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Next-shoring: A CEO's guide

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Proximity to demand and innovative supply ecosystems will trump labor costs as technology transforms operations in the years ahead.

The problem

Demand for manufactured goods in emerging markets is surging and fragmenting as factor costs shift; technological advances, such as more powerful robotics and the Internet of Things, are creating a range of new opportunities for manufacturers to digitize operations.

Why it matters

Manufacturing strategies built on labor-cost arbitrage are becoming outmoded; the race is on to get ahead of what comes next.

What to do about it

Place greater emphasis on proximity to both demand and innovation while:

- Making location decisions that balance economies of scale against the growing diversity of tastes within and across global markets
- Building supplier ecosystems that combine technical expertise with local domain and market knowledge
- Developing the people and skills needed to make the most of technological advances across the organization

When offshoring entered the popular lexicon, in the 1990s, it became shorthand for efforts to arbitrage labor costs by using lower-wage workers in developing nations. But savvy manufacturing leaders saw it as more: a decisive change in globalization, made possible by a wave of liberalization in countries such as China and India, a steady improvement in the capabilities of emerging-market suppliers and workers, a growing ability to transfer proven management processes to new locales, and increasingly favorable transportation and communications economics.

Something of equal moment is occurring today. As we settle into a "new normal" catalyzed by the global financial crisis, the ensuing recession, and an uneven global recovery, traditional arbitrage models seem increasingly outmoded.[1] For some products, low labor costs still furnish a decisive competitive edge, of course. But as wages and purchasing power rise in emerging markets, their relative importance as centers of demand, not just supply, is growing.

Global energy dynamics too are evolving—not just the now-familiar shale-gas revolution in the United States, but also rising levels of innovation in areas such as battery storage and renewables—potentially reframing manufacturers' strategic options. Simultaneously, advances stemming from the expanding Internet of Things, the next wave of robotics, and other disruptive technologies are enabling radical operational innovations while boosting the importance of new workforce skills.

Rather than focus on offshoring or even "reshoring"—a term used to describe the return of manufacturing to developed markets as wages rise in emerging ones—today's manufacturing strategies need to concentrate on what's coming next. A *next-shoring* perspective emphasizes proximity to demand and proximity to innovation. Both are crucial in a world where evolving demand from new markets places a premium on the ability to adapt products to different regions and where emerging technologies that could disrupt costs and processes are making new supply ecosystems a differentiator. Next-shoring strategies encompass elements such as a diverse and agile set of production locations, a rich network of innovation-oriented partnerships, and a strong focus on technical skills.

[1]See Ian Davis, "The new normal," *McKinsey Quarterly*, March 2009, mckinsey.com.

In this article, we'll describe the economic forces sweeping across the manufacturing landscape and examine technologies coming to the fore. Then we'll suggest some principles for executives operating in this new world. The picture we're painting is of necessity impressionistic: next-shoring is still taking shape and no doubt will evolve in unexpected ways. What's increasingly clear, though, is that the assumptions underlying its predecessor, offshoring, are giving way to something new.

Economic fundamentals

The case for next-shoring starts with the economic fundamentals of demand (since the importance of local factors is growing) and supply (as the dynamics of labor and energy costs evolve).

The importance of local demand factors

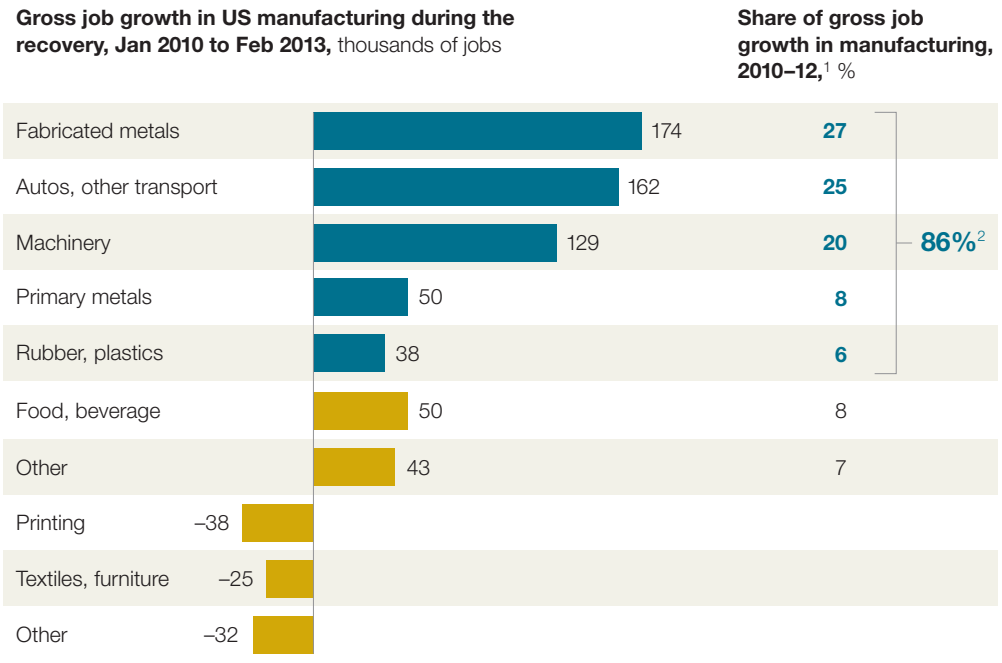
More than two-thirds of global manufacturing activity takes place in industries that tend to locate close to demand. This simple fact helps explain why manufacturing output and employment have recently risen—not only in Europe and North America, but also in emerging markets, such as China—since demand bottomed out during the recession following the financial crisis of 2008.

Regional demand looms large in sectors such as automobiles, machinery, food and beverages, and fabricated metals. In the United States, about 85 percent of the industrial rebound (half a million jobs since 2010) can be explained just by output growth in automobiles, machinery, and oil and gas—along with the linkages between these sectors and locally oriented suppliers of fabricated metals, rubber, and plastics (Exhibit 1).[2] The automotive, machinery, and oil and gas industries consume nearly 80 percent of US metals output, for example.

[2] See *Manufacturing the future: The next era of global growth and innovation*, McKinsey Global Institute, November 2012, on mckinsey.com, for an in-depth analysis of the economics and trends surrounding five types of manufacturing industries: *global technologies* (for instance, electronics) that are R&D intensive and highly traded, *global innovation for local markets* (autos, machinery) that are R&D intensive but tend to produce adjacent to demand, *labor-intensive regional processors* (food, fabricated metals) that are highly localized and locate adjacent to demand, *resource-intensive commodities* (metals, paper and pulp) that are energy intensive and locate near demand or resources, and *labor-intensive tradables* (apparel, footwear) that are highly traded and locate where labor is cheap.

Exhibit 1

In the recent US industrial rebound, about 85 percent of the job growth in manufacturing occurred in automobiles, machinery, and regional-supplier industries.



[1]Figures do not sum to 100%, because of rounding.
[2]Data reflect growth for local-supplier industries to the oil and gas sector, in addition to those for automobiles and machinery.

Source: US Bureau of Labor Statistics; McKinsey Global Institute analysis

In China too, locally oriented manufacturers have contributed significantly to rising regional investment and employment. The country has, for example, emerged as the world's largest market and producer for the automotive industry, and many rapidly growing manufacturing sectors there have deep ties to it. As automotive OEMs expand their capacity in emerging markets to serve regional demand, their suppliers have followed; the number of automotive-supplier plants in Asia has tripled in just the past decade.

The emerging markets' share of global demand is steadily climbing, from roughly 40 percent in 2008 to an expected 66 percent by 2025 (Exhibit 2). As that share rises, it also is fragmenting into many product varieties, feature and quality levels, price points, service

needs, and marketing channels. The regional, ethnic, income, and cultural diversity of markets such as Africa, Brazil, China, and India (where some local segments exceed the size of entire markets in developed nations) is raising the ante for meeting local demand. In the automobile industry, for example, fragmenting customer demand has led to a 30 to 50 percent increase in the number of models. Ninety percent of recent capital expenditures in the automotive sector have involved product derivatives worldwide and capacity expansions in new markets.

The limits of labor-cost arbitrage

Surging local demand helps explain why rapid wage growth in China hasn't choked off manufacturing expansion there. Wages have nearly doubled since 2008, partly as a result of domestic minimum-wage policies.[3] (The country's 2011 five-year plan called for 13 percent average annual minimum-wage increases, a rate some provinces have already exceeded.) True, in a few labor-intensive, trade-oriented industries, such as apparel production and consumer electronics, labor-cost changes do tend to tip the balance between different geographic regions; manufacturing employment in Bangladesh and Vietnam, for instance, has benefited from China's wage surge, even as Chinese manufacturers are seeking to raise productivity.

But these are far from the only implications of rising wages. Just as Henry Ford's $5 day helped create a new consuming class, so higher wages in China are increasing local demand, thus reinforcing the local-investment choices of OEMs and suppliers. At the same time, there is little evidence of a zero-sum game between China and advanced economies, such as the United States. Rather, the narrowing labor-cost gap reinforces the importance of local demand factors in driving manufacturing employment. Indeed, factor costs often have the greatest impact on location decisions *within* a region—for example, Airbus moving to Alabama instead of Texas or North Carolina. These costs interact with policy factors, such as infrastructure spending and tax incentives, to shape a region's overall economic attractiveness.

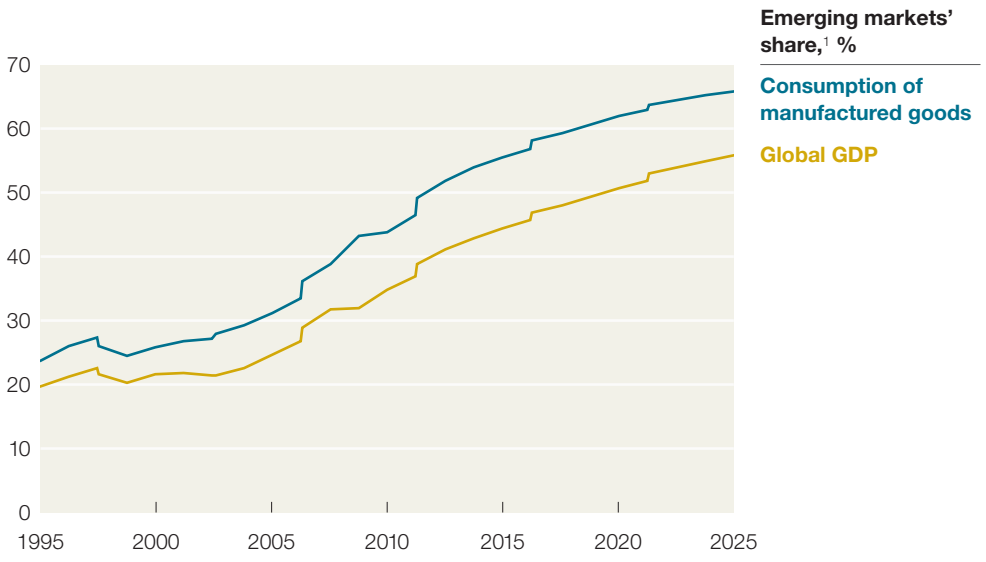
The impact of energy costs

The price of natural gas in the United States has fallen by two-thirds as gas production from shale deposits rose by 50 percent annually since 2007. A narrow range of sectors—gas-intensive manufacturing,

[3] Measured in nominal dollars.

Exhibit 2

Emerging markets' share of global demand is expected to reach 66 percent by 2025.



[1]Both measured in US dollars.

Source: IHS Global Insight; McKinsey Global Institute analysis

such as the production of petrochemicals, fertilizer, and steel—are benefiting most directly. Some downstream players in the energy value chain have begun shifting investments. Dow Chemical, BASF, and Methanex, for example, have announced plans for new US manufacturing capacity to take advantage of cheaper, abundant energy supplies.

These moves are important for such companies and subsectors; McKinsey Global Institute (MGI) research suggests that by 2020, lower-cost energy could boost US GDP by somewhere between $400 billion and $700 billion.[4] But do they presage a dramatic rebalancing of global manufacturing activity? Electricity costs were already lower in the United States than in many countries, including China—which, along with others, also has opportunities to boost its own energy output through hydraulic fracturing. And fossil fuels aren't the only area where the energy-supply picture is morphing.

[4]For more, see the full McKinsey Global Institute report, *Game changers: Five opportunities for US growth and renewal*, July 2013, on mckinsey.com.

Consider, for example, the potential impact of energy-storage technologies, especially lithium-ion batteries and fuel cells, which are becoming more capable and less costly. At the same time, the improving economics of renewable-energy production—particularly solar and wind power—offers manufacturers an expanding range of future supply options. In some developing regions where power grids are unreliable or nonexistent, factory complexes served by distributed solar power may be feasible. Distributed generation is also growing in combined heat–power (CHP) plants, which use heat created in the production process to run steam turbines and generate electricity locally.

None of these is a silver bullet today. But as advances continue over time, more and more companies may become able to ask themselves where they would place major strategic bets if the availability and price of energy were lesser concerns. That too will probably lead back to a focus on local demand patterns. Interestingly, the country representing the greatest source of future demand growth—China—also is actively stimulating the development of a range of new energy sources and storage technologies through a focus on new strategic industries in its five-year plans.[5]

Technology disruption ahead

Technology is affecting far more than energy dynamics. Advanced robotics, 3-D printers, and the large-scale digitization of operations are poised to alter fundamental assumptions about manufacturing costs and footprints.[6] To derive value from these shifts, companies will have to make significant investments and ensure access to hubs of innovation, capable suppliers, and highly skilled workers.

Advanced robotics

Investments in industrial robots have increased by nearly 50 percent since 2008—even in emerging nations such as China—as a new generation of advanced systems develops, with greater dexterity and ability to process information. These robots can perform an expanding

[5]See Guangyu Li and Jonathan Woetzel, "What China's five-year plan means for business," July 2011, mckinsey.com.

[6]For more, see *Disruptive technologies: Advances that will transform life, business, and the global economy*, McKinsey Global Institute, May 2013, on mckinsey.com.

array of factory tasks—for instance, manipulating small electronic parts, and picking and packing individual products. They can work side by side with humans and be trained by factory-floor operators rather than programmed by teams of highly paid engineers. Improved economics and capabilities eventually may yield productivity gains that are unforeseen today, as well as better products and faster speed to market. As that happens, companies will be able to retool their manufacturing systems to provide new roles for these mechanical "workers."

Cheaper, more proficient robots that can substitute for a wider variety of human tasks are another reason companies may locate more manufacturing closer to major demand markets, even where wage rates are higher. In developing nations, robots could speed up rates of automation and help bridge shortages of some production skills. MGI research suggests that 15 to 25 percent of the tasks of industrial workers in developed countries and 5 to 15 percent of those in developing countries could be automated by 2025.

Further out, highly robotized factories also equipped with other information technologies might shift competition to areas such as the ownership of customer networks, which should become increasingly valuable as information embedded in them starts guiding production priorities and flows. Flexible, intelligent assembly robots also should enable contract manufacturers to serve an increasingly diverse range of customers, creating new opportunities for attackers to target attractive microsegments.

3-D printing

The economics of 3-D printing are improving rapidly, as well. While still only a sliver of value in the manufacturing sector (0.02 percent), sales of 3-D printers are set to double, to $4 billion, by 2015, and prices for the equipment are declining swiftly.[7] Also, 3-D printers open up the possibility of more distributed production networks and radical customization. In early manufacturing applications, some companies are using the devices to accelerate product development, since they eliminate wait times for prototyping by faraway specialists. Companies will be able to consider new supply-chain models and, in some cases, replace traditional suppliers of parts with targeted usage of in-house printers.

[7] *Wohlers Report 2013: Additive Manufacturing and 3D Printing State of the Industry*, Wohlers Associates, May 2013, wohlersassociates.com.

These printers won't replace traditional high-volume modes of production, such as die casting and stamping. For more specialized goods, though, it's easy to imagine the emergence of service businesses—the equivalent of copy or print shops—that would manufacture items based on design specifications provided by B2B or B2C customers. Crowdsourcing networks for new-product ideas could one day complement traditional R&D activities for some manufacturers. (For more on 3-D printing, see "3-D printing takes shape," on mckinsey.com.)

Digitized operations

Significant as advanced robotics and 3-D printers are, they represent just two plot lines in a much bigger story about the digitization of operations. Cloud computing, mobile communications, and the Internet of Things[8] are beginning to combine with advanced analytics to create threads of intelligent data that link assets and stakeholders as never before. Increasingly, products will communicate with each other, with robots and advanced machines inside factories, and with customers and suppliers. Digital "DNA" for parts (including the materials, equipment, and time required to make them) will also be increasingly available.

The implication is that we are approaching a day when manufacturers will have unprecedented global visibility into who makes what, where, and how well. They'll be able to run virtual operations "war rooms" on their phones. They'll have new opportunities to solve plant-floor optimization problems as intelligent machines interface with each other and with people on the line. In the near future, manufacturers also will exploit opportunities for crowdsourced design and on-demand production. These opportunities will extend well beyond goods made by 3-D printers; manufacturers will pursue the buying and selling of previously underutilized production lines "by the hour" and will rely on dynamic databases to determine what every part should cost. And new forms of technology-enabled collaboration, such as the three-dimensional virtual assembly and testing of vehicles, will redefine what it means to be proximate to innovation—which may be locally generated or accessed via broadband.

Digital operations aren't a far-off fantasy. GE already has a 400-person industrial Internet software team and its employees use iPads to run an advanced battery factory in New York State. Amazon.com is employing

[8]The growing collection of sensors and actuators embedded in products and equipment.

growing numbers of smart warehouse robots. Fiat has reduced the number of physical prototypes needed to introduce a new product; Alcoa has compressed prototyping time and costs for some products; and an auto supplier recently slashed an eight-month prototyping process to one week.

Next-shoring

Although these forces are still gathering strength, they're already pointing toward two defining priorities for manufacturing strategy in the era of next-shoring: proximity to *demand* and proximity to *innovation*, particularly an innovative base of suppliers. In developed and emerging markets alike, both ingredients will be critical. Next-shoring isn't about the shift of manufacturing *from* one place *to* another but about adapting to, and preparing for, the changing nature of manufacturing everywhere.

Optimizing location decisions

Being close to demand is particularly important at a time when consumption in emerging markets is growing rapidly, boosting with it the diversity of the regional preferences that manufacturers must contend with. In a 2012 interview with McKinsey, Timken CEO James Griffith explained his company's approach: "Over the last ten years, we've added a very strong Eastern European, Indian, and Chinese manufacturing base," not because wages are low there "but because those were the markets that were growing." This expansion has been accompanied by a strategic shift away from a focus on automotive parts—"we could make a car last for a million miles, but nobody cares." The new emphasis is on fast-growing mining, trucking, steelmaking, and cement-making customers in emerging markets. For them, Timken's reliability is a decisive asset.[9]

Locating manufacturing close to demand makes it easier to identify and meet local needs. It's a delicate balancing act, though, to create an efficient global manufacturing footprint that embraces a wide range of local tastes, since economies of scale still matter in many industries. Volkswagen has coped by moving from vehicle platforms to more modular architectures that provide greater flexibility for manufacturing several product variants or derivatives.

[9] See "Manufacturing's new era: A conversation with Timken CEO James Griffith," December 2012, mckinsey.com.

New products, market segments, and consumer preferences are combining with perennial risks (such as seasonal variations in demand and fluctuations in wages and currency rates) to boost uncertainty in manufacturing and supply networks. That uncertainty places a premium on operational agility—the ability to adapt design, production, and supply chains rapidly to fluctuating conditions.[10] This too may play into location decisions.

Take the experience of a consumer-products company that had relied on one plant to supply its major market. When the company began experiencing unaccustomed spikes in regional and seasonal purchasing patterns, shortages and lost sales ensued. To accommodate rising variations in demand, the company built a second plant, with similar cost characteristics, in a different region. This additional capacity helped ensure supplies to the prime market, where the problems were most acute, while also allowing the company to meet growing demand opportunistically in several new markets close to the new plant. Although the investment was considerable, it lowered the company's risk exposure, eliminated damaging stockouts, and improved the bottom line.

Building supplier ecosystems

New combinations of technical expertise and local domain knowledge will become the basis for powerful new product strategies. Responsive, collaborative, and tech-savvy supplier ecosystems will therefore be increasingly important competitive assets in a growing number of regional markets. To keep up with the opportunities afforded by technological change, for example, a major manufacturer that until recently had relied on a low-cost supplier in Mexico for parts has begun working with a new supplier that has cutting-edge 3-D printing capabilities. The new relationship has lowered stocking costs (since parts are made on demand), while providing avenues for developing prototypes more quickly.

Examples like this are just a start. As information flows among partners become more robust, they will usher in a range of improvements, from surer logistics to better payment systems. These will create a virtuous cycle of collaborative benefits. The supply bases of many manufacturers thus may soon need significant upgrades and capital

[10] For more on operational agility, see Mike Doheny, Venu Nagali, and Florian Weig, "Agile operations for volatile times," *McKinsey Quarterly*, May 2012, mckinsey.com.

investments to create joint competencies in areas such as robotics. Collaboration and management investment in skill-development programs could be necessary as well. In some cases, it may be valuable to collaborate with local or national governments to create the conditions in which the manufacturing ecosystems of the future can flourish. Tighter supply networks also will foster production systems that reduce the need for virgin natural resources, a topic addressed in more detail by our colleagues in "Remaking the industrial economy," available on mckinsey.com, on February 5.

A failure to develop innovative supply ecosystems will have growing competitive implications for countries as well as companies. The competitive challenges facing the United States sometimes look more like a system failure than an economic one. US investment in advanced robotics, for example, often lags behind that of other developed economies, with trade deficits prevailing even in sectors where wage-rate differentials aren't a big influence on location decisions.

Developing people and skills

All this will place a premium on manufacturing talent, creating a range of regional challenges. In Europe and the United States, educational institutions aren't producing workers with the technical skills advanced manufacturers need. In developing economies, such as China, the millions of lower-cost production associates who are well adapted to routine manufacturing may find it difficult to climb to the next level. Line supervisors—often fresh out of regional universities—struggle to manage baseline operations and to coordinate teams. Organizations will need to invest more in formal training and on-the-job coaching to bridge the gaps. They must also cast a wider net, supporting local community colleges and technical institutes to shape curricula and gain access to new talent streams.

A related challenge is the need for new management muscle. As it gets harder to hide behind labor-cost arbitrage, regional manufacturing executives and midlevel managers will need to become both better at running a tight operational ship and more versatile. They should be able to grasp the productivity potential of a range of new technologies and have enough ground-level knowledge of local markets to influence product strategies and investment trade-offs. The

ability to build external relationships—with suppliers, education partners, and local-government officials who can influence the development of vibrant, sophisticated supply ecosystems—will also be a source of competitive advantage.

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Next-shoring will look different in different locales, of course. Europe and the United States have impressive advantages in areas such as biopharmaceuticals, automotive engineering, and advanced materials. China, meanwhile, is quickly climbing the expertise curve, with increasingly sophisticated corporate and university research facilities and growing experience in advanced processes and emerging industries.[11] In the world we're entering, the question won't be whether to produce in one market for another but how to tailor product strategies for each and how to match local needs with the latest veins of manufacturing know-how and digital expertise. While the road map for every company, industry, and location will be different, we believe that the principles we've laid out here should be useful for all.

[11] See Gordon Orr and Erik Roth, "The CEO's guide to innovation in China," *McKinsey Quarterly*, February 2012; and "China's innovation engine picks up speed," *McKinsey Quarterly*, June 2013, both available on mckinsey.com.

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