Yen's Shifting Value Helps Japanese Carmakers Meet New Challenges

Apr 01, 2014 Law and Public Policy Strategic Management Asia-Pacific

Two recent headlines trumpet what many see as a more hospitable climate for Japanese businesses: Japanese "companies have roared back with bumper profits as the currency's slide to five-year lows made exports more competitive…," reports Reuters. "The seesaw battle between General Motors and Toyota for global sales leadership just tipped in Toyota's direction again," notes Forbes.

The consensus is that Japan's recent economic success, among some big exporters at least, follows Prime Minister Shinzo Abe's efforts to turn the long-moribund economy around, which resulted in an 18% slide in the yen during 2013. While that made goods produced in Japan cheaper, some observers warn that the shot in the arm is a one-time boost. Sales are up by big percentages over the previous year, but in 2014, such increases will likely pale by comparison with 2013's banner year, the argument goes.

Yet the story of Japan's manufacturing economy going forward defies easy predictions, say professors from Wharton and the University of Tokyo. When the yen was high during much of the 2000s, Japanese manufacturers honed the groundbreaking lean-production practices that first brought Japan to economic prominence in the 1970s through the 1990s. Now many of those firms are poised not only to be more competitive globally, thanks to the lower yen, but also to export the hard-won, innovative lean processes to emerging markets, which are eager to create similarly efficient industries at home, says Takahiro Fujimoto, an economics professor at Tokyo University. As in the past, others may find lessons in the Japanese manufacturing models.

'Like a Gem': Learning from Defects

The history of Japanese automakers post World War II is a central chapter in global manufacturing's evolution. A key catalyst was Japan's enthusiastic adoption in the early 1950s of the ideas of W. Edwards Deming, an American whose breakthrough statistical methods for improving quality underpinned Japan's Total Quality Control practices.

Though a distant memory now, in the 1950s and 1960s when Japan was still recovering from the devastation of productive assets after World War II, its products had a reputation for low quality – even shoddiness, notes Morris A. Cohen, a Wharton operations and information management professor. "They knew it." And so they brought in Total Quality Control (TQC) and made continual efforts to lower production costs. "Quality rates became so high they were known to say that a defect is like a gem, a treasure, because you learn so much from it."

> *"There's no talk of re-shoring in Japan yet – but it's on the way." –Takahiro Fujimoto*

By the time Japanese cars hit the export markets in big numbers in the early 1970s "with higher quality cars and lower costs," they had established a strong beachhead overseas. Then "they blew away the competition during the 1980s and early 1990s," Cohen adds. Japanese auto manufactures were "the center of the universe when it came to manufacturing. We all studied them," including such innovations as the Toyota production system, just-in-time (JIT)

inventories and lean manufacturing. The question back then was, “How can American industry compete?”

But for so many Japanese industries today, success is more elusive against a backdrop of intensifying international competition. In the last two decades, Cohen points out, Japan “lost out to competitors like South Korea and Taiwan, which did them one better, and [the country] started losing market share. Now there is the rise of China.”

Japanese electronics companies, for example, have found it tough going. A quick look at how South Korea’s Samsung dominates flat screen TV production and controls a huge share of the smartphone market, while once-mighty Sony falters — its paper was downgraded to junk status in early 2014 — tells the tale. Yet, in autos the story is different. “Japanese companies compete hard to remain technological frontrunners in traditional areas of strengths such as the automotive industry,” noted the *Financial Times* in December 2013.

The high yen kept Japanese carmakers sharp over the last decade or more as they strove to compete on price. Competition came, not only from rival auto companies, but also from lower-cost plants outside of Japan yet within the same company. Nissan, for example, now produces more than 70% of its cars outside of Japan, and some of those plants were manufacturing cars more cheaply than the Japanese plants. That led to the threat of closure for Nissan’s long-lived Oppama plant, located about an hour and a half outside of Tokyo. For Oppama, it was cut costs or risk being shuttered.

“Due to the high cost structure of Japan’s operations and high yen to dollar, the plant lost its leadership status to the Nissan Mexico plant for new vehicle cost and to the Nissan manufacturing plant in the UK for the productivity index,” noted Junichi Endo, president and CEO of NMKV Co., Ltd. — a joint venture between Nissan and Mitsubishi Motors to produce mini cars – speaking last year in Tokyo.

To avoid closure, executives created the “Oppama challenge, a strategy for survival,” said Endo. Plant managers and employees found ways to cut costs by 7% by “implementing 454 ideas.” Product improvements helped reduce direct labor costs by 20% between 2006 and 2010, he added. Investment recovery rates – making better uses of existing assets — rose 57%.

Oppama gained a reprieve. But Japanese plants in other industries did not fare so well. The Shiseido cosmetics group, for example, last year announced it was closing a factory that had operated for 50 years and was expanding production in Vietnam.

Not Just a Lower Yen

Given that the yen’s plummet in 2013 was a result of “Abenomics” — Prime Minister Shinzo Abe’s mix of quantitative easing and stepped-up government spending — it would be easy to conclude that many Japanese companies, autos especially, are simply riding the wave of devaluation to strong new revenues.

But the bigger story, as the Nissan experience above illustrates, is that years of high yen values have forced many Japanese companies to scrimp for ever-leaner production processes as a way to hold costs down while continuing to innovate. While some plants in Japan – like Shiseido’s — lost their competitive edge, others found a way to thrive. Fujimoto, who also is director of the Manufacturing Management Research Center at the University of Tokyo, cites an example of how the formerly high yen forced innovation at a Japanese pencil factory which was facing extinction. Order-to-shipment lead time was 30 days, leaving many customers dissatisfied. By streamlining processes and technologies, the factory slashed lead time to six hours, ensuring survival and showing that innovation is a critical quality.

The challenging yen environment has also sharpened Japanese automakers like Nissan and Toyota. Toyota’s “assembly productivity is up 20% in 20 years,” notes Fujimoto. “The only reason it was not more was because they were already lean…. Ironically, because of hardship, Japanese factories – which have had to compete with China and manage recession — were forced to be lean and physically very strong.”

Consequently, those Japanese companies that are thriving now are in a strong position not only to compete, but to pass on their hard-won lessons on lean manufacturing to colleagues in developing countries, Fujimoto adds. That is one of the most important focal points for manufacturing competition going forward. Notes Cohen: "It's no longer the world of 30 years ago where, just because you have a better product at a better price, you can assume you are going to win." Today, every region of the world wants to ensure [the] welfare of its citizens. "The BRICS [Brazil, Russia, India, China and South Africa] were not on the map 30 years ago," Cohen adds. While Japan is shrinking, "places like India and Brazil have the population. It's much more difficult to compete in these new markets … and everybody wants the factory in their country. This pressure has always been there, but it's greater today."

> *"They are pushing the envelope on how much variety they can sustain on these assembly lines, to the point that it really starts to look like a made-to-order system." –Morris A. Cohen*

It's not just the factory floor jobs that developing countries now expect. "When firms offshore production stages, they must also offshore their firm-specific managerial and technical know-how," writes Richard Baldwin, a professor of international economics at the Graduate Institute in Geneva, in the *East Asia Forum*. Developing countries today can simply join a supply chain. "Joining is a lot faster than building."

It is not entirely a one-way street. As wages in many emerging markets shoot up, the gap with advanced countries is shrinking. "The wage gap [between Japan and emerging countries] is narrowing, so everyone must improve productivity," says Fujimoto. China's labor costs used to be one-twentieth of Japan's. Now it is just one-fifth [in car production, one-tenth overall]," he adds. That puts Japan within "shooting range" of being labor-competitive, and that is before accounting for the effects of the weaker yen. There is no talk of re-shoring in Japan yet, but it's "on the way," Fujimoto adds. Now emerging markets are looking at increasing productivity, and Japan has the skill set to help.

Mass Customization

A visit to Nissan's Oppama plant underlines some of the innovations and efficiencies that helped retain the plant's viability. One of the most important improvements came on the factory floor for trim and chassis operations. In the past, workers had to walk a few steps from the assembly line to reach stacked parts bins, select the correct part and return. That means a lot of walking and reaching, but it has been greatly streamlined.

One solution, enhanced over recent years, was the creation of a "kitting" system in which key parts needed (after chassis and engine assembly) at a point of assembly arrive automatically in a large electric wagon (an automated guided vehicle or AGV). The robot AGV simply follows a thin strip of magnetic tape along the floor as it meanders around the factory loaded with parts that arrive immediately behind workers just as they are needed. "In kitting, you are staging parts [in the AGVs], and then later on you are taking them out," Cohen says. That's different from the older system – a strict just-in-time approach to inventory where the idea was, "I need this part, I get it, I'm done, I don't have to touch it twice."

But the switchover to kitting is not a regression because it supports larger goals, say Cohen and John Paul MacDuffie, a professor of management at Wharton and director of the Program on Vehicle and Mobility Innovation (PVMI) at Wharton's Mack Institute for Innovation Management. "With a much more complex product mix being built on the assembly line, JIT and in-sequence delivery couldn't fully keep up – in part because it was hard to fit all the parts next to the line, plus it was too much for the worker to select parts from among so many variations." Thus, "kitting is the innovation for dealing with this greater complexity, even though it means handling parts twice, which would once have been considered *muda* — a waste — that should be avoided."

In other words, kitting aided efficiency by adding more flexibility for assembly line workers. No longer does one line produce, say, all subcompacts and another all SUVs. Now, a subcompact car might be immediately followed by an SUV on the same line. A gasoline-powered car can be followed immediately by an electric car. This greatly reduces

expensive down-time that used to be needed for switching a line over from one model to another. “The larger point is how the innovations of lean production … have evolved to keep up with the demands of building high product variety for global markets,” says MacDuffie.

Toyota also uses the kitting system, MacDuffie points out. And Cohen notes that other recent efficiencies take place earlier in the production and assembly. “It used to take GM hours to change dies. Now Toyota can do it in minutes.”

What’s more, this allows cars to be built individually – or through mass customization. After visiting Nissan’s Oppama factory recently and observing these dynamic production lines in action, Cohen noted that each car carries a sign with the end-customer’s name on it, and some options can be individually added on the spot. “Even though they may be building in batches to deliver to their dealers, each car is still unique,” Cohen says. “They are pushing the envelope on how much variety they can sustain on these assembly lines, to the point that it really starts to look like a made-to-order system. Each unit that comes down the line is unique, a different model, a different configuration….”

Consistency: Emulating McDonald’s

Mass customization has been an ongoing goal. With so many different types of models, however, processes have become increasingly complicated, which means that carmakers have had to outsource more of the preparation, Cohen says. “As variety increases, complexity increases, and getting all of the things you need at the right place at the right time becomes more challenging. What seems to be happening is there is more involvement from suppliers earlier, and manufacturers are giving them more information to be prepared.”

Not only do suppliers for Nissan build whole components — such as full dashboard assemblies — that arrive at the line “just in time,” but they sometimes build their components right under the carmakers’ roof rather than at their own factories, notes Cohen. That is the newest wrinkle in what generally has been an evolutionary, rather than revolutionary, process. “It’s really the big items [like modules] that are expensive to move – not spark plugs, which they can get from suppliers around the world” — that suppliers might end up building on-site.

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This is the new challenge for Japanese automakers. They increasingly must extend their supply chains beyond Japan, where they used to source almost everything. This adds to the challenge of consistency, even if it might help to insure against the kinds of parts shortages that followed the 2011 tsunami when so many local Japanese suppliers were knocked offline for varying amounts of time. These are the same challenges manufacturers face the world over. As the geographic sources of inputs shift and customers demand more tailored products, physical and digital supply chains must change from being centered on inventories to focusing on speed-to-market, innovation and flexibility.

Mass customization, meantime, goes beyond the production line to the product line. Consider Nissan’s effort to bring out 51 new models between 2012 and 2014 – about one new model every six weeks. It’s an enormous challenge. One way to approach it is to take an entirely new view of the manufacturing process, says Fujimoto, who suggested that manufacturing is “essentially the creation and transmission of design information to customers.”

That means the focus is on “design [as opposed to the material] side of manufacturing…. The primary source of customer value is design information.” Automakers are not delivering cars so much as they are delivering a complex design that tightly fits customer needs. Processes are then built to serve the design.

It’s a way of thinking that puts the customer at the center. But it also creates challenges, chief among them – consistency, says Cohen. Cars built in one location must be the same as the same car built in another. “You are trying to do what MacDonald’s does,” Cohen says, when it comes to quality and customer experience.

How do companies coordinate it all? Using digital processes and modular designs. Nissan's Endo notes in his paper that many of Nissan's cars share four basic components or modules: the engine compartment; cockpit; front underbody and rear underbody; and the architecture for electronic components. But it's not entirely a cookie-cutter operation. Modules undergo some variation, and sometimes quite a bit of modification, as they are fitted for different models. This means that, in the case of cars at least, there is always a tension between standardization of modules and giving each model a distinct design identity, MacDuffie notes.

In Nissan's case, the master design is done at Nissan's R&D center, and the production processes' design and development (for assembly line layout, automation, workflow and the like) occur at the company's Global Production Engineering Center (GPEC) outside Tokyo. Endo calls GPEC the "glue" that holds it all together – allowing production consistency across regions. That is especially important when "a single model is made in many different countries," says MacDuffie. Still, some development, innovation and minor design changes, in addition to assembly, are done overseas in local markets to allow for different cost structures, according to MacDuffie. There might be "less automation investment in countries where labor costs are very low," for example.

That division between centralization and local production allowed for a recent major change: Nissan has resurrected its old Datsun nameplate, which has been dormant since 1986. Datsuns are now at least partly developed and sourced locally with Japanese expertise. It is a sign of how Nissan now stratifies its marketing approach. The Datsun brand will not be sold in advanced markets. Likewise, the high-end Infiniti will be made only in Japan. "In some markets, like India and Brazil, spending $10,000 on a car is a luxury," notes Cohen. So Nissan is building factories in those countries for those markets, to help keep costs down. Often, cutting costs means leaving out components, such as comfort features, or those not required by local law, such as certain safety or pollution-control features.

As automakers add model after model and increasingly embrace mass customization, can they also keep profits strong? Carlos Ghosn, chairman, president and CEO of Nissan Motor Co., who is French, Lebanese and Brazilian – it is very unusual for a non-Japanese to head a large Japanese firm — certainly plans to. He recently said the company is sticking with its three-year-old Power 88 strategy – taking an 8% market share in global vehicles and increasing operating profits to 8% by 2016. Some analysts question whether the goals will be reached.

All of these moves by Nissan raised an interesting question from Stephen Harner recently in a *Forbes* magazine article titled, "Is Nissan Losing Its Soul under Carlos Ghosn?" Noting that the number of cars produced in Mexico alone by Nissan will roughly match production in Japan by 2016, Harner noted that Nissan's aggressive turn to locating new plants and R&D outside Japan could "weaken the Japanese stylistic, quality and 'feel' characteristic that make Japanese cars competitive…. Ghosn is truly a global executive with a global perspective," he noted. "But how far can global Japanese companies go – or be taken – before they lose the 'Japaneseness' that made them great? We may find out."