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Manufacturing

By Harry Moser

RESHORING TOOLS TO RETAIN COMPANIES AND ATTRACT FOREIGN DIRECT INVESTMENT

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Reshoring is bringing back manufacturing that went offshore. The Reshoring Initiative is a non-profit organization dedicated to helping companies understand the true cost of offshoring by using Total Cost of Ownership (TCO) analysis. The more companies use TCO, the less they offshore and the more they reshore. The Initiative first presented reshoring to the IEDC Annual Conference in 2012. This article is a follow-up to provide more data and tools for members, and to encourage further TCO usage. The Initiative's goal is to balance the U.S.' approximately $600 billion/year trade deficit. Doing so would increase U.S. employment by about 6 million and significantly reduce federal, state, and local budget deficits.

The logic of reshoring is similar to the logic espoused by most EDOs (Economic Development Organizations): produce near the customer. Over the past few decades, companies rushed to offshore for cheap labor and low purchase price. But as the global economic climate evolves, the labor savings have shrunk and the "hidden costs" of producing far from home have become both greater and more apparent, increasingly offsetting the residual labor savings. With the adoption of Total Cost analysis, companies are increasingly deciding to source locally. The full spectrum of reasons for this shift is diverse and complex, but the fundamental reality is that the U.S. is still the largest market for most products. To meet the needs of the domestic market, it makes sense for U.S. companies to expand here instead of offshore, and for foreign companies to locate their factories close to U.S. consumers. EDOs can use this analysis to retain existing companies and motivate FDI (Foreign Direct Investment).

"Zentech's facility in Baltimore continues to build power management and wireless printer products reshored from China in 2011."

The advantages of producing near the consumer are great. IEDC's 2012 Winter issue of Economic Development Journal reported on a closely related concept, a Creative Molecular Economy now underway.[1] This is an economic model based on the nature of organic systems, where the global community consists of interdependent sub-communities/regions that connect, collaborate, and compete. The coming "Organic Age" is far more complex, ambiguous, and perpetually in a state of high-speed change than the Industrial Age it is replacing. Education, flexibility, and innovation are identified as the key attributes for success within this model. As a new economy evolves, it is no surprise that these attributes also help drive companies to reshore. Loss of flexibility and reduced ease of innovation (along with subsequent increased intellectual property theft) are among the important hidden costs of offshoring. Education, especially training a skilled

Harry Moser is Founder and President of the Reshoring Initiative. In addition to the TCO Estimator software, the Initiative also provides a database of 300+ reshoring articles and a Case Studies feature where companies can share their real cases of reshoring. All resources are available on the website at: www.reshorenow.org. (harry.moser@reshorenow.org)

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CHART 1

Eleven Reshoring Cases Demonstrate the Breadth of the Industries Involved

Company	Product	Reasons Production Reshored	From	To
Lincolnton Furniture Company	Bedroom and dining room furniture	- High transportation costs - Competitive labor costs in the United States along with labor availability	China	Lincolnton, N.C.
Apple	Mac Computers	- Cut down on delivery times and shipping costs - Improved PR	China	U.S.
Wright Engineered Plastics	Plastic injection moldings for medical and telecom customers	- High transportation costs - Rising foreign wages - Quality defects common and difficult to deal with	China	Santa Rosa, Calif.
General Electric	Water heaters	- State of Kentucky provided tax incentives - High-tech appliance models newly designed - Lean production processes adopted in the U.S. - Ease of design and innovation in the U.S. - Collaboration with workers and unions cut U.S. unit cost by $20 - Total cost of ownership: Chinese costs 6 percent higher than American when considering inventory and delivery problems	China	Louisville, Ky.
Freeman Schwabe Machinery	Hydraulic die cutting presses	- Restoring the company's long-term "Made in USA" heritage - Warranty costs reduced by 90 percent - Ability for the company to control its own destiny - Improved speed to market - Rebuild employee skills and morale	Taiwan	Cincinnati, Ohio
Ford Motor Company	Hybrid transmission components, battery packs and steel forgings	- Quality issues	India Mexico Japan	Ohio Michigan
Bailey Hydropower	Hydraulic cylinders	- Fast delivery versus five weeks on the water - If quality is a problem, then no more bad units en route in the long supply chain	India	West Knoxville, Tenn.
Karen Kane	Women's apparel	- Quality-control issues - Rising labor costs - Nimble domestic companies are better able to capitalize on fashion trends - More sophisticated manufacturing techniques mean production is no longer prohibitively expensive	China	Los Angeles, Calif.
Morey Corp.	Circuit boards	- Quality issues - Inventory cut by 94 percent	China	Woodbridge, Ill.
Ace Clearwater Enterprises	Welded assemblies for aerospace and energy	- Quality-control issues - Customers are willing to pay more for high precision and quality	Hungary	Torrance, Calif.
NCR	ATMs	- Slow response time from foreign contract suppliers, especially from the lower tiers - Chinese wages up - Innovation: silos eliminated by having manufacturing near engineering and customers	China India Brazil	Columbus, Ga.

Links to articles on each of these cases can be found at: www.reshorenow.org/book/table

workforce, is the single most important controllable factor in rebuilding a solid manufacturing base, as will be discussed later.

Companies across all sectors of manufacturing have reshored, or have committed plans to bring work back to the U.S. Chart 1 is a sampling of some of the 200+ companies that have/will reshore.

A CLOSER LOOK AT TCO

TCO is defined as a total of all relevant costs associated with making or sourcing a product domestically or offshore. TCO includes current period costs and best estimates of: relevant future costs, e.g. warranty; risks, e.g. IP loss; and strategic impacts, e.g. impact on product innovation.

TCO analysis helps a company objectively identify, forecast, and minimize Total Cost. It takes into account the costs of wages and currencies (which are important to keep track of, especially in low-labor-cost countries where they are often rising quickly), as well as energy and transportation prices. Other factors such as those associated with the risk of supply chain shocks and disruptions caused by natural disasters and political instability also are accounted for. Chart 2 shows the distribution of reasons (costs) that motivated published cases of reshoring. The tangible costs are the most frequently mentioned.

CHART 2

Distribution of Reasons for Reshoring

Reason	Number Of Cases Cited
Wage and Currency Changes	54
Quality, Warranty, Rework	41
Delivery	38
Freight Cost	32
Travel Cost/Time or Local Onsite Audit	27
Inventory	25
Total Cost	20
Intellectual Property Loss or Risk	20
Communications	14
Image/Brand (prefer U.S.)	12
Loss of Customer Responsiveness	9
Emergency Airfreight	9
Difficulty of Innovation/Product Differentiation	6
Natural Disaster Risk	4
Price	4
Green Considerations	4
Burden on Staff	3
Product Liability	2
Personnel Risk	1
Regulatory Compliance	1

Source: Reshoring Library 9/16/12

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HOW TO CALCULATE TCO

The Reshoring Initiative has developed a Total Cost of Ownership Estimator™, a complimentary tool, to help companies easily determine their TCO for specific products or tools. The user assigns a value to each of 36 factors that is relevant to each source in the specific case. The Estimator uses the factors to calculate 27 costs, which it accumulates into a single Total Cost for a product sourced from a particular supplier or a particular company owned factory. The user repeats the process for each source, and can then objectively compare the TCO for the same product from multiple sources, whether local or offshore. The following list is a guide to the costs addressed in the TCO Estimator, beginning with "hard cash" costs and progressing to more subjective measures.

1. **Cost of goods sold or landed cost:** price, packaging, duty, and planned freight (such as surface shipment), logistics fees, and insurance.
2. **Other "hard" costs:** costs that are calculable and highly likely to occur, including:

a. *Carrying cost for in-transit product.* Payment for foreign products often occurs prior to shipment whereas domestic suppliers are paid after shipment, often long after. In-transit times are longer.

b. *Carrying cost of inventory on-site.* The amount of onsite inventory will be dramatically higher for product shipped by ocean freight than for shipments from a local, just-in-time, supplier. Cycle inventory is higher due to larger, less frequent shipments. Safety stock is higher due to longer delivery times. Large inventories associated with offshoring also are a risk in the next business downturn.

c. *Prototype cost.* Sourcing prototypes locally allows engineers and marketing organizations to work more effectively with the suppliers during product development. Local suppliers typically charge less for the prototype if they also receive the production orders.

NV3 Technologies, which fabricates cell phone charging kiosks, moved all of its production from Asia to Maryland because of quality and delivery issues.

Indoor/outdoor lighting fixture manufactured by Hubbardton Forge in Castleton, Vermont. Each fixture has two aluminum spinning components (shown above) that as a result of understanding the total cost were sourced domestically instead of overseas.

d. End-of-life or obsolete inventory. When a product changes, offshore sourced products' obsolete inventory in-house, en-route, and on order will be higher than products from a local source.

e. Travel costs. Travel expense and time for ongoing auditing and problem solving can have a notable impact on a product's total cost.

3. Potential risk-related costs: High-frequency risks, such as emergency airfreight, scrap, and rework, to name a few, can be calculated based on past experience with an existing supplier. New products or new suppliers will require estimates.

a. Rework. These costs can be especially high for custom products, such as molds or dies.

b. Quality. Who pays for scrap? In addition to the cost of lost production and warranty-related payouts when the product fails, quality problems are costly in other, less tangible ways, such as lost market share, permanent loss of customers, or the negative impact on brand image.

c. Product liability. How do the suppliers compare in terms of accessibility, willingness, and ability to pay any product-liability claims?

d. Intellectual property risk. Approximately 5 to 7 percent of world trade consists of counterfeit or pirated goods.[2]

e. Opportunity cost. What is the cost of lost orders and customers when a supplier cannot respond quickly enough to changes demanded by the market?

f. Brand image. Several recent surveys have shown an increasing preference for domestically made products and decreasing preference for Chinese products. These changing attitudes are based on improving quality of U.S. products, publicity about poor quality imports, and recognition of domestic manufacturing's impact on the economy, neighbors, and family.

g. Economic stability of the supplier. It is much easier to find accurate information about the stability of a supplier located in the home market than it is for a supplier overseas. Lower tier suppliers are especially hard to monitor in developing countries.

h. Political stability of the source country. Even countries that are making good economic progress can become destabilized because of changing consumer expectations and demands and political unrest.

4. Strategic Costs:

a. Impact on innovation. Separating manufacturing from engineering degrades the innovative effectiveness of a company and its home country. Conversely, "clustering" – having suppliers, research universities, manufacturing, development, and production located near each other – provides a large advantage for innovation.

b. Product differentiation and mass customization. It is easier and less costly to make the move to mass customization with short, tightly clustered supply chains

5. Overall impact on society: The current TCO Estimator calculates the micro-economic impact on the firm. We are developing two additional features to estimate the broader impact on our society:

a. Environmental: Some companies measure the "cleanliness" of their own production and their supply chains. "Green" costs can now be manually inserted into the TCO Estimator. A green calculation will be added to a future version. Green issues will become more important as the population continues to grow, impacting sustainability. As a result it is likely that hard costs, such as carbon taxing, rather than voluntary estimates, will increasingly apply in this area.

b. Macro-economic: Reshoring increases U.S. employment and business activity in domestic suppliers. This feature will value that impact by summing the extra taxes that workers and companies will pay and the lower government expenditures for unemployment, food stamps, welfare, and stimulus programs.

TCO analysis helps a company objectively identify, forecast, and minimize Total Cost. It takes into account the costs of wages and currencies (which are important to keep track of, especially in low-labor-cost countries where they are often rising quickly), as well as energy and transportation prices. Other factors such as those associated with the risk of supply chain shocks and disruptions caused by natural disasters and political instability also are accounted for.

THE IMPACT OF USING TCO

User data shows that about 25 percent of what has been offshored would come back if all companies used TCO instead of price for sourcing decisions. The impact of using this approach is demonstrated by a statistical analysis of user calculations. The results for the most recent 27 cases of China vs. U.S. are in Chart 3.

CHART 3

Summary of Users' TCO Results: China vs. U.S.

