Reconfiguring your manufacturing footprint for growth

May 2019
Companies with China-centric manufacturing bases are increasingly facing a common set of challenges: international growth is handicapped by long lead times and the inability to quickly respond to changes in customer demand, operational costs are increasing and the trade war has increased tariffs to the key US market on a large range of goods. In response, companies increasingly reconfigure their manufacturing footprint to enhance competitiveness and accelerate growth.
Manufacturing supply chains are changing

Companies that manufacture in China are increasingly reconsidering their manufacturing footprint with a view to moving part of their production to South — South East Asia or North America. Based on our experience, in particular India, Vietnam, the US and Mexico are among the top destinations being considered for technology driven products and Bangladesh, Sri Lanka and Myanmar for low value goods such as apparel.

The fundamental drivers of this trend have been in place for a few years.

1. Many Chinese companies are internationalizing with often near 50% of revenue derived from outside of China. As such they realise their growth in overseas markets is handicapped by the distance to their customers and their inability to quickly respond to changes in customer demand.

2. Manufacturing cost in China have been increasing e.g. labour cost (Figure 1), social contributions and regulatory compliance. With an aging population and continued economic growth, further cost increases appear likely in coming years.

3. The trade war has increased tariffs on a large range of goods further eroding the cost competitiveness of Chinese manufacturing. As a quick resolution does not appear likely and with the risk of no-deal, the activity to review and reconfigure the manufacturing footprint has accelerated the trend over the last year — in particular for companies with large exposure to the US market.
The operating environment in China is changing

“A few years ago, I worked with an US East Coast based manufacturer of high-end plastic consumer goods to assess the unit cost savings of outsourcing manufacturing to Eastern China. The savings were 5-15% depending on the SKU before factoring in working capital and lead time increases. Today, that saving would likely be zero. ”
— Christian Lynaes, Director, PwC Hong Kong

The US-China trade war has further increased costs, for example, the US has released 3 lists of products (originating from China) subject to additional import duties.

<table>
<thead>
<tr>
<th>Products</th>
<th>Value</th>
<th>HS Tariff Items</th>
<th>Additional Duty</th>
<th>Effective Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automobles, computer disk drives, pump parts, valves, printers and other industrial parts.</td>
<td>~USD 34 billion</td>
<td>818 items</td>
<td>25%</td>
<td>6 Jul 2018</td>
</tr>
<tr>
<td>Some chemical products, machinery products, semiconductors and semiconductor manufacturing machinery, etc.</td>
<td>~USD 16 billion</td>
<td>279 items</td>
<td>25%</td>
<td>23 Aug 2018</td>
</tr>
<tr>
<td>Seafood, agricultural products, fruits, daily necessities, etc.</td>
<td>~USD 200 billion</td>
<td>5,745 items</td>
<td>25%</td>
<td>10 May 2019</td>
</tr>
<tr>
<td>Essentially all remaining imports</td>
<td>~USD 300 billion</td>
<td>3,805 items</td>
<td>25%</td>
<td>Pending</td>
</tr>
</tbody>
</table>
Getting the manufacturing footprint right

Reconfiguring the manufacturing footprint requires the ability to answer four key questions:

1. Should we build and operate a new factory?
2. Where is the best location for the new factory?
3. What is the best CapEx plan and how are we going to set up the new factory?
4. How do we effectively reduce or exit our existing investments and minimise stranded costs?

In our experience, there are five key success factors for the analysis required to answer the key questions and to avoid unexpected problems during set up and operations.

- **Have a growth and future orientated mind-set** — by looking not just at the current consumer demand pattern but importantly at the future demand pattern and service level requirements.

- **Analyse based on a comprehensive framework** — to assess all aspects of business performance instead of focusing on just costs (i.e. also on supply chain service levels, CSR and environmental performance).

- **Use a rapid filtering process** — to quickly eliminate options and zero in on a few scenarios for detailed analysis.

- **Review the full operating model implications** — including those on tax and customs duty as well as on the broader supply chain as well as the cost of exiting the existing setup.

- **Use insights driven Data & Analytics** — paired with a flexible scenario modelling tool to guide decision making. It is important that both the tool and the analysis adapt as the project proceeds and goes into detail with a few scenarios.
Growth and future orientation

A forecast of the demand volumes for the coming 5 to 10 years is necessary to evaluate the attractiveness of the different potential locations. This also includes a clear understanding of the trends in customer demand as well as the different demand segments (e.g. some customers prioritise lead time, some prioritise costs, have peak seasons etc.). As part of the forecast, expected changes in market trends and the corresponding impacts on the supply chain also need to be taken into account.

Comprehensive analytical framework

To assess advantages and disadvantages of different locations, we recommend a comprehensive analytical assessment framework is used that covers 6 categories of analysis:

- **Demand fit**
  - Assessment of the expected performance in fulfilling customer demand (e.g. average lead time from the potential manufacturing locations to the customers) and the service level (e.g. reliability and on-time-delivery)

- **Setup and transition costs**
  - Estimation of land price and construction costs as well as company registration fees. Costs related to reducing or exiting investments and/or shifting production as well as related stranded costs

- **Tax impact**
  - Evaluation of FTAs, applicable import/export tariffs at the different locations as well as analysis of tax rates, tax credits and other tax incentive programmes such as property tax abatements or discretionary grants

- **Supply fit**
  - Evaluation of the local supplier base, material lead time and labour availability and quality. Such as unemployment rate, educational attainment rate or unionisation rate

- **Operational environment and risk**
  - Estimation of infrastructure availability and quality (e.g. public roads, railroads, ports cargo) and assessment of local policies related to the specific industry

- **Operating costs**
  - Estimations of labour costs (e.g. manufacturing workers, technicians and management), utility & facility costs (e.g. electricity, water and gas, depending on the industry) as well as logistics costs (e.g. material transportation from manufacturing site to distribution centres).
Key Supply Chain factors

A number of supply chain factors are affected by the location choice. Traditionally, experts use the SCOR model to evaluate five interlinked performance metrics to assess supply chain performance at each location, however, we advocate also taking into account the disruption risk and external impact of the supply chain reconfiguration in order to provide a more holistic assessment.

Traditional approach
- Flexibility
- Reliability
- Speed
- Costs (operational)
- Assets (capital expenditures)

New approach
- Flexibility
- Reliability
- Speed
- Costs (operational)
- Assets (capital expenditures)
- Disruption risks
- Social & environmental impacts

Rapid filtering process

Analysing different locations for a potential expansion is a very time intensive process, therefore, a rapid filtering process is crucial to shortlist the best suited locations as fast as possible. PwC will typically facilitate interactive workshops leveraging our experience in order to help our clients eliminate the less interesting locations early in the process. In addition, the workshops offer a good platform to align all stakeholders.

Review of operating model implications

Any change to the supply chain and manufacturing footprint will have broader implications on business operating, legal, tax and financing models. Sample questions that must be answered includes: “What taxes and tariffs will apply to the produced goods?”, “How will processes such as production allocation and procurement be managed?”, “What will the inter-company transfer pricing, trade and physical goods flows look like?” etc. If not considered adequately then e.g. inefficiencies, taxes and duties can cripple the new facility’s competitiveness despite e.g. labour cost advantages. In addition, the cost to exit existing investments or reduce the volume of production at existing facilities must be considered along with an evaluation of ways to minimise the stranded costs from the shift of production. In the case of a full exit, potential material legal and regulatory hurdles to exit must also be evaluated.
Use insights driven Data & Analytics

The usage of data analytics e.g. via PwC’s SCOOP platform, is essential to evaluate the right locations. It gives the possibility to discover insights that profoundly impact your decision-making process. In addition, the findings can be used as input for a flexible modelling tool, which is crucial to run and compare different scenarios. The model should be able to handle progressively more detail and data points as the process evolves as well as be able to compare different scenarios quantitatively.
What is SCOOP?

Supply Chain Opportunity and Optimisation Platform (SCOOP) is PwC’s supply chain analytics platform which provides rapid insight into supply chain performance. Using advanced analytics — including machine learning, simulation and optimisation — it addresses your complex supply chain challenges and helps identify quick wins using your data.

SCOOP accelerates how our clients can access and build capability in advanced supply chain analytics:

<table>
<thead>
<tr>
<th>Sustainable data handling</th>
<th>Rapid deployment</th>
<th>Self funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid big data processing into a sustainable targeted data model.</td>
<td>Configure and deploy reusable advanced supply chain analytics in weeks, not years.</td>
<td>Identify hard to find cost saving opportunities to enhance your supply chain using advanced analytics. Use the identified opportunities along with benchmarking to fund capability development.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Packaged global PwC expertise</th>
<th>Insight visualisation</th>
<th>Command centres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capturing and packaging PwC’s global delivery expertise in supply chain analytics to accelerate knowledge transfer.</td>
<td>Explore configurable dashboards that provide deep insight into supply chain performance.</td>
<td>Immersive and high impact visualisation of outputs help to identify and communicate potential issues, risks and opportunities in a compelling way.</td>
</tr>
</tbody>
</table>

Visualisation of product clustering outcome.

Order sparsity and customer peak as basis for seasonal strategy.
Value to be unlocked

A loose rule of thumb is that 80% of supply chain costs are determined by the location of facilities and the flow of goods between them. Companies seeking a supply chain that delivers competitive cost advantage therefore invests considerably in ensuring that they have the optimal manufacturing footprint and distribution network to match. It is our experience that such changes often deliver a higher cost impact than can be achieved with process and operational excellence programmes alone.

Case Study — Expansion to Southeast Asia

Our client, a consumer goods manufacturer, faced two major challenges: 1) profit margin pressure because of increasing labour costs in China, and 2) capacity constraints due to rapidly increasing demand. Our client ask us to help investigating different countries in Southeast Asia for expanding their manufacturing footprint and lower costs. Applying our analytical framework, we analysed demand fit, supply fit, operating environment & risks, operating costs, country costs and one-off costs to set up a new factory in a range of countries within ASEAN. On this basis and through a structured process we short-listed two tailored scenarios for further analysis.

Our analysis conclusion was that, from an overall perspective, Country A is more favourable for the specific client. The country offers political stability and skilled labour, however, manufacturing costs are not significantly lower than in China. At the same time, Country B appeared to be the more cost-efficient solution, however, material political risk factors and a high likelihood of tariff increases tipped the scales in favour of country A.

Alongside that analysis, we reviewed existing operations and identified opportunities to increase capacity by 15% at the existing factories through efficiency improvements that would not require capital investments.

1 Watson et al., Supply Chain Network Design: Applying Optimisation & Analytics to Global Supply Chain
Did you know?

The average annual salary of manufacturing workers (figure 2) in different states in the US is around 10 times higher than in Mexico, however, the average salary for managers (figure 3) is almost the same.

**Figure 2**: Average salary manufacturing workers in USD / year

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<table>
<thead>
<tr>
<th>State</th>
<th>Average Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>34,110</td>
</tr>
<tr>
<td>Arizona</td>
<td>46,170</td>
</tr>
<tr>
<td>California</td>
<td>40,375</td>
</tr>
<tr>
<td>Kentucky</td>
<td>42,700</td>
</tr>
<tr>
<td>New Jersey</td>
<td>41,590</td>
</tr>
<tr>
<td>Ohio</td>
<td>36,620</td>
</tr>
<tr>
<td>Oregon</td>
<td>34,990</td>
</tr>
<tr>
<td>Tennessee</td>
<td>155,110</td>
</tr>
<tr>
<td>Texas</td>
<td>38,155</td>
</tr>
<tr>
<td>Chihuahua</td>
<td>3,107</td>
</tr>
<tr>
<td>Jalisco</td>
<td>3,606</td>
</tr>
<tr>
<td>Nuevo Léon</td>
<td>3,744</td>
</tr>
<tr>
<td>Salas Potosi</td>
<td>2,359</td>
</tr>
<tr>
<td>Zacatecas</td>
<td>2,626</td>
</tr>
</tbody>
</table>
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Source: United States Department of Labour; gob.mx; PwC analysis.

**Figure 3**: Average salary managers in USD / year

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<table>
<thead>
<tr>
<th>State</th>
<th>Average Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>102,450</td>
</tr>
<tr>
<td>Arizona</td>
<td>100,050</td>
</tr>
<tr>
<td>California</td>
<td>119,410</td>
</tr>
<tr>
<td>Kentucky</td>
<td>95,860</td>
</tr>
<tr>
<td>New Jersey</td>
<td>131,400</td>
</tr>
<tr>
<td>Ohio</td>
<td>184,690</td>
</tr>
<tr>
<td>Oregon</td>
<td>95,690</td>
</tr>
<tr>
<td>Tennessee</td>
<td>97,640</td>
</tr>
<tr>
<td>Texas</td>
<td>121,930</td>
</tr>
<tr>
<td>Chihuahua</td>
<td>92,000</td>
</tr>
<tr>
<td>Jalisco</td>
<td>94,000</td>
</tr>
<tr>
<td>Nuevo Léon</td>
<td>100,000</td>
</tr>
<tr>
<td>Salas Potosi</td>
<td>73,000</td>
</tr>
<tr>
<td>Zacatecas</td>
<td>72,000</td>
</tr>
</tbody>
</table>
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Source: United States Department of Labour; gob.mx; PwC analysis.
**Case Study — Expansion to North America**

**Challenge**
Our client was serving the North American consumer market, however, the products were manufactured in Asia and shipped to the US. They faced three main factors impacting the operating environment: 1) rising demand in North America, 2) labour costs increase in China, and 3) changing import tariffs from China to the US. Our client asked us to assess and compare different US and Mexican states as potential options for expanding their manufacturing footprint and increasing their market competitiveness.

**Approach**
We applied our analytical manufacturing framework and analysed the six corresponding framework elements for a total of eight states in the US and three states in Mexico.

**Findings**
From an overall perspective, a single US East Coast state appeared to be the most suited state for an expansion of our client’s manufacturing base. Except for operating costs being slightly above average, that state outperformed the majority of the other investigated states in most analysed areas. In addition, our analysis of the competitive landscape showed that a large number of our client’s competitors are operating manufacturing sites near that location, which implies the existence of local suppliers and favourable policies for this specific industry. From a cost perspective only, a state in central Mexico appeared to be the most favourable location. Costs for manufacturing workers are roughly ten times lower than in the US and again around 30% lower than the other investigated Mexican states. This cost advantage offset the slightly higher transportation costs, however, based on our experience, 3PL delivery quality and reliability is lower than in the US.

At time of writing, the company’s next step is to start its 2nd stage analysis to work through the detailed financial modelling assessing the total costs of each option and the value of lead-time improvements.

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**Demand fit assessment: lead time from sites to customers.**

**Supply fit assessment: labour quality and availability.**

**Country / state costs: evaluation of favourable tax incentives per state.**

**Supply fit assessment: analysis of supplier landscape.**

**Project plan and timeline.**

**Summary of framework and corresponding favourable locations.**
Is your manufacturing footprint configured for the future?

Supply chains and manufacturing footprints are set to change drastically in the coming decades. Asian consumer markets growth is rapidly changing the global profile of demand, globalisation is giving way to regionalisation and increased protectionism, while longer-term automation will significantly reduce the role of manual labour in the cost structures of many manufacturing industries. At this inflection point in global trends, is your manufacturing strategy and footprint still fit for growth?
PwC is uniquely qualified to combine strategy, supply chain, taxation and data analytics expertise to offer end to end support to our clients. Our global network allows us to source deep subject matter expertise for every specific industry and market in order to provide a unique customer experience tackling a broad range of topics, including:

- Detailed country and site location assessments
- Operations, manufacturing and supply chain strategy
- Supply chain analytics, optimisation and network design
- Operating model review and design
- Evaluation of tariff impact and other tax consequences along with tax incentive negotiation support
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