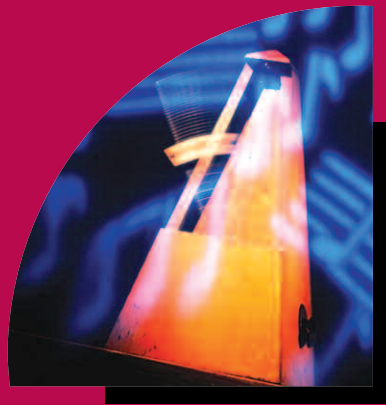


# IMPULS



## IMPLICATIONS OF CHINESE COMPETITOR STRATEGIES FOR GERMAN MACHINERY MANUFACTURERS



Stiftung für den Maschinenbau,  
den Anlagenbau und die Informationstechnik



# IMPLICATIONS OF CHINESE COMPETITOR STRATEGIES FOR GERMAN MACHINERY MANUFACTURERS

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# ZU DIESER STUDIE

Mit einem Umsatz von 678 Mrd. Euro war China schon 2012 der mit Abstand größte Maschinenproduzent der Welt. Auch für die nächsten Jahre ist weiteres Wachstum vorgezeichnet. Auf den Auslandsmärkten übernimmt China mit einem Anteil von inzwischen elf Prozent an den weltweiten Exporten eine zunehmend bedeutendere Rolle.

Derzeit unternimmt China mit staatlicher Unterstützung große Anstrengungen, um von Low-Tech in High-Tech-Bereiche aufzusteigen und damit in Segmente des deutschen Maschinenbaus vorzudringen. Das ist eine riesige Herausforderung für den deutschen Maschinenbau und Anlass, die Strategien des chinesischen Wettbewerbs intensiver zu analysieren.

Die IMPULS-Stiftung des VDMA hat deshalb EAC-Euro Asia Consulting PartG beauftragt, die Strategien chinesischer Wettbewerber in den Bereichen Forschung und Entwicklung, Produktion, Service, Kooperationen, Mergers & Acquisitions und Internationalisierung zu untersuchen. In 122 ausgewählten chinesischen Unternehmen aus den Bereichen Werkzeugmaschinen, Textilmaschinen, Thermoprozesstechnik, Kompressoren, Druckluft- und Vakuumtechnik, Pumpen, Holzbearbeitungsmaschinen, Gießereimaschinen sowie Hütten- und Walzwerkeinrichtungen wurden insgesamt 319 Interviews zu den strategischen Ausrichtungen geführt. Hinzu kamen 43 Experteninterviews mit Vertretern aus Wissenschaft und Administration.

Herausgekommen ist eine der detailliertesten Untersuchungen über die Strategien des chinesischen Wettbewerbs entlang der Wertschöpfungskette. In der vorliegenden Studie haben wir die Ergebnisse für die acht untersuchten Fachzweige des Maschinenbaus zusammengefasst. Wir bedanken uns bei den Autoren der Studie und den beteiligten Fachverbänden des VDMA, die uns mit einer Vielzahl von Informationen unterstützt haben.

Frankfurt, Februar 2014



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# I MANAGEMENT SUMMARY

## 1.1 STRATEGIEN IM ÜBERBLICK

Die acht ausgewählten Maschinenbau-Sektoren in China bieten mit einem Gesamtmarkt von 66,2 Mrd. Euro sowie einer Importgröße von 18,3 Mrd. Euro in 2011 ein signifikantes Wachstumspotential für den deutschen Maschinenbau. Die chinesische Regierung sowie Unternehmen zeigen ambitionierte Pläne, diesen Markt auf ein höheres Technologie-Niveau zu entwickeln und mit einheimischen Herstellern zu besetzen.

Chinas Maschinenbauindustrie war bis vor kurzem auf den Ausbau des Volumensektors fokussiert und vernachlässigte Investitionen in Schlüsseltechnologien. Im 12. Fünfjahresplan werden jedoch deutliche Signale gesetzt und versucht, durch politische Anreize die vorhandenen technologischen Lücken zu schließen.

Dabei intendiert die Regierung in Peking, das mittlere Markt-/Technologiesegment so zu stimulieren, dass sich lokale Mid-Tech-Hersteller in der Technologieentwicklung in High-Tech-Segmenten positionieren können. Durch zusätzliche Konsolidierungsvorgaben, mit z.T. drastischen Umsetzungsvorschriften, strebt die Regierung eine höhere Wettbewerbsfähigkeit und Marktmacht ausgewählter lokaler Unternehmen gegenüber ausländischen Konkurrenten an, um in Zukunft „National Champions“ zu entwickeln.

In einer Studie der IMPULS-Stiftung und EAC-Euro Asia Consulting zur Untersuchung der Wettbewerbsstrategien von 122 ausgewählten chinesischen Maschinenbauunternehmen in acht relevanten Fachzweigen des Maschinenbaus wurden die Pläne und Strategien der führenden Anbieter in den einzelnen Wertschöpfungs-/Funktionalbereichen analysiert.

Die Studie belegt eine Parallelstrategie der chinesischen Hersteller: Zum einen wird die unternehmensinterne Innovationskraft gestärkt, um Innovationen in Zukunft aus eigener Kraft hervorzubringen und zum oberen Marktsegment vorzustoßen. Zum anderen liegt der Fokus aufgrund des fehlenden technologischen Know-hows gegenüber ausländischen Herstellern gezielt auf „Good Enough“-Produkten. Derartige Maschinenkonstruktionen sind inländischen Kundenpräferenzen aus dem mittleren Marktsegment in Funktions-, Technologie- und Kostenanforderungen angepasst.

Mit Hilfe dieser „Good Enough“-Strategie konnten sich chinesische Hersteller erfolgreich im mittleren Marktsegment positionieren und hier auch gegenüber technologisch hochwertigeren Maschinen und Anlagen ausländischer Hersteller behaupten. Die Technologielücke im oberen Marktsegment ist für den Großteil der chinesischen Marktteilnehmer jedoch nach wie vor zu signifikant, um in naher Zukunft erfolgreich eine valide Marktposition zu erreichen.

An dieser Stelle greift die Regierung ein: Der 12. Fünfjahresplan zielt darauf ab, China zu einer technologisch führenden Volkswirtschaft zu entwickeln. Hierzu wurden von der Regierung sieben gezielt zu fördernde „Strategische Schlüsselindustrien“ (alternative Antