

briefing

Globalisation research programme

The IfM is actively developing a programme to explore how globalisation is impacting the nature and spatial distribution of manufacturing activities. Our analytical framework is the manufacturing value chain from R&D, through production to end of product life management. The early country focus has been on China, Germany, India, Japan and the USA. For the initial phase of the China study we met with representatives from the following:

Industry

- Haier (White Goods)
- ZTE (Telecoms)
- Midea (White Goods)
- Youngor (Textiles)
- Rolls Royce Int. Ltd (China)
- Airbus China Ltd
- ExcelStor (Electronics)
- HYT (Telecoms/Electronics)
- Strix Ltd (Components/Home appliances)

Industry associations, government and policy advisors

- State-Owned Assets Supervision and Administration (SASAC)
- General Research Institute for Non-Ferrous Metals (GRINM)
- Development Research Centre of the State Council (DRC)
- Zhejiang University
- Guangdong University
- British Embassy, Beijing and Consulate Office, Guangzhou
- British Chamber of Commerce
- Institute of Industrial Economics
- Ministry of Science & Technology
- Institute of World Economics and Politics

China targets high-tech manufacturing

The sustained growth of the Chinese economy is driven by the impressive performance of its manufacturing sector. Key highlights include:

- A strong infrastructure and supplier base (including OEM contract manufacture of finished goods) provides significant competitive advantage in traditional industries; Chinese firms are world leaders in volume terms across many sectors including high-tech sectors such as telecoms.
- In selected industries, the market dominance of Chinese firms is resulting in them now leading next generation manufacturing technologies e.g. steel, telecoms, ship-building and, to a lesser degree, in mature markets e.g. domestic appliances, textiles, leather.
- Many state-controlled enterprises have also grown dramatically with 13 major Chinese state industries present in the Fortune 500 list. These are loosely supervised by a co-ordinating body (SASAC) which provides direction on investment and liberalisation policies.
- National strategies (11th 5 year plan) for manufacturing focus on 'Enabling' and 'Hi-Tech' programme initiatives in order to narrow the gap with international products. They emphasise technologies supporting green, digitised, modular, and reliable/sustainable manufacturing.
- National policy makers are questioning the benefits of low-value manufacturing and switching attention to higher-end manufacturing e.g. IT, pharma, aerospace (despite failed previous attempts) with clear policies to invest in fundamental research capability and building absorptive capacity.
- Current industry absorptive capacity remains low but emerging flagship companies and industries may provide models for moving from 'imitator' (reverse engineering focus) to 'innovator' (leading-edge technology). These developments coupled with heavy

investments in key state industries, education and technology universities, are likely to develop Chinese capabilities faster than in other developing economies.

- The impressive growth of Chinese manufacturing has signified the transformation from a highly planned to a mixed economy. Its sustainability in environmental, social and political terms has been carefully and pragmatically managed overcoming difficulties as they arise. Sustaining this growth going forwards will present social, technological, environmental and political challenges with a generation now having only experienced 10% GDP growth.
- Over the past 20 years key engines for growth have been the unique regional clusters in PRD, TRD and Pan-Bohai regions.

Implications for UK companies

- China is not only focused on low-end mass market manufacturing but has made serious investments in aerospace, shipbuilding, steel, IT and telecommunications.
- Both government and foreign owned MNCs are now investing in aerospace, IT and pharma R&D and manufacturing. Expertise centres are expected to emerge over the coming years.
- Intellectual property protection remains a major concern for foreign manufacturers and Chinese flagship companies with intense competition amongst component manufacturers.
- Increased partnering and collaboration between UK and Chinese universities may provide opportunities for technology transfer and training.
- The relatively immature services sector is set to grow across manufacturing (maintenance and upgrade), logistics (transport), retail and support services (banking, legal etc).

Research & Development

Design

Supply management

Production

Distribution/
route to market

After sales services

Value chain: key findings and highlights

R&D and Design

- The acquisition of overseas technologies is used to redress capability gaps; there is a frustration however with the perceived guarded approach by the West to technology transfer through export regulation and controls in North America and the EU.
- There is an active pursuit of 'secondary' innovation with indigenous innovation being encouraged. This is supported through rapid growth of the higher education and education infrastructure with major investments in universities.
- Research institutions are closely affiliated to key industries and are well established - though there continues to be some duplication and there is a concern that the need to be self-reliant may be reducing genuine research.
- Nationally, specific programmes have been developed to encourage joint development of high potential ideas between entrepreneurs and scientists.
- In response to high-levels of imported industrial machinery, there is a policy focus on localisation of (heavy) plant and machinery, including production equipment, with incentives for end-users to adopt locally manufactured (prototype) products.
- Priority areas for government include aerospace, energy and defence where domestic demand is anticipated to remain strong.
- National strategies (11th 5 year plan) focus on two programmes - Enabling and Hi-tech programmes with the latter featuring technologies supporting green, digitised, modular, and reliable/sustainability manufacturing in order to narrow the quality gap between Chinese and foreign products.
- In many sectors design capabilities are seen as a major weakness in China; Some notable exceptions are emerging (e.g. HonHai, ZTE, Lenovo) where the journey from imitation to innovation is well advanced.
- Many OEMS have created 'universities' that aim to support product design; this development is actively encouraged by national and provincial governments. University expenditures are focused on applied research (design focused) rather than exploratory fundamental research areas.

Supply management

- Basic component manufacturing capabilities are extensive providing lower input costs to OEMs.
- Component suppliers tend to cluster around OEMs often creating single industry clusters of major scale, and with significant cost savings. These clusters also promote fast component replenishment, kanban operations, with low intermediate inventory.
- Government promotes the development of 'agents' who can provide local or imported components to OEMs; this development of the agent approach makes foreign manufacturing investment in China more attractive and practical. Importing of high-value components is seen as important to secure and develop manufacturing in general.
- Funding by provincial government to support the local development of tertiary suppliers has significant benefits to OEMs who are well served by co-located or closely located suppliers.
- The single industry upstream supply cluster that is prevalent in many product categories provides for rapid component and product replenishment without the need for sophisticated planning and management systems. This helps relatively immature supply networks to operate highly responsive operations often with risk-pooling supplier partnering approaches.

Production

- Extensive and largely modern production capabilities are now established across most mature industry product categories; there is still an 'assembly focus' but there are moves towards the manufacture of complex components with some firms venturing into product design.
- Many industries and firms are developing capabilities from 'assembly' to 'design-and-assembly' as part of an integrated contract manufacturer 'service'. Examples are emerging where this creates a competitive barrier to contract manufacturing and some firms are considering the separation of design and manufacturing operations (e.g. HYT).
- Some industries are now finding that they dominate global markets with major growth being driven by domestic Chinese requirements e.g. shipbuilding, steel, construction. These industries, which include some prominent state

owned enterprises, are investing in all elements of the value chain and becoming global leaders.

- In some sectors gaps in capability are being identified (such as aerospace and energy) where growing domestic demand is not matched by manufacturing, technology and research capabilities; these are being prioritised for government support.
- Domestic demand is generally serviced by local industries where 'tailored customer specifications', often around expediting supply within two weeks/30 days, allows local firms preferential position. Genuine competitive advantage of local players is however present in after-sales product repair and warranty-related services.

Distribution/route to market

- Development of the retail trade appears unrestricted by government controls; but some concerns have been expressed about 'foreign control' on the daily-life of Chinese people.
- Large international retail chains already have sophisticated procurement and logistics operations in several major cities. These represent global sourcing hubs for overseas markets; the scale of these operations are such that they are influencing international shipping capacity.
- Dedicated hypermarkets of unparalleled scale focused exclusively on exports and international traders have emerged e.g. YiWu International Trade City. These make it easier for small scale manufacturers to collectively serve international markets through the sharing of common marketing and distribution infrastructure.
- Massive projects to improve capacity and efficiency in shipping ports, air cargo and road networks aim to sustain the ability of China to continue its growth in exports of manufactured goods.

After sales services

- Significant activity in banking and legal services in selected centres - Shanghai and Beijing are emerging. However, lack of consumer confidence in the immature banking systems may frustrate the development of e-business despite the rapid development in markets and consumerism in general.
- Emergence of service, repair and training centres focused for domestic markets are now being set up e.g. Airbus China, where training by foreign enterprises has helped their rapid development.