



FEATURE

Reshoring or localization on your mind?

Smart factory capabilities can provide opportunities for value creation at both greenfield and brownfield facilities

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Manufacturers are moving facilities closer to home, which presents an opportunity to upgrade to smart factory infrastructure. It also means making critical decisions about facility investments, strategy, technology, and people.

For decades, the story of manufacturing was globalization. But, in recent years, manufacturers have begun to move production closer to home. This means new or expanded local facilities, which makes the opportunity to upgrade to smart factory infrastructure at these facilities irresistible.

Upgrading to a smart factory infrastructure, however, is a complicated endeavor. Should you build new (a greenfield approach) or upgrade an existing facility (a brownfield approach)? What strategic and technology considerations should guide your planning? How should you evolve your workforce? Finding answers to these critical questions is key to realizing the opportunities inherent in the recent reshoring and localization trend.

The reshoring and localization trend and the opportunity it presents for smart factories

The last decade has witnessed many global supply chain disruptions—an earthquake and tsunami in Japan, floods in Thailand, a US-China trade war, the COVID-19 pandemic, and, more recently, blockage of the Suez Canal.¹ The push for reshoring, to minimize supply chain disruption, started long before COVID-19, but it accelerated during the

pandemic as the importance of supply chain resilience came to the forefront.

A survey of global analysts in August 2020 found that more than 80% of industries experienced supply chain disruptions because of the pandemic, and about 75% of companies are planning to accelerate their reshoring initiatives by building smart factories closer to home locations, or their customers' point of need.²

Also, in recent years, many lower manufacturing cost regions have experienced wage inflation. This has reduced the labor arbitrage opportunity, especially when balanced against supply chain risks. For example, labor costs in China have been rising greatly in past years, and overshot those in Mexico about five years ago, which makes US locations much more attractive to native companies.³ In addition to lower cost, reshoring (bringing production *to* a home country or points of demand) and localization (bringing production *closer to* a home country or points of demand) offer other benefits through geographical proximity, time zone alignment, shorter lead times, and better service delivery. It also helps manufacturers tailor products to local preferences, and in some locations offer more intellectual property (IP) protection and a more talented local workforce.

Reshoring and localization can also be driven by customers' perception of a brand and its purpose. Approximately, 65% of global customers (including both consumers and industrial buyers) said they would prefer products made in their country, prompting many companies to localize production by building nearby smart factory capabilities.⁴

Over the years, customers' need for trustworthy supply chains has been an evolving and accelerating trend. Beyond pandemic-induced drivers, rethinking where manufacturing occurs and how supply chains are structured will likely be ongoing considerations. Customers will likely continue to look for trustworthy supply chains that exhibit two broad dimensions: competence (being operationally excellent) and character (having a social conscience and being environmentally sustainable). These considerations will help determine what products companies manufacture and where they base their facilities.

As companies plan to move home or near home, they should consider embedding smart factory capabilities that offer opportunities to enhance both competence and character. Based on a Deloitte global study, companies running smart factory initiatives have, on an average, seen a 10% increase in production output, 11% increase in capacity utilization, and 12% increase in labor productivity.⁵ Smart factory capabilities can also speed new products to market by reducing innovation development time as much as 30%.⁶ In addition, smart factory capabilities create opportunities to make energy-efficient changes—over 80% of respondents in an August 2020

Deloitte-MAPI survey said that they have invested in advanced technologies for plant consumption and energy management in the last two years.⁷

Given these performance benefits, many business leaders are investing in smart factories. In the Deloitte-MAPI survey, 62% of 850 global executives committed to continuing or accelerating their smart factory investments.⁸ And on average, companies allocated 20% more toward smart factory budgets in 2020 compared to 2019.

Choosing between brownfield and greenfield facilities when reshoring or localizing

Beyond improving efficiency and mitigating supply chain risk, both greenfield and brownfield approaches offer significant opportunities for new digital, automation, and other smart factory capabilities that improve manufacturing and supply chain performance. Costs, benefits, and risks are associated with both brownfield and greenfield approaches, and leaders should weigh the merits of each strategy to determine which makes the most sense in each situation. Not surprisingly, in the Manufacturing Ecosystems study, respondents focused on balancing both: retrofitting their existing facilities with building new facilities in equal measure.

When weighing greenfield versus brownfield, leaders should consider many factors that are intertwined and impact each other (figure 1), making this decision complex and multifaceted.⁹

FIGURE 1

Factors relevant to reshoring or localization discussions



Note: The factors listed above are nonexhaustive and there could be other factors relevant to a reshoring or localization discussion.

Sources: Deloitte, *Branching out: 10 questions for inbound US investors*, 2018; Amy V. Benstead, Mark Stevenson, and Linda C. Hendry, "Why and how do firms reshore? A contingency-based conceptual framework," *Operations Management Research* 10 (2017): pp. 85–103; Deloitte analysis.

Broadly, choosing between greenfield and brownfield typically hinges on three, key corporate considerations: costs and timelines, capacity expansion, and capabilities development.

Evaluating costs and timelines: Greenfield investments typically require higher infrastructure development costs than brownfield facilities given the need to build a factory from the ground up versus expanding an existing facility. With brownfield operations, companies can identify existing pain points and leverage smart factory capabilities in their existing operations more quickly than building a new factory.

Both approaches have financial and tax implications. However, an exact comparison of costs involved, and associated incentives depend on the location and the nature of the facility and require a detailed assessment. But not all benefits

will be tangible. Local job creation through a greenfield investment, for example, could lead to enhanced goodwill and brand presence in the new location.

Expanding existing capacity: If a brownfield facility exists, it's important to assess its condition and whether it makes sense to expand the capacity in the current location. In a brownfield situation, there are inherent advantages associated with existing real estate such as an established physical supply chain, labor, and support functions, which can be extended to support the business expansion.

Ultimately, however, there could be more disruptions and limitations than initially assumed with a brownfield approach. Leaders of reshoring or localizing companies may feel confident with their physical flows and processes and believe that they just need a technology upgrade to acquire

smart factory capabilities. Unfortunately, that's often not the case. For example, there may be space constraints that limit the reconfiguration of assets and production lines. Moreover, the ability to integrate new systems with existing operations technology in legacy manufacturing sites can require extensive and sometimes expensive upgrades. Additionally, companies often underestimate the difficulty of getting workers to think and work differently. Finally, existing plants might not be close enough to new or expanding customer markets to encourage innovation and growth.

Establishing smart factory capabilities: Most business leaders find that there are two main objectives behind smart factory implementations: expanding current capabilities and building new capabilities. If the objective is to expand current capabilities, a brownfield approach could be suitable. In a brownfield setting, “making room” by [deploying smart factory capabilities](#) can look like other forms of digital transformation. Thus, many organizations can leverage brownfield investments to meet the following objectives:

- Apply lessons learned from past digital transformation efforts.
- Use the need to localize as an opportunity to spur a broader digital transformation.

If the objective is to build new capabilities and address deep-rooted process, asset, and technology challenges by rethinking established ways of working, a greenfield approach could be better suited.¹⁰ A new smart factory could be better aligned to the businesses' strategic direction as it's designed with these requirements in mind and could greatly enhance flexibility to meet rapidly changing customer needs of a dynamic market segment.

With a greenfield approach, it's important to assess the organization's experience with a particular

geographic location in terms of technical knowhow and understanding of the talent and customer segments. Additionally, there may be several methods to “go greenfield,” such as setting up your own facility, licensing it, or forging a new joint venture. However, locating, designing, and building a new smart factory from the ground up is challenging for even well-established companies. This approach generally requires significant capital outlays and construction timelines compared to other approaches. Real estate cost, tax implications, workforce recruiting and retention, and supply chain partners are important to address before building a new smart factory.¹¹

Key smart factory considerations for a greenfield facility include:

- **Assess the fundamental approach to your business.** Consider the different parts of the operation that you want to manage yourself versus outsource. What role do you play in your ecosystem? Do you manufacture everything you sell inside your factories, or do you leverage critical vendors to manufacture subassemblies? If the latter, design the plant for sharing space and bring your partners into your factory for final assembly. Ensure your greenfield factory has the capabilities needed to tie your supply chain ecosystem together.
- **Reimagine your business model and opportunities.** With the opportunity to build brand new, don't lift and shift the same old operations. Go to your customers to understand what they want and how your products can evolve. You may find that based on your new geographic location, you could serve as a make-to-order rather than make-to-stock company.
- **Assess the factory and information flows.** As you interact with your raw material and supply network, evaluate how parts move in and out of your factories. Potentially of more importance, how does your data move across

your supply chain? Use factory simulation software to create a digital twin of your plant and processes to experiment with the factory design and determine maximum production efficiency. When a piece of equipment at a station fails, are you able to continue production in other parts of the factory? If inventory piles up at the failed station, do you have enough room to store it? Finally, identify long lead time equipment as they are critical dependencies for your plant. In one example, a large piece of equipment was slated for the center of a plant, with conveyors flowing in and out. Without the large piece on hand, the conveyors could not be installed, and construction stopped as the team waited for weeks until the equipment arrived.

Greenfield operations provide the potential to reimagine your business; however, moving forward without a honed and disciplined plan could be disastrous. It's important to take all factors into

consideration, simulate, and test using digital twins to ensure accurate construction and delivery. Before you bend metal or pour concrete, you should know exactly the capacity, capability, and cost of the expected facility by having an exact virtual replica (a digital twin), which permits comprehensive modeling, simulation, testing, and evaluation of the proposed factory. Additionally, this digitalization can be invaluable to help ensure detailed oversight of the product, production, and performance of your new facility for years to come.

Since there are many moving parts to a reshoring and localization discussion, creating a scorecard or checklist to closely examine factors and associated favorability scores helps compare options (figure 2). However, despite thorough planning, there will be uncertainties associated with changes in climate, political environments, and other factors that could impact the outcome of a decision in either direction.



FIGURE 2

Checklist at a glance for greenfield and brownfield discussions

✓✓ Highly favorable ✓ Favorable ✗ Unfavorable

	Brownfield	Greenfield
 Evaluating costs and timelines		
Infrastructure development costs	✓	✗
Financial and tax incentives*	✓	✓
Implementation time frame	✓	✗
 Expanding existing capacity		
Use of existing infrastructure (supply chain, real estate, labor, etc.)	✓✓	✗
Ease of reconfiguring assets and lines	✗	✓
Integration of new systems with existing operations technology	✗	✓
Worker inertia to new systems	✗	✓
Access to new and growing markets	✓	✓✓
Goodwill and brand presence	✓	✓✓
 Establishing smart factory capabilities		
Expansion of current capabilities	✓	✗
New capabilities development	✗	✓
Address deep-rooted challenges associated with processes, assets, and technology	✗	✓
Focus on sustainability and climate change impact	✓✓	✓
Alignment with long-term strategic direction for growth	✓	✓✓
Ability to pursue new business models	✗	✓

Note: *Depends on the location and the nature of the facility and requires a detailed assessment.

Sources: Deloitte, *Branching out*; Benstead, Stevenson, and Hendry, "Why and how do firms reshore?"; Deloitte analysis.

Three overarching pillars of success for building smart factory capabilities

Regardless of the choice between brownfield or greenfield investments, strategy, technology, and people are critical to building smart factory capabilities that are prepared to weather future supply chain disruptions.

Strategy: A “zoom out/zoom in” approach¹² focuses on different time and space horizons for strategy and business planning. Iterating between the horizons can be helpful when looking at the overall reshoring or localization strategy. Zoom out and start with the organization’s long-term global footprint strategy. If you don’t have one, create one. Then zoom in and focus on the organization’s presence within the targeted local ecosystem. Finally, assess agility within the four walls of the factory. Reshoring and localization present opportunities to examine value creation across an organization, assess global supply chain security and future market trends, as well as evaluate the organization’s energy resiliency and climate change strategies. Ultimately, driving factors for both brownfield and greenfield approaches will likely depend on customers’ needs and preferences. Key strategic considerations include:

- **Assess how your plant will adapt to changes in production levels and product design in sync with customer preferences.** With reduction in transit time, you could start production later or accelerate customer lead times. For example, a leading automotive manufacturer set up an advanced manufacturing facility that could quickly adapt to changes in production capacity and flex from 10 jobs per hour to 25.¹³ The company also adapted to changes in product designs. It could

transform a truck into a minivan by removing the top and providing extra trunk space. The company rented space to its suppliers within the factory to offset the overall cost of operations. 3D printers enabled rapid prototyping and production and could produce parts onsite for suppliers. Automated guided vehicles were deployed to deliver spare parts and welding material to different stations around the plant, saving employees time and effort.

