

By Invitation

Perspectives on Global Manufacturing¹



Kasra Ferdows

Manufacturing matters. It is a key to prosperity for nations and companies. In 2019, the world generated US\$13.8 trillion value added in manufacturing (Worldbank, 2020b), representing 15 % of the world's gross domestic product (GDP). If you add the activities created by manufacturing but not included in these numbers its effect is much larger: it accounts for almost half of the world GDP. Even beyond its economic value, it nourishes research and develops critical skills, and in some cases, it is considered to be important for national security. What happens in manufacturing is of interest to multiple constituencies.

Manufacturing is also a hallmark of global cooperation. Nowadays, remarkably, very few products are manufactured in a single country. Parts produced in one country are often sent to another for further work, to a third for assembly, and to other countries for packaging, storage, distribution, and sale, and sometimes for remanufacturing, reuse, or disposal. A cursory examination of aggregate trade statistics shows the extent of this phenomenon: In 2019, world merchandize trade was US\$18.89 trillion (the rest, US\$6 trillion, was in services) (World Bank 2020b), and the largest and growing share of goods traded were *intermediate* goods—parts, components, and semi-finished products—as opposed to *primary* goods (essentially raw materials) and *finished* goods (ready to be used by consumers) (United Nations, 2020).

This global fragmentation of manufacturing has been happening at an astonishing rate. In the last seven decades, global trade (more than three-fourth of which has been merchandize—i.e., essentially manufactured-trade) has been growing faster than the global GDP, frequently by a wide margin. Only in a few years during this long period, while the world faced extenuating (and exceptional) circumstances, it grew at a slower pace, and even more rarely it actually declined from its level in the previous year. One such year was 2020, which was of course due to the COVID-19 pandemic. But global trade is expected to rebound in 2021 and resume its historical trend.

The accelerated rate of globalization of manufacturing has naturally created more complexity. For manufacturing companies, it has increased the complexity of two basic decisions: *which part of the firm's value chain should be produced where*, and *how should such a network of factories be managed*? For governments, it has made formulating the policies for attracting and retaining manufacturers more demanding. For others, including some of the non-governmental organizations, it has made achieving a variety of object-

¹ This text has originally been written in a slightly different version as a foreword to the following book: “Global Manufacturing Management – From excellent plants toward network optimization”, by T. Friedli et al., 2021, Springer, Berlin.

ives—such as persuading the companies to adopt more sustainable practices, protecting labor and human rights in the extended global supply chains, ensuring the safety of manufactured products, and leveraging manufacturing to help the poor and reduce poverty—more arduous.

The literature has not kept up with this growing complexity because research in global manufacturing has been hampered by high levels of *detail complexity* (i.e., when a large number of independent variables must be considered), *dynamic complexity* (i.e., when cause and effect are subtle and where the outcomes of interventions are not well-understood) (Senge, 2006), and hysteresis (i.e., when there is delayed reaction to stimulus). Each of these three obstacles exacerbates the difficulty caused by the other two, making this kind of research more challenging (Ferdows, 2018).

Integrating Strategic and Operational Perspectives

It is therefore understandable that much of the literature on global manufacturing is focused on a limited number of issues. These issues range from high-level *strategic* ones to routine *operational* ones. A shortlist of the strategic issues includes design of the global footprint of the firm's production and supply chain network (including offshoring, reshoring, and sourcing decisions), deployment of new technologies and big data, mitigation of risks in dispersed production, improvement of sustainability of the network, and transfer of production know-how in global networks; some of the routine operational issues include managing allocation of resources and products to plants, inculcation of lean and operational excellence practices in the global network, and tracking of performance of factories in the network. Most books and articles cover issues mostly in one or the other category, seldom both or their interactions.

Adding the Policy Perspective

Besides discussing strategic and operational issues in managing global manufacturing, it is also useful to consider how constituents other than the manufacturers themselves are viewing the issues in global manufacturing. For example, how do groups such as politicians, industry lobbyists, government officials, and a host of other experts in different institutions, even the media and general public, think about trends in global manufacturing? These groups, collectively, influence taxes, subsidies, tariffs, local laws and regulations, and a host of other important factors which directly affect manufacturers' decisions of where to locate their factories and how to manage them. They craft the *policies* that govern global manufacturing.

Their views are often shaped by events in the global trade and geopolitics. For example, changes in trade pacts (e.g., the recent Regional Comprehensive Economic Partnership among the ASEAN countries), trade frictions (e.g., US-China), economic and demographic changes around the globe (e.g., rise of Asia or aging population in the developed world), new global logistics infrastructures (e.g., China's Belt and Road Initiative), and new international mandates (e.g., limiting carbon-footprint, or supply chain transparency, safety and ethical compliance), can evoke strong reactions in many of them, which in turn can affect decisions made by the manufacturing companies.

It is therefore useful to view global manufacturing also from their perspectives. Two over-arching questions that seem to be at the heart of many debates among policy makers

about global manufacturing are: First, “is manufacturing leaving the rich countries?” Second, “are the global manufacturing footprints in most companies over-extended?”

“Is manufacturing leaving the rich countries?”

This question is a source of never-ending debate among scholars and policy makers; it also influences business managers’ thinking. The conventional wisdom holds that these days most new factories are built in low-cost countries. Consider the discussion in the United States. It is often shaped by sensational headlines in the media, such as *“The Death of American Manufacturing”* (Morely, 2006), and events in a few industries (like apparel and toys). Closure of factories create real hardship and not surprisingly can shape the public perception. But in general, these views are often based on anecdotal evidence or events in small segments of manufacturing. A closer examination of the macro data suggests a different picture.

The assertion for decline of manufacturing in the US is mostly based on two observed trends: decline of manufacturing *jobs* and decline of *share* of value added in manufacturing in the GDP. Indeed, according to the World Bank (2020a), the number of manufacturing jobs in the United States has declined (from US\$18.1 million in 1998 to US\$13.5 million in 2018), causing real hardship, and the sector’s share of GDP has fallen (from 16.1 % in 1997 to 11.2 % in 2017). However, US value-added in manufacturing has not declined. It rose from US\$1.38 trillion in 1997 to US\$2.18 trillion in 2017 (in nominal dollars, and still a larger amount even after adjusting for inflation) (Worldbank, 2020b). The US has been the world’s largest manufacturer in six of the last seven decades. It lost the number one position to China in 2009, but is still the second largest manufacturer in the world.

US is even a bigger manufacturer in relative terms. Per capita, US produced 2.4 times more value-added in manufacturing in 2019 than China (US\$6610 in US versus US\$2780 in China). South Korea, Japan, Germany and Switzerland, among other rich countries, had even a larger per capita value-added in manufacturing (See *Figure 1*).

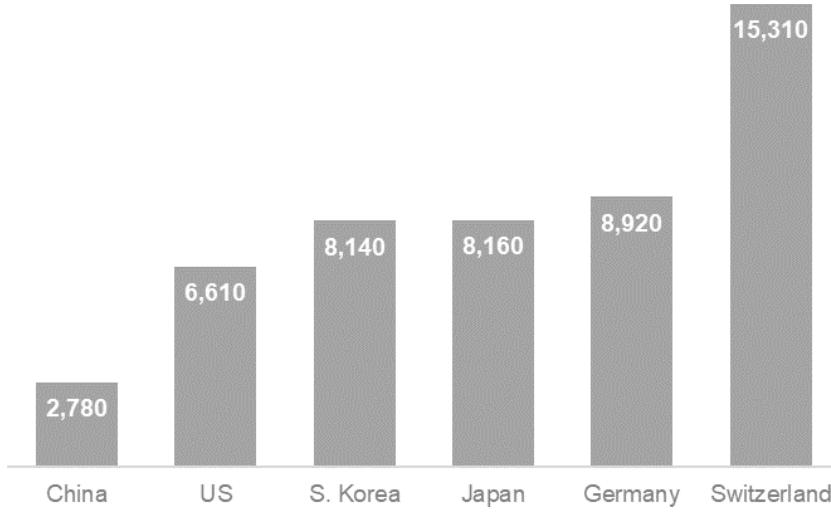


Figure 1: Per capita manufacturing value added (US\$, 2019). Data from Worldbank (2020a).

None of these countries are developing or “low-cost” countries. The average person in many advanced countries is producing--and often exporting --more manufactures than the average person in most developing countries (*Ferdows*, 2019). This is in contrast to the notion that rich countries are not competitive locations for manufacturing.

In fact, examining the foreign direct investments in manufacturing by multinationals (who supposedly locate their factories in most desirable locations around the world), suggests an opposite picture, at least for the US and a few other rich countries. According to the United Nations Conference on Trade and Development (UNCTAD) (2020), foreigners have consistently built more factories in the United States than in any other country. For example, in 2019, foreigners invested US\$101 billion in the United States to build “greenfield” facilities (meaning new ones, not repurposed structures) — about half were factories, and the rest were power plants, telecom networks and other infrastructure projects. That was a quarter of the US\$402 billion total greenfield investments in the world, significantly more than the greenfield investment in China, which was US\$62 billion in 2019. Other top recipients of manufacturing investments that year include several other rich countries: UK, Germany, Netherlands, France, Canada, and Spain. Vietnam, Brazil, and India, each with around US\$30 billion greenfield investment, were also among the top ten recipients, but the factories in Brazil and India were mostly for serving domestic demand; only the new factories in Vietnam seem to have been mostly for exports, often serving a second source for multinationals that had depended solely on factories in China for some parts or products (UNCTAD, 2020).

The suggestion that the rich countries, with their high-cost environments, have become unattractive for manufacturing is also rebutted by many experts. For example, a 2018 ranking of the ten most attractive countries for manufacturing compiled by the Brookings Institution (*West & Lansang*, 2018), using 20 indicators (measuring appeal of policies and regulations, tax policy, energy, transportation, health costs, workforce quality, and

infrastructure and innovation) were Britain, Switzerland, United States, Japan, Canada, Netherlands, South Korea, Germany, Spain, France (China was ranked at number 13).

In short, developed countries, already home to a great deal of manufacturing, remain competitive. Manufacturing is *not* leaving the rich world.

“Are the global manufacturing footprints over-extended?”

The disruption caused by the COVID-19 pandemic in 2020, added to the tariff and geopolitical frictions in previous years has raised the question of whether companies have gone too far in dispersing their production networks. Some experts—in academia, think tanks and consulting companies—argue that companies should seriously start shrinking their global manufacturing footprints and near-shore or even reshore some of their off-shore production.

Altering the footprint of a company’s global production network is not new. Companies are always doing that in response to changes in external and internal (that is, inside their company) conditions; sometimes they do it simply to correct a bad past decision. A new analysis of inventory and transportation costs, impact of potential disruptions, or risks of leakage of intellectual property, can trigger, and has triggered, reshoring production. But is there any evidence that the frequency of such decisions has improved dramatically? Have we reached a “tipping point” in reshoring?

Data on reshoring is patchy. Going beyond the hype in some media—which are frequently based on anecdotes and merely declarations of intentions—there is little evidence of a “tipping point”. Reshoring manufacturing is still only a small fraction of offshoring (i.e., moving or investing in production outside the home base). “*There is no evidence of any coronavirus-induced rush by companies to return operations to the United States,*” (Alden, 2020), or, going even a few years back, as an OECD report (De Backer *et al.*, 2016) puts it, “*it is a trickle rather than a flood; [and] reshoring initiatives that are often publicly launched do not always materialize.*” A study of a sample of 1,500 large German companies found that, between 1995 and 2015, for every company that reshored production, four offshored (Kinkel, 2018).

The latest data on foreign direct investment provide additional evidence that companies continue to *spread* their manufacturing around the globe at historical rates rather than retracting them. Rich countries, while being among the world’s largest manufacturers (see above), are also among the world’s largest investors of manufacturing abroad (see *Figure 2*).

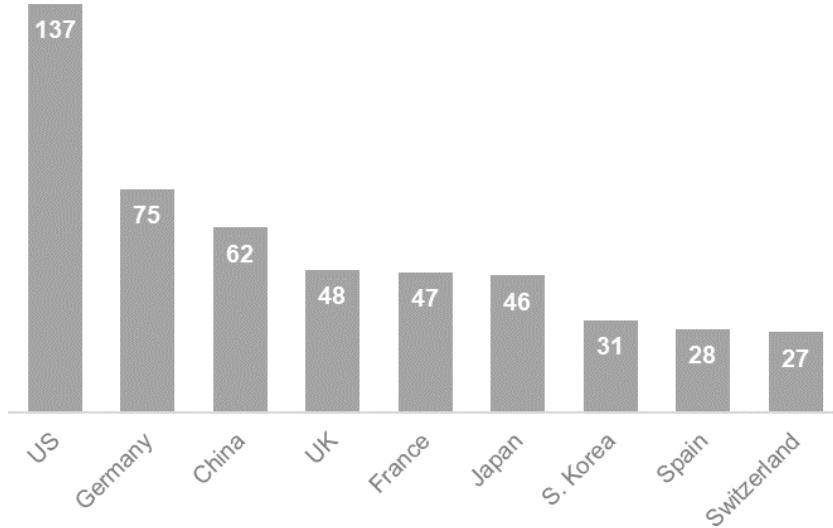


Figure 2: World's top foreign direct greenfield investors² (billion US\$, 2019). Data from UNCTAD (2020)

Note that even China, the world's largest manufacturer (US\$3.89 trillion manufacturing value added in 2019) (Worldbank, 2020b) and destination for manufacturing for many companies worldwide, was the third largest investor in manufacturing abroad.

It is clear that multinational manufacturers expand their global networks not just to reduce costs but more often to access growing markets and specialized skills. According to a recent report (Kharas, 2017), 88 % of the next billion new entrants into the middle class will be in Asia, and by 2030 the middle class worldwide is expected to spend US\$64 trillion, US\$29 trillion more than the 2017 level. Multinational manufacturers cannot ignore these growing markets, and they—especially those that produce consumer products—need factories close to these consumers to be able to respond to their demand for ever-faster deliveries, especially as e-commerce continues to grow astronomically.

Final Words

There are no compelling reasons to believe that global manufacturing networks are entering a period of retraction or increasing concentration in the developing countries. Competitive and world class manufacturing can and will continue to be done in both developed and developing countries, although managing them will become increasingly more complex.

² About half of “Greenfield FDI” in US and many other countries is in building new manufacturing facilities. Rest are telecom, pipelines and other infrastructural projects.

References

Alden, E. (2020). No, the Pandemic Will Not Bring Jobs Back From China. *Foreign Policy*. <https://foreignpolicy.com/2020/05/26/china-jobs-coronavirus-pandemic-manufacturing-trump/>

De Backer, K., Menon, C., Desnoyers-James, I., & Moussiegt, L. (2016). Reshoring: Myth or Reality? (OECD Science, Technology and Industry Policy Papers No. 27; OECD Science, Technology and Industry Policy Papers, Vol. 27). <https://doi.org/10.1787/5jm56frbm38s-en>

Ferdows, K. (2018). Keeping up with growing complexity of managing global operations. *International Journal of Operations & Production Management*, 38(2), 390–402. <https://doi.org/10.1108/IJOPM-01-2017-0019>

Ferdows, K. (2019). Five Myths about Manufacturing. *Washington Post*.

Kharas, H. (2017). The Unprecedented Expansion Of The Global Middle Class An Update, Global Economy and Development at Brookings.

Kinkel, S. (2018, January 25). Industry 4.0 application and reshoring of manufacturing – evidence, limitations & policy implications. Presentation at Makers Workshop “Industry 4.0 – Implications for an EU industrial policy,” Brussels. https://www.ceps.eu/wp-content/uploads/2017/11/Presentation%20Steffen%20KINKEL_EU%20Industrial%20policy%204.0_Brussels_25-01-2018.pdf

Morely, R. (2006). The Death of American Manufacturing. *The Philadelphia Trumpet*.

Senge, P. M. (2006). The fifth discipline: The art and practice of the learning organization (Rev. and updated). Doubleday/Currency.

United Nations. (2020). International Trade Statistics. https://unstats.un.org/unsd/tradekb/Knowledg_ebase/50090/Intermediate-Goods-in-Trade-Statistics

United Nations Conference on Trade and Development (UNCTAD). (2020). World Investment Report.

West, D. M., & Lansang, C. (2018). Global Manufacturing Scorecard: How the US compares to 18 other nations. Brookings.

Worldbank. (2020a). World Bank national accounts data, and OECD National Accounts data files. <https://data.worldbank.org/indicator/NV.IND.MANF.CD>

Worldbank. (2020b). World Development Indicators, Macrotrends. <https://www.macrotrends.net/countries/USA/united-states/manufacturing-output>

Prof. Dr. Kasra Ferdows, is a Professor for Operations Management at Heisley Family Chair of Global Manufacturing in the McDonough School of Business.

Address: Georgetown University, 37th and O Streets NW, Washington, DC 20057, USA,
E-Mail: ferdowsk@georgetown.edu