Manufacturing In 2025, Part Two

This is the second part of a two-part series on the next fifteen years in manufacuring. To read the first part, go here [1].

1. Segment of one: Will you be able to suit customers' increasingly specific needs?

The migration to highly customized products is accelerating in both consumer and business-to-business markets. The trend started first in high-technology markets such as personal computers. Dell's website, for instance, was one of the first to allow customers to configure their PCs with the components they wanted before placing the order. At the back end, advanced manufacturing and logistics technologies allowed for just-in-time assembly and delivery.

Shortening production runs

Now hyper-customization is spreading to a broader range of products. Consider the

simple nutrition bar. The typical grocery or wellness store cannot possibly stock all the brands and flavors to match every customer's taste. In addition, some customers may want to vary their bars depending on the day's activities. So a young Illinois-based company called Element Bars has handed the reins over to consumers. Element Bars' website offers design-your-own nutrition bars through its dynamic, drag-and-drop interface, with 5,800 variations of core, fruits, nuts, sweeteners, protein boosts, and packaging. In beverages, Coca-Cola has introduced its Freestyle fountain machine that dispenses more than 100 different flavors.

Another form of customization is delayed product differentiation. It is becoming more feasible to differentiate the product after purchase by relying on an extended network of components, accessories, and independent strategic providers to add value that helps a product stand apart. Apple's iPhone is one of the most successful examples, having attracted thousands of application developers, allowing users to configure their iPhone with the specific tools they want. Apple has managed to design and build a base product that can have endless permutations with little incremental investment on Apple's part.

Shortening product life cycles

Some products will lend themselves to further differentiation through the experience surrounding the configuration of the product. A case in point is Local Motors, a fledgling Massachusetts-based firm that uses crowdsourcing techniques to design and build cars. Local Motors brings together car enthusiasts from around the world in a model similar to open source software development. In June 2010, Local Motors released the Rally Fighter, a $50,000 off-road, but street-legal racer. Enthusiasts contributed to the design of the car, which then combines off-the-shelf components to be sold as a kit, with final assembly done by customers in local micro-factories as part of a "build experience." Each design will be released in a share-friendly "creative commons" license.

Mass customization can delight customers and offer a route for manufacturers to create tremendous value. But it is not easy to plan, engineer, and execute an efficient operation or build a network that accommodates such customization. The challenge lies in providing a sufficient level of customization while still being able to grow profit margins. You need to get the common/custom ratio just right: Customize too much and you'll go broke. Customize too little and nobody will buy.

Shifting toward a flexibility focus

Traditional manufacturing, with an engineering group, tool sets, production lines, and even entire factories dedicated to turning out one product line, works well for a high volume (and, ideally, stable) product with few variations. It's automated, fast, inexpensive, but rigid. Customized products, by contrast, with many options and permutations, demand a more modular manufacturing process, using machinery and production lines that have a high degree of flexibility as opposed to continuous flow—and that type of manufacturing typically comes at a higher cost.

These developments will favor manufacturers that can master a dual focus,

embracing greater market-facing complexity while at the same time promoting greater internal simplicity. Highly customizable products, more frequent orders, and lower build quantities may require having more suppliers to manage and will put stress on forecasting and shop floor operations.

Tackling complexity

To succeed in this new environment will not necessarily require creating entirely new tactics and capabilities, but rather that manufacturers become more proficient at the proven ones. For example, manufacturers will want to sharpen their focus on identifying value-added complexity (aspects of the product or channel that customers value and are willing to pay for) at the same time as minimizing wasteful complexity.

While this sounds simple in concept, it is challenging for many companies to effectively execute. Companies usually target the symptoms rather than the root causes and, as a result, see limited benefit in the short term and, longer term, often see a recurrence of issues. Companies that successfully tackle complexity take a holistic and integrated approach to understand the true impact on the value chain, and therefore, business performance. Once companies have a clear view of the value chain, they can utilize complexity-reduction methodologies, of which Lean Six Sigma is one.

2. Ready to produce anywhere: Can you move operations every few years to balance local customer expectations with local supply capabilities?

In the past, global sourcing and location decisions centered on chasing low-cost labor, as long as quality was acceptable. But the real, total cost of managing extensive manufacturing networks has risen. Many manufacturers moved too much production capacity off-shore to places quite distant from the centers of demand—driving up costs with complex network management, and reducing their agility in responding to customer needs. After all, North America remains the largest market for many manufactured goods. Now, some firms have reversed their offshoring moves to return to domestic facilities, where they can respond more quickly to customer needs and shifts in local demand: they are rebalancing regional supply with regional demand.

Utilizing total landed cost

For the next 15 years, manufacturers would do well to adopt a “globally local” mindset, one that balances local demand with local supply. Besides labor costs and quality, other variables will come into play: currency swings, energy and transportation costs, and intangibles such as customer service, language, and political stability. Although many organizations use a total cost model, few have adopted a robust model that incorporates all considerations of cost and service, as shown in Figure 1. Sourcing decisions in the future will need to be based on a deeper understanding of total landed cost.

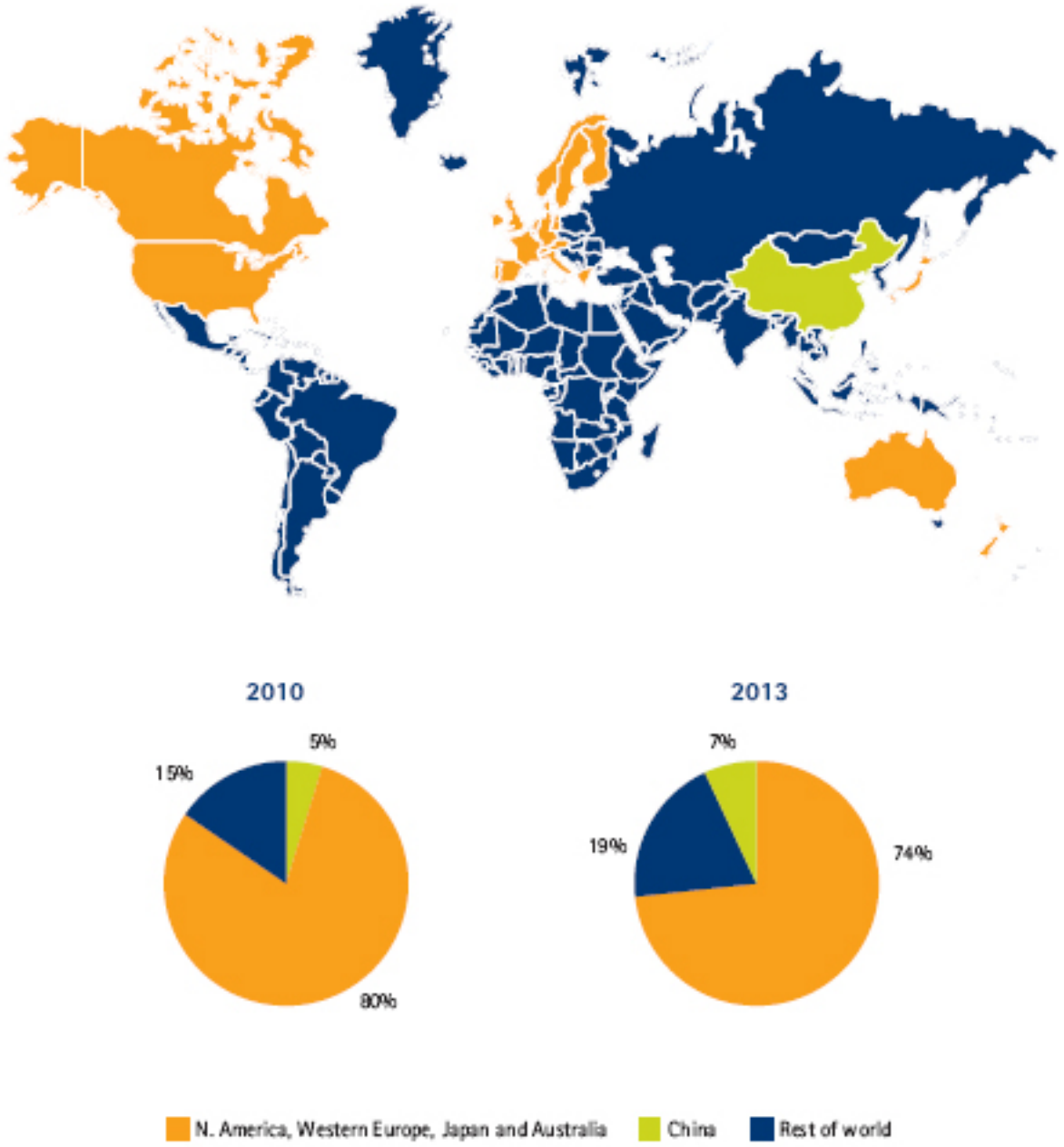
Balancing local supply with demand

One consideration will dominate here: go where the purchasing power is. In a recent Accenture survey, manufacturing companies predicted that their customer base in emerging markets and China will grow appreciably within the next three years, with the US remaining as the largest market. Longer-term, these trends are expected to continue, and successfully balancing regional supply to these “demand” markets will be one key to growth for most manufacturers.

Condensing capital timeframes

Note that the “globally local” imperative will have implications for capital investment decisions. If modular operations move every few years, executives may have to take a shorter horizon than the traditional 10 years for tooling or 20 years for machinery. That will affect the size and payback calculations for capital equipment.

Figure 2: Manufacturers' distribution of customers in 2010 vs. projected for 2013



3. Extended family: Can you truly rely on strategic partners for your most

sensitive activities? If so, they might be your new secret weapon.

Many suppliers to the manufacturing process, especially those that are strategic partners, have become integral in delivering the value proposition, rather than being arms-length vendors. As such, they require more information and tight business process alignment in order to be able to respond faster and with flexibility.

Shifting from fixed to variable costs

To advance this trend even further over the next 15 years, companies will have to adopt new manufacturing models that depart from “made by us.” The models and processes may vary even within one company, to better serve diverse channel and customer needs. But an overarching benefit will be the shift from fixed costs to variable costs, which will help manufacturers achieve the requisite flexibility.

That’s the logic behind contract manufacturing, to cite just one model, which has won over many consumer electronics firms that must contend with extremely short product lifecycles. Flextronics, for instance, operates approximately 80 factories in 30 countries around the world, making cell phones for RIM (Blackberry), routers for Cisco, and printers for Hewlett-Packard. The firm adroitly ramps up and down, giving customers confidence that they can speed their time to market. Flextronics produced the Xbox 360 for Microsoft, allowing Microsoft to rapidly secure a foothold in consumer electronics.

Contract manufacturing is also thriving in the form of online sourcing bazaars such as mfg.com and alibaba.com. While these companies have operated for a decade, the spread of broadband connections in recent years now allows any firm in virtually any location to post a request for proposals online for a global network of manufacturers to bid on, and to pay via credit card or Paypal. The technology connects buyers with suppliers of manufacturing services, while directing the collaboration, quoting, due diligence and analysis processes. This allows the smallest players to access the same tools and technologies as large competitors.

Relying on specialist contractors is one way companies have chosen to make costs more variable. Another way is to invest only in those assets that are essential to own and operate in-house, and to use shared services or business process outsourcing arrangements for other aspects of the operation.

Adopting differentiated models and processes

As a result, many companies have to manage more suppliers and integrate their activities into their own systems and processes—which raises new risks. With a complicated product, supplier complexity can overwhelm the system and lead to substantial problems. The complexity of managing many far-flung suppliers can cause delays in a product release. Supplier issues can also threaten to tarnish a major manufacturer’s brand. Protests over working conditions at overseas suppliers frequently target the primary manufacturer-customer in question, because that brand is so well known and thus vulnerable to public criticism.

For lower-value, non-critical parts and components, arm's-length suppliers will continue to make sense. Where critical components or capabilities are involved, manufacturers obviously need a more strategic relationship with suppliers. The next generation of strategic supply relationships is taking shape with suppliers physically locating inside the customer's facilities, so that they can tie in to the customer's systems and coordinate more closely.

Several auto plants have pioneered this "plant within a plant" model. Ford's Camaçari plant in rural Brazil closely integrates more than two dozen suppliers, including Lear and Visteon, which produce components alongside Ford's main assembly line. The arrangement takes the just-in-time concept to a new level. It also helps with quality control, because any problem with a part can be more quickly traced to its source and corrected.

Whatever the mix of supplier relationships, the coming decade will bring more varied choices and configurations that manufacturers have to manage. From the supplier's standpoint as well, the "plant within a plant" environment is far more fragmented than the traditional means of producing and delivering a component. Financial processes may have to be revised, since purchase orders might lag actual production. Forecasting and planning for multiple locations inside a customer, each with relatively small volume, will be quite different than planning for one classic, large facility.

Moreover, the human and cultural challenges are not trivial for staff working inside a customer facility. There are dangers of getting captured by the customers' interests, losing sight of the supplier's goals, becoming rusty at certain technical or business skills, or disengaging from the informal network of colleagues within one's own company. Each player needs greater visibility into the operations and plans of its counterparts. Security standards need closer coordination. Executives will have to anticipate and head off these potential problems, while still maintaining a strong relationship with the customer.

4. The shop floor and beyond: Are you executing for agility?

The strategic activities and new models that we anticipate manufacturers will need to adopt can never be static.

Creating a more agile production environment

All of these models depend on successful continuous improvement programs and reinvigoration of "classic" inside-the-four-walls capabilities. Turbocharging continuous improvement programs hinges, in turn, on having adaptable people with the right skills on the shop floor and in development labs. Shop floor operations thus will for the years ahead be in a state of flux characterized by machine reconfiguration, continuous improvement, and Lean Six Sigma initiatives—all aimed at driving agility and flexibility while maintaining low cost and high quality.

Obtaining right mix of skills

A first-order challenge in this regard will be getting enough people with the right "thinking" skills (beyond operator skills) to regions where operations are expanding or being put in place. Shortfalls of skilled labor are projected for the fastest-growing markets. India faces a potential shortage of 2.45 million engineers by 2020, and China's gap in skilled professionals could reach 5.9 million by 2015.

In the United States, a large wave of retiring "baby boomers" may cause similar gaps if the younger generation does not step up its technical skillsv. The domestic aerospace and defense industries, for example, face the combined problem of an unprecedented wave of retirements in coming years with a shortage of younger, qualified workers in the pipeline. Although in the US, about 70,000 engineers graduate annually, only a small share enter aerospace or defensevi. The problem is exacerbated by the declining number of American college students studying science, technology, engineering, and mathematics. The recent recession has caused some boomers to delay retirement, to be sure, but that affords only a brief grace period.

Leveraging predictive analytics

Advanced analytical skills will be in especially high demand. By analytics, we mean an integrated framework that employs quantitative methods to derive actionable insights from data, then uses those insights to shape business decisions and, ultimately, to improve outcomes. As such, analytics move well beyond the realm of standard reporting tools and techniques.

The ability to use quantitative data to shape decisions and outcomes has become a key source of competitive advantage in recent years, and requires both the right people and the right technology. With information technology practically ubiquitous, and computing power and transaction volumes increasing at an accelerated pace, firms of any size can harness data to get smarter about customer behavior, the supply chain, product development, production lines, talent management, and other areas.

High-performing companies have embedded strong analytical muscle and made it central to the execution of their strategy. Scheduling analytics at Cemex, for instance, allows the firm to deliver cement to construction sites within a specified 20-minute window, which allows Cemex to charge premium pricing in a commodity market.

Manufacturers are awash in shop floor data, but many still struggle to make sense of it all and turn it into meaningful insight that helps them to sense and respond and even to be predictive. The goal is to use real-time data from shop-floor systems to quickly anticipate problems in cost, quality, productivity, or customer service so that staff can make immediate course corrections. Finding shop-floor employees who have the requisite analytical skills (not just technical skills but also some combination of coaching, consulting, and business design skills) thus represents a challenge that firms should be addressing now.

5. More than environmentally-friendly: Are you preparing methods of sustain-

ability that will differentiate your brand?

Despite the recent recession, environmental and social sustainability remains a high priority among many major companies. One key motivation is that heightened customer awareness about sustainability increasingly influences purchasing decisions. Investors, too, are demanding greater corporate attention to sustainability, as they file more and more shareholder resolutions involving issues related to “responsible” business practices, climate change, health, and safety. Another motivation is reducing operational costs: when implemented in conjunction with operational efficiency programs that help firms minimize waste, sustainability initiatives can also help reduce costs over the long-term by reducing usage of water, electric power, transportation fuel, or other commodities.

Providing transparency

The clamor for transparency underscores the growing pressure that public companies face to disclose sustainability-related risks and opportunities. Unilever, for example, recently announced that one objective in its overall business strategy is to double the size of its business over the next 10 years while maintaining (or decreasing) its environmental footprint.

The issue recently reached a tipping point in consumer packaged goods circles: Walmart announced its goal of eliminating 20 million metric tons of greenhouse gas (GHG) emissions from the company’s global supply chain by the end of 2015. Its suppliers will have no choice but to comply with the new program if they want Walmart to continue selling their products.

Manufacturers will need to find innovative ways to incorporate elements of sustainability into their offerings, and to make sure that customers are aware of those elements from design to disposal. Some manufacturers are already using third parties to certify products and operations as “sustainable”, which adds to their credibility and serves as subtle markers in marketing. In addition to sustainable considerations, suppliers must commit to sourcing that doesn’t compromise quality. Several U.S. toy makers had to recall millions of toys made by contract manufacturers in China, and pay heavy fines, after the toys were found to have lead paint or dangerous designs.

The future is already here

The manufacturing landscape we’ve depicted 15 years out is closer than you might think. Far from being blue-sky musings, each theme discussed here connects directly to business realities today.

Moreover, these themes are interconnected. Cost-effective customization requires deft management of an integrated global network, which in turn depends on a skilled, analytical and flexible workforce.

Firms that worry only about how to eke out a few points of growth today and delay addressing the many changes taking place around them risk being overtaken by

more nimble competitors from new corners of the globe. Developing capabilities to address each of these themes, on the other hand, sets a course to turn manufacturing operations from a cost center into a competitive advantage.

A globally local world is a riskier world, to be sure. It will be more difficult for incumbents to protect their existing business. Large multinationals will have to learn to become start-ups again, with a renewed focus on tomorrow.

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Check out the full white paper here [2].

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