- **Evaluate “total” costs in the home location.** For instance, an increase in production cost may be offset by savings in logistics costs and closer control over product quality. Being closer to the point of demand gives you an opportunity to reduce inventory levels and carrying costs and produce less waste.
- **Evaluate how your reshoring or localization strategy impacts your place in the ecosystem.** Facilities do not operate in isolation. Moving an entire ecosystem to your home country, for example, will take time and sizeable investments.¹⁴
- **Integrate an energy resiliency, sustainability, and climate change strategy into the reshoring or localization effort.** Smart factory strategy presents several opportunities to reduce environmental impacts and greenhouse gas emissions by retiring old and inefficient equipment or plants and making other, energy-efficient changes.¹⁵ Smart factories can yield important benefits to sustainability through higher asset efficiency, optimal labor footprints, and reduced energy use.¹⁶ Over 80% of respondents in an August 2020 Deloitte-MAPI survey said that they have

invested in advanced technologies for plant consumption and energy management in the last two years.¹⁷ Examples of such investments are many. Cummins, an engine manufacturing company, invested in smart technology that captures the energy generated during engine testing and converts it into electricity that can be used within the facility or sent back to the grid, thereby reducing the company's energy usage by 20% since 2010.¹⁸

Bringing operations closer to home base also helps companies reduce transportation-related emissions from distant locations and gives them more control and visibility into their nearby suppliers' compliance with and support toward climate change goals. Thus, companies could tackle their "Scope 3" emissions better. (These are emissions occurring in the broader supply chain such as those resulting from transportation and distribution, waste disposal, etc.)

Technology and data management: Parts of the supply chain may have been automated with different platforms that may be difficult to integrate. It's important to identify how to remove or reduce these digital breaks, thus reducing the need for manual interventions (so output from one system can automatically feed into another), thereby reducing errors and improving efficiency. Finally, maintaining data streams in a secure environment is critical to successful smart factory operations.

Across technology and data management efforts, it's important to remember that machines are not just for augmenting humans but unleashing and enabling greater human potential.¹⁹ Below are some of the key areas for leaders to consider:

- **Drive connectivity.** Perhaps the biggest challenge in a brownfield facility is connecting unconnected machines (some dating back several decades) with current technologies. This leads to data unavailability or incompatibility issues that hinder analysis. Even with newer equipment and technologies, the various connected devices and systems on the shop floor are difficult to network.²⁰ It's important to plan for seamless connectivity across systems, expect connection breaks, and deploy resolution to realize desired business outcomes.
- **Prioritize choices and deployments.** A greenfield approach presents the challenge of choice overload. With so many technologies to choose from, such as industrial Internet of Things (IoT), cloud and edge computing, AI, machine learning, augmented and virtual reality (AR/VR), it's important for leaders to understand what to deploy and where.²¹
- **Deploy AI wherever possible across the value chain.** Develop a thorough assessment of how AI can drive value in both greenfield and brownfield scenarios—from fulfillment to planning, product design, production, and customer service.²²
- **Establish remote monitoring.** The ability to remotely monitor the factory can play a key role in improving supply chain resilience in crisis situations such as COVID-19 by ensuring business continuity.
- **Ensure trust.** Focus on data management issues and cyber risk management whether retrofitting or building new systems to ensure trust with customers, employees, suppliers, and other stakeholders.²³

Workforce: Investing in people is as important as investing in fixed assets and IP. Some key workforce considerations include:

- **Get to know the local talent.** As you scale up your operations or start new operations, evaluate the local talent availability (drawing from the full portfolio of full-time or part-time employees and gig workers²⁴) and their readiness for smart factory capabilities.
- **Learn from them.** Leverage the familiarity that the local workforce brings (in the form of awareness of local political and environmental situations, working conditions, etc.) to aid smooth operations of the new facility.
- **Train them.** Assess whether you have the right programs to train your workforce on smart factory tools and applications. Evaluate whether the new workforce can be trained virtually by trainers from established facilities through AR/VR toolkits.
- **Think carefully about the working environment.** The workplace of the future goes beyond plexiglass dividers, temperature checks, sanitation, and vaccinations. It should be configured as a place that brings employees and supply chain partners together and uses technology to foster collaboration both in a physical and virtual setting.
- **Give your workforce the right tools.** It's most important to make your people your partners in the smart factory journey and show

them the value it's creating for them. Do you have persona-based applications (operations manager, line supervisor, operator, etc.) that ensure that the right information is available to the right role at the right time? Such tools make the intended individuals' tasks more intuitive. A combination of the right talent and automation can maximize value and offset the labor cost arbitrage.