Comparison Basis	U.S. % of China Price or TCO, average	% of cases where U.S. has the advantage
Price	169%	15%
TCO	96%	56%
Difference	73%	41%

From this data we could conclude that the use of TCO instead of price changes the sourcing decision on 41 percent of the cases. Conservatively we reduce that figure to 25 percent.

Based on analysis of the articles in the Reshoring Library, the Initiative calculates that about 50,000 manufacturing jobs have been reshored in the last three years. That surge represents about 10 percent of the total increase in manufacturing jobs since the low of January 2010. If the current trend of increased TCO use is paired with other favorable trend factors or strategies, the potential for reshored jobs is estimated at up to 6 million in Chart 4.

CHART 4

Potential for Reshored Jobs

Scenario (Source of the scenario)	Manufacturing Jobs*	Total Jobs**
Today: If all companies used TCO (Reshoring Initiative)	~500,000	1,000,000
By 2015: If Chinese wage trends continue (~BCG)	1,000,000	2,000,000
Better U.S. training, process improvement, automation, tax rates (~Advanced Manufacturing Partnership)	2,000,000	4,000,000
End of offshore currency manipulation	3,000,000	6,000,000

*# of jobs and scenarios are cumulative.
**Assumes a low 1.0 multiplier effect

The potential is great for the American economy, workforce, and individual companies, but in order for the potential to be realized, many more companies must adopt TCO analysis. In its March 12, 2012 report, Boston Consulting Group identifies seven industry sectors as being at or near the tipping point, where it will make economic sense for production to return to the U.S. if companies look at total cost.[3]

According to Zentech President Matt Turnpin, "Zentech's facility proves Baltimore is better than Beijing."

When it becomes clear that there is often not a TCO penalty associated with domestic sourcing, it is easier for a company to place more emphasis and resources on building strategies such as product-differentiation or product innovation, both of which are maximized via local sourcing. A company might also pursue cost-reduction programs, such as lean, theory of constraints (TOC), design for manufacture and assembly (DFMA), quick response manufacturing (QRM), automation or training that might have seemed insufficient to close a 40 percent price gap but are more than able to close a 10 percent TCO gap.

TCO use and industry awareness of the potential benefits of reshoring are essential components of rebuilding the U.S. industrial base. When companies understand their total cost of ownership they offshore less and reshore more. Individual companies, educational institutions, Wall Street, and consumers are starting to embrace reshoring. In January 2012, the White House hosted the "Insourcing Forum," highlighting the Reshoring Initiative's objectives in the lineup. President Obama later summarized in the 2012 State of the Union, "…we have a huge opportunity, at this moment, to bring manufacturing back. But we have to seize it."[4] TCO use is showing more companies that they can help both themselves and America by bringing production back. The sidebar at the end lists multiple ways EDOs can use TCO analysis and other Initiative tools.

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CHART 5

Behavioral Change Suggestions/Call to Action

Player	Present Condition	Needed Behavior
Consumers	- Price driven.	- Seek made in America products
OEM manufacturers	- 60% decide on offshore vs. reshored sourcing based on price or other simple measures	- Consistently use TCO.
All manufacturers	- Underinvesting vs. China and much of Europe - Training, especially apprentice training, generally poor	- Apply lean, automation, TOC, QRM and other means to close any remaining TCO gap - Start extensive apprenticeship programs.
Community colleges	- Community colleges have dropped manufacturing programs but they are coming back.	- Emphasize the importance of manufacturing careers and offer a wide variety of manufacturing career preparation.
U.S. government	- Overly focused on exporting. Starting to appreciate reshoring.	- Make providing the workforce needed for the nation to be globally competitive the highest priority.
Reshoring Initiative	- Very visible in the factory level manufacturing community, the contract manufacturers, the economic developers and the government. - Not effective enough with the OEMs	- Obtain a reference company – a large OEM – that uses the TCO Estimator and serves as an example for others
Brick and mortar retailers	- Too high a priority on lowest cost products	- Source based on TCO instead of ex-works price - Make it easy for consumers to find made in America products and to understand the quality differential
Online retailers	- A number of small retailers promoting American made products	- Take advantage of dramatically lower overhead to offer American made online at the price of offshore made at brick and mortar retailers
Contract manufacturers	- Generally: good quality, slow response, higher prices, poor training	- Use TCO as a sales tool to convince customers of the benefits of buying domestically from them - Respond fast enough to preserve the natural advantage that flows from proximity to the OEM customer
K-12 education system	- Overall poor - Guidance counselors primarily guide to the best college the student can enter, rather than to the best career the student can achieve.	- Dramatically improve student performance, especially in STEM fields, and preparation for mfg. careers - Provide the tools for students to compare a skilled manufacturing professional career to the probable outcome of attending a 4 year college
Universities	- Just get the desired number of students. Field of major not important.	- More focus on engineering, especially manufacturing and industrial engineering
Wall Street	- Rewards companies for offshoring	- Ask companies about their use of TCO instead of price variance for sourcing decisions and bonuses
Venture Capital	- Routinely insists that start-ups get the prototype made here and then immediately source from Asia	- Help start-ups use TCO to make better sourcing decisions
Government leaders	- Talking about manufacturing much more than in the past - Proposing legislation to strengthen manufacturing	- Promote manufacturing as not just good for the country but as providing a better career for many citizens - Promote TCO. Actively encourage companies to use it. Insist that governments use it for sourcing decisions. Insist that government contractors use it.
States, especially economic development organizations	- Tend to focus on competing with each other for factories	- Focus on helping companies decide not to offshore or that have offshored to reshore or find local suppliers - Focus as much on getting OEMs to outsource locally as on OEMs' new facilities
Unions	- IUE-CWA and AFL-CIO have been trained by the Initiative to discuss TCO with employers.	- Create conditions so that the U.S. is the most profitable, while not the lowest wage, location for companies to produce for the N. American market. - Recognize that the union is stronger, member jobs more secure, if the company has strong domestic sourcing of components, even to non-union suppliers, than if the components are outsourced overseas or even produced in-house overseas. Thus align interests with domestic suppliers to reshore and maintain both components and final assembly domestically.

MORE WAYS TO IMPROVE MANUFACTURING AND THE U.S. ECONOMY

To bring enough jobs back to restore our economy and balance the trade deficit will require a broad range of actions and behavioral change across most sectors of our society, as outlined in Chart 5. The highest priority is on developing a much stronger skilled workforce. Reshoring helps recruit that workforce by demonstrating to students and society that local manufacturing is coming back and providing solid long-term careers.

CONCLUSION

The fastest, most cost effective, stable way for EDOs to strengthen their local economies is to motivate and enable reshoring and help companies see the benefits of not offshoring.

ENDNOTES

1 "Unleashing Fundamental Change," by LaDene Bowen, CEcD, FM; Ronnie Bryant, CEcD, FM, HLM; Jim Damicis; Scott Gibbs; Rick Smyre; and Mark Waterhouse, CEcD, FM, HLM. EDJ Winter 2012

2 "Knock-offs catch on," The Economist, March 4, 2010

3 "Made in America Again," BCG, March 2012

4 "Management: How to Make It in America," Quality Magazine, April 6, 2012

HOW EDOS CAN USE TCO AND RESHORING

Help local companies make more objective sourcing decisions

Convince local companies to stay, expand and source locally

Convince foreign companies to locate in the U.S.

Use Reshoring Case Studies to promote:

- **Local companies**
- **Your area as the "U.S. Reshoring Capital"**

Use the Reshoring Library to identify prospects

Put as much emphasis on local outsourcing as on new OEM factories:

- Organize state or regional Purchasing Fairs to help local suppliers replace offshore sources for the OEMs
- Build clustering/moats/ecosystems around your companies
- Attract suppliers and OEMs to join the cluster
- Remember that local outsourcing offers much faster implementation (no waiting for approvals, negotiations, construction, etc.) and less or no need for incentives since the OEM and the supplier are negotiating the deals. You just help them network!

Use the success of reshoring to motivate the strengthening of local manufacturing skills training