What does innovation in China today look like? What are the challenges that confront Chinese innovators in global supply chains? Political scientist and China specialist Edward Steinfeld posed these questions in his *Critical Issues* presentation “China’s Rise in the Production of Cutting Edge Technology.” China is not currently a base for “upstream” research and development, but it is an innovator in “downstream” implementation of new designs and materials. Forging time-pressured manufacturing innovations in multi-firm networks, Chinese firms are emerging as the world leaders in technological “know how” and are crucial to the success of the supply chains in which they are embedded.

Steinfeld’s presentation mostly focused on Chinese manufacturing innovation in industrial products, particularly energy technologies. Previous research has focused on upstream research and design innovation, but these “new to the world” technologies are not the beginning and end of innovation. Upstream innovation must be coupled with innovative downstream manufacturing know how. Chinese firms are particularly adept at this form of innovation and addressing the demands of tempo, scale, and cost-efficiency in the manufacturing process. For these new energy technologies, much of Chinese manufacturing has occurred within global multi-firm networks – unlike other East Asian economies, large vertically integrated enterprises have not been the norm.

Two examples articulate much of these unique dynamics and challenges associated with Chinese manufacturing innovation. With the explosion of Chinese demand for wind turbines, many foreign companies sought to export to China. Within a year of the foreign companies’ market entrance, a Chinese company emerged with a cheaper alternative. How did the Chinese company achieve what had taken its foreign competitors twenty years? They engaged in reverse engineering of the foreign product. This was not a simple case of “copying” the product, however – the Chinese engineers figured out how to make the product cheaper while still maintaining quality standards. To complete this feat the Chinese company built an inter-firm network of suppliers, thereby getting what they needed and building their product much more efficiently. Through partnering and innovative reverse engineering the Chinese firm reduced the time-to-product timeline from twenty to a couple years.

The Solar Photovoltaic (PV) industry in China includes another example of manufacturing innovation and the networked approach to inter-firm relations. A Silicon Valley startup developed a new nano-material that would dramatically increase the efficiency of solar cells. Unfortunately for the startup, their engineers did not know how to apply the new material in a commercial setting. On the verge of bankruptcy, the startup brought its material to Chinese manufacturers. Initial negotiations stalled with Chinese fears over sharing their technology translation know how, but eventually a Shanghai firm agreed to partner with the Silicon Valley startup. Engineers from both companies worked together on the production line and the product was ultimately a success. This example illustrates that Chinese manufacturing skills are not just employed to copy foreign products for the domestic market, but are also crucial components of global supply chains.

China’s leading role in manufacturing innovation challenges traditional thinking in regards to the nature of innovation and the context in which innovation occurs. Innovation is not only upstream research and development, but also downstream know how. Furthermore, innovation does not only occur in the young, venture capital-funded entrepreneurial startup – it can increasingly be found in inter-firm networks. There are challenges associated with these forms of innovation, however. Firms’ embeddedness in “global echo systems” exposes them to risk at all ends of the
supply chain. Secondly, future Chinese innovation will increasingly require cross-disciplinary work, something Chinese engineering firms have not traditionally excelled at. Finally, the Chinese version of innovation will require the rest of the world to change its traditional conceptions of technology transfer and intellectual property. These ideas currently only emphasize the upstream single-firm research and development idea of innovation and obstruct problem solving.