Reshoring is easier said than done and it's not a decision that supply chain executives can make in isolation. Multiple factors come into play and competing priorities can deeply affect the direction business leaders choose. Accordingly, there should be an understanding, evaluation, and consensus regarding the trade-offs among costs, risks, and resilience.

Both for brownfield and greenfield decisions, a comprehensive and thoughtful approach for strategy, technology, and workforce is critical for a successful reshoring or localization execution. Also, this is a long-term process depending on whether the entire supply chain, or parts of it, will be brought onshore or localized. Starting early is important. It's also vitally important to review the overall impact that multiple reshoring and localization efforts may have on heightened demand for landed space and talent availability at target locations. Just as essential is the execution of current operations while reshoring and localization is occurring. Leaders should seek to minimize disruption to current work (as much as possible) and ensure that impacted people are involved early in open, two-way communications.

NUANCE WITHIN THE RESHORING AND LOCALIZATION TREND

No two manufacturers will likely face the same conditions or decisions for reshoring, and organizations that cater to global customers may need to deploy complex localization strategies.

It's not always as simple as "bringing production closer to home"

In the case of global companies, reshoring or localization may not be focused on a single home country; instead the effort could entail local-for-local manufacturing in regional production sites that are closer to where product demands come from.²⁵ It's important to note that when parts of the supply chain are brought back to the home country, typically, the assembly and Tier 1 operations may be reshored and localized, and Tier 2 and 3 operations may still remain in a foreign location, which makes external dependence a continuing concern.²⁶ Many companies are also considering a "China+1" strategy to diversify their operations, with operations in another country that offers benefits akin to manufacturing in China.²⁷ The challenge with this approach is that it turned out that many of the "+1" countries also got their supplies from China, so even those pursuing this strategy found their supply chains got disrupted during the pandemic. The bottom line is that many companies have realized their deep dependence on China. Even if they felt diversified, once they got below Tier 3, much of their supply chain came from just one place. For organizations to truly mitigate risk, they should ensure that their supply network is not dependent entirely on one area beyond Tier 2 levels as well.

And some industries are more likely to bring production closer to home than others

While popular media discusses reshoring and localization across industries in the same manner, the real activity is likely to happen in select industries with sound business cases.²⁸ In response to COVID-19 and a general increase in global trade and national security tensions, many countries are focusing on rebuilding their domestic manufacturing capacity in critical supply chains such as pharmaceuticals, medical devices, and electronic products.²⁹

- **Medical devices and pharmaceuticals:** The need for timely availability of medical devices and pharmaceuticals becomes more important than ever in the post-COVID-19 world. Just as the health care industry is changing rapidly toward virtual patient-focused settings, the supply chain structure for medical devices and pharma is transforming.³⁰ Given its national importance, this was one of the first industries to receive government support in many economies such as the United States, EU, and India.³¹
- **IT hardware manufacturing:** Electronic products, semiconductors, and servers are critical to maintaining continuity for federal and commercial operations. As national security is prioritized over cost, it eases the focus on manufacturing these components at a lower expense. The industry is also experiencing demand because of the growing need for cloud computing and data centers.³² In the United States, the CHIPS Act provides US\$10 billion for a new federal grant program that incentivizes domestic semiconductor manufacturing and includes an investment tax credit for the purchase of semiconductor manufacturing equipment and other facility investments.³³
- **Automotive and aerospace and defense:** Many automotive companies have been reshoring their manufacturing to home locations in the United States and the United Kingdom over the past 10 years due to national and economic factors.³⁴ Likewise, in the aerospace and defense sector, there is focus on decoupling from China at original equipment manufacturers (OEMs) and subtier levels.³⁵

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