



The Chemical Industry in China and the Middle East: Cooperation or Conflict?

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For most of the 20th century, the global chemical industry was dominated by what could broadly be called the Western world (Western Europe, North America and Japan as an honorary member of the club). However, in the first decades of 21st century this dominance is being challenged by other countries and regions, in particular the Middle East and China. This paper examines the change and looks at the potential for cooperation or conflict between the different areas.

Simplistically speaking, the chemical industry turns raw materials into marketable products via industrial processes that require both physical assets and technological know-how (Fig. 1). In this regard, the chemical industry does not fundamentally differ from other producing industries.

Let us examine the different contributors to the value creation process.

For the chemical industry, oil and gas will probably remain the most important bottleneck among the raw materials in the next few decades. Of course there are other important raw materials as well, particularly for inorganic chemicals and for specific areas such as fluorochemicals or rare earths, but generally these are either more evenly distributed globally, or of lower importance to the industry, or both. In addition, there are attempts to replace petrochemical value chains by those based on bio sourced materials, but at current prices these are

probably not fully competitive yet.

Among the three regions examined, the Middle East clearly has the best position regarding the most important chemical raw materials. The abundance of oil and gas is the region's main competitive advantage as these resources by far exceed the resources of these and related raw materials (e.g., coal) in other regions. In contrast, China – though a big oil producer itself - strongly depends on import of petrochemical raw materials, and this is unlikely to change despite the strong political will to self-sufficiency and progress in coal chemical and bio based materials. The Western world is also generally a net importer of petrochemical raw materials, though the more recent developments in shale gas have reduced the dependency of at least Northern America on imports.

In terms of production capabilities, some distinction can be made between physical assets (i.e., existing chemical plants) and production knowledge (both on a high level such as technologies for license and on the level of the skills of typical chemical engineers). However, in both aspects Western companies currently have a clear lead as they have both a much deeper base of intellectual property and related knowledge and a broader and more highly developed portfolio of production assets. In contrast, the Middle East is comparatively weak regarding production capabilities and still primarily relying on Western expertise as the region historically lacks both experiences

with production in general and a long-established education system to provide a sufficient number of qualified scientists. China's expertise is already a bit more developed, but focused mostly on basic chemicals, particularly in the state-owned companies. In contrast, in high-value areas such as specialty chemicals, China still lacks the knowledge and assets to provide a broad and diversified portfolio despite strong political will to move towards this direction. Overall, the West is still the key knowledge carrier the rest of the world relies on, be it via imitation, licensing, hiring of expats etc.

As for customers and markets, the main development in the last decade has been China becoming the biggest chemicals market in the world. This is China's biggest asset, and it does obviously not only include those chemical products consumed by Chinese end customers but also those used for production of finished goods that are later exported from China. In contrast, the local chemicals markets of the Middle East are relatively irrelevant. Finally, the Western world is certainly an important market for chemicals, particularly for those targeting higher-end market segments. Table 1 summarizes the relative contribution of the three regions to the global chemical industry.

In the medium term, these contributions are likely to change somewhat (see table 2). China is likely to develop much stronger production capabilities both on the level of assets and the level of know-how, while the Chinese chemicals markets will also further increase in importance (despite the recent slowdown of the Chinese economy, growth is still much higher than in most other regions). The Middle East is massively

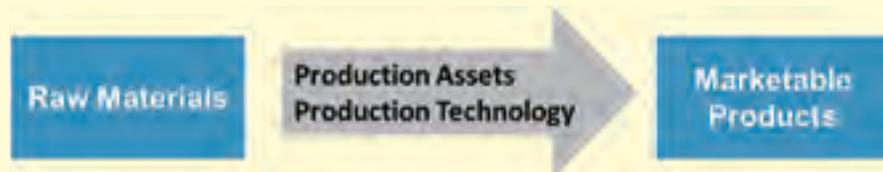


Fig. 1: Schematic Value Creation Process of the Chemical Industry

**Tab. 1: Current core contributions to chemical industry by region(+++ very high, o low)**

Region	Core Contributions to Chemical Industry			
	Raw materials	Production		Markets
		Technology	Assets	
China	+	+	++	+++
Middle East	+++	o	+	o
Western World	+	+++	+++	++

expanding its production assets, trying to move downstream in the chemicals value chain to capture a larger share of the overall value created in petrochemicals. However, in the near future this shift will be more on the level of assets (which can be established in a few years' time) than on the level of knowledge on all relevant levels (which will probably take decades or more). For the Western world, shale gas will lead to a divergence in development between the US on one side and Europe/Japan on the other side. Shale gas increases the raw materials supply in the US and will therefore also lead to higher investment in production assets while the larger scarcity of suitable raw materials in Europe and Japan will probably lead to a long-term loss in production assets there.

Consequences

As shown above, currently each of the three regions has a fairly specific contribution to the overall global chemical industry: raw materials (Middle East),

markets (China) and production technology (West). This opens the way for collaboration between the regions, the first of which have already happened, for example the three-way cooperation between Shell, PetroChina and Qatar Petroleum to build a refinery in Zhejiang.

In the long run, given the developments anticipated in table 2, there is also a distinct possibility for cooperation only between the Middle East and China. As both these regions (and particularly China) increasingly develop production technology and assets, the current role of the West as a contributor will be threatened. For the resulting two-way cooperation between the Middle East and China, the technology component will probably decide on who has the stronger position as the advantage in raw materials will always stay with the Middle East while China will always have better market access. The most likely outcome is a situation in which most of the upstream technology up to base chemicals lies with the Middle East and the downstream/specialty technology with

China. However, it is not clear whether this will be acceptable for the chemical SOEs whose current strength is more on basic chemicals technology.

In conclusion, both the Middle East and China need each other as their strengths in raw materials and market access complement each other. Cooperation may be facilitated due to the somewhat similar governance status of the key companies on both sides – both are heavily dominated by the respective governments. Conflicts may arise over where exactly to hand over the value creation process from the Middle East to China. This will be decided both by the alternatives both parties have (and thus their respective bargaining positions), and their technology level. Very high volume bulk chemicals will likely be more suited to production in the Middle East while highly specialized or customized, low volume, labor- and research intensive chemicals are more suited to production in China. Chemicals somewhere in between will be the most interesting to watch. ■

Tab. 2: Trends for core contributions to chemical industry by region (↑↑↑ very strong increase, → no change, ↓ decrease)

Region	Core Contributions to Chemical Industry			
	Raw materials	Production		Markets
		Technology	Assets	
China	→	↑↑	↑↑	↑
Middle East	→	↑	↑↑↑	→
Western World	→(EU) ↑(US)	→	↓(EU) ↑(US)	→