we strongly believe in putting people first, which is why we are committed to the professional development of our employees. At a 2019 TrustBelt Conference in Louisville, GEA's President and CEO Kevin Nolan articulated his thoughts on our company's philosophy of developing talent internally and with local community partners in the Ohio Valley to be successful:

'My takeaway from this is: Embrace your own valley. You don't need to go

to Silicon Valley — we have a valley right here that is amazing and has more to offer than anywhere in the world.⁷²

With support across the company, GEA is creating the Industry 4.0 talent pipeline to help solve the skills gap and ensure the company has the manufacturing engineering talent it needs to support recent investments in our US plants and distribution centres. Some of our unique programmes include:

- *Kentucky Federation for Advanced Manufacturing Education (KY FAME)*: GEA funded and crafted a blueprint for bridging the manufacturing skills gap, which led to the creation of the Greater Louisville Chapter of the KY FAME. This is a group of area manufacturing companies taking action to fill the pipeline of mid-skill manufacturing workers, which is critical to the region’s large manufacturing industry. In 2017, the first class of the Advanced Manufacturing Technician Program (AMT) at Jefferson Community

& Technical College graduated from the two-year apprenticeship-style programme with full-time job commitments and little to no student loan debt;

- *GEA2DAY*: In 2018, GEA announced a collaborative partnership with Jefferson County Public Schools in Louisville, called GEA2DAY. This offers opportunities for high school seniors to join a weekly two-day workforce that pays a starting wage of US\$17.17 per hour, offers real-world experience and reimburses up to US\$6,000 per year in college tuition. In addition to high school students, the programme has attracted college students and working mothers to manufacturing. This model has spurred other flexible workforce programmes at other GEA sites;
- *Industry 4.0 Development Program*: In 2019, GEA began the two-year Industry 4.0 Development Program (see Figure 4), targeting recent engineering college graduates or mid-career employees who want to work in the company’s nine smart factories in the US. As the



FIGURE 4 Industry 4.0 Development Program

digital transformation sweeps across GEA, the supply chain team is focused on developing talent through four highly technical rotations in industrial controls, robotics, testing and data visualisation;

- *Supply Chain Development Program (SCDP)*: GEA offers early-career training programmes designed for new college graduates to work alongside seasoned veterans on impactful supply chain projects. GEA's development programmes offer structured job rotations through multiple assignments that increase career exposure and experience in a short time.

CHALLENGES AND RESULTS

According to the National Association of Manufacturers,

'About 1.4 million U.S. manufacturing jobs were lost during the early days of the pandemic ... setting back the manufacturing labor force by more than a decade.'³

GEA has not been unaffected by this drastic change. In 2021, GEA's main campus in Louisville, which houses five large manufacturing plants, faced significantly higher than normal attrition. The team has been thinking creatively about how we can attract the best talent to our organisation. Through a recent wage increase, the introduction of a ridesharing mobile application, and a host of new flexible work schedules, GEA is working diligently and creatively to close the hiring gap. In 2022 and beyond, our total organisation focus will be on our employee value proposition, which is the equilibrium between compensation, work difficulty, culture, flexibility and the working environment

that an employee weighs every day. As an organisation, we must do things differently in 2022 and beyond by continuing to evaluate and change the environment and culture to address the needs of today's workforce.

In the same vein, the COVID-19 pandemic has made it difficult to not only get people, but also to get the materials needed to meet the increased consumer demand. Since the beginning of the pandemic, US ports have become backlogged with container ships, delaying parts and components to our manufacturing sites. In 2019, GEA began routing inbound materials through the port in Savannah and the inland rail spur to the Appalachian Regional Port, where we built a new logistics centre in 2020. This change in our shipping strategy saved the organisation 3m miles of trucking due to its proximity to nine of GEA's plants. Through the unique combination of our digital supply chain, which increases the visibility and tracking of our products across the supply chain, and the changes to our port strategy, GEA has been able to navigate the disruptions and continue serving our customers in an efficient way.

When we benchmark with peer companies outside of the appliance industry, they are typically surprised by the volume of change GEA has implemented over the last five years. Our results have been significant, with a double-digit compound annual growth rate over the last five years, a robust product portfolio, and better understanding of consumers than ever before.

CONCLUSION

While there are many factors that have led to our success, three stand out to me, and I offer these words of advice for any enterprise wishing to reinvent itself.

First, you need a clear strategy and vision for your supply chain team. We are a large, growing organisation, and the supply chain team is empowered to know how the areas they lead tie to the overall business objectives. Our Factory Master planning process is one way we have ensured integration of the various elements to ensure the integrity of the ecosystem we are building.

Second, you must transform at a greater rate than the change in your external environment. Keeping up with technological progress is critical to your organisation's long-term success. The evolution of robotics and digitisation is a great example of the changes that have taken place in technology over the course of the last ten-plus years that you must use as solutions to be viable.

The final element is engagement with your team. No matter how high-tech your business becomes, success is always driven by the engagement of your people.

The entrepreneurial mindset, the ability to explore recent technology, and giving employees an opportunity to see their work making a difference in the lives of US consumers is inspiring our employees to achieve more than ever before.

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