The days of conventional machining by means of dyes, presses and hammers appear to be numbered with computer aided design (CAD) software, materials science and other technologies that 3D printing relies on becoming more advanced in recent years. Already a revolutionary practice for several industries, 3D printing (3DP) will prove to be a disruptive technology for logistics and how goods are transported across the world.

3% FOR 3DP BY 2037
We expect 3DP to grow significantly over the next 20 years, potentially reaching about 3% of total global manufacturing. 3DP is less labour intensive than traditional manufacturing and could reduce reliance on lower-wage countries for product assembly, which is a key driver of the US-China bilateral trade imbalance. In addition, as mass production via 3DP becomes more economically feasible, supply chains could be shortened with more manufacturing carried out locally. Net goods transportation may reduce as a result, negatively affecting transportation infrastructure's revenue.

The infrastructure segment likely to bear the brunt of this change over the next 20 years will be ports, given the central role of cargo transport for port activity as opposed to passenger traffic, as well as the central role maritime ports play in the handling of most international goods transportation. Additionally, the global relationship most likely to face the most significant test will be the one between the United States and China.

THE US AND CHINA
A significant portion of US imports from China are products that, in our view and based on recent technological advancements, are well suited for 3DP. Fitch expects that 20%-50% of these goods could be produced domestically, which could result in a reduction of 10%-25% in US imports from China. If trade protectionism continues to intensify, businesses in the US and China may have a strong incentive to adopt processes that facilitate domestic goods production, including 3DP. This could also help the US reduce its bilateral trade deficit with China.

A significant proportion of US imports from China are products that, based on recent advancements, can be competitively produced in part or in whole with 3DP technology, in our view. These imports include machinery and electronic equipment, such as computers and mobile phones. Potentially 20%-50% of these goods could migrate to domestic production as a result of 3DP.

Though the US and China provide the most fascinating case study of the impact of 3D printing, trade relationships between other countries throughout Europe, the Middle East and Africa, Latin America and other parts of Asia will also be affected. The level of disruption that 3D printing can create for logistics is far-reaching and covers several different areas as highlighted below.

THE SUPPLY CHAIN
The adoption of 3DP could shorten supply chains by bringing the production of some components in-house, therefore closer to the source of demand, which would reduce the net transportation of end products.
from traditional manufacturing centres like China, Taiwan and Japan. It could also increase the transportation of raw materials to be used as substrate for 3DP, with raw materials going directly to, or near, the product sale location. 3DP could also result in greater automation by reducing the inventory and assembly requirements for products, therefore reducing the number of steps and workers involved in manufacturing. For example, General Electric is now using its own 3D printers to manufacture jet engine fuel nozzle tips, realising a net cost reduction. The new component is 25% lighter and is made of a single piece, whereas previously it was made from around 20 pieces.

**VALUE CHAIN**
The use of 3DP may alter and even remove entire value chains. For example, if consumers are able to 3D print items at home, which otherwise they would buy in a store, such as replacement parts for domestic appliances, this will remove the need for the value chain that has developed to get the part from the manufacturer to the distributor. It may no longer be necessary to manufacture millions of objects in low-cost locations and ship them around the world to warehouses and shops. However, it is likely that alternative, more efficient, value chains would evolve, which may also be more environmentally friendly.

**TECHNOLOGY BREAKTHROUGHS**
The speed of 3DP manufacturing processes could be greatly enhanced if technological breakthroughs, by a start-up, university research facility or R&D department of another incumbent firm, led to faster and more cost-efficient production for example. If incumbent firms are unable to adapt to new technology due to patent protection, prohibitive development costs or an inability to replicate the proprietary technology, they risk becoming uncompetitive.

**DECENTRALISED MANUFACTURING**
As technological advancements lead to smaller and cheaper 3D printers, manufacturing may become decentralised, which could disrupt traditional manufacturing company business models and change goods and materials traffic flows.

**CLOSER TO MARKET**
3DP may enable certain products to be produced closer to the end user, which would improve delivery times, but reduce traffic flows. 3DP may also allow certain products to be produced as cheaply in the market where they are sold as they would be in an area with cheap labour, therefore reducing dependence on low-cost labour.

**REDUCED BARRIERS TO ENTRY**
Lower tooling costs associated with 3DP techniques may lead to reduced cost barriers for potential new entrants into manufacturing. However, other barriers to entry, such as intellectual property rights, patents and prohibitively expensive equipment, may continue to limit widespread adoption, if present.

**CONCLUSION**
With automotive, industrial, aerospace, consumer and medical companies already utilizing 3D printing, the new technology is already changing the status quo of how goods are delivered internationally. Also, as the mass production of 3DP becomes more economically feasible, supply chains will be shortened with more manufacturing done near company headquarters and net goods transportation may be reduced, which in turn could lower transportation industry revenue. What this also does over time is potentially reverse the several years of growth we have seen in world export volumes and shipping container traffic.

**ABOUT THE AUTHOR**
Emma W. Griffith and George Abbatt are both analysts in Fitch’s Global Infrastructure Group. Emma is a Senior Director who leads Fitch’s coverage of seaports in North America. George is a director focused on transportation and sports sector ratings in Europe.

**ABOUT THE ORGANIZATION**
Fitch Ratings Inc. is one of the “Big Three credit rating agencies” and one of the three nationally recognized statistical rating organizations (NRSRO) designated by the U.S. Securities and Exchange Commission in 1975. Fitch Ratings is dual headquartered in New York and London. Hearst owns 100 percent of the company following its acquisition of an additional 20 percent for $2.8 billion on April 12, 2018. Hearst had owned 80 percent of the company after increasing its ownership stake by 30 percent on December 12, 2014, in a transaction valued at $1.965 billion. Hearst’s previous equity interest was 50 percent following expansions on an original acquisition in 2006.

**ENQUIRIES**
https://www.fitchratings.com/site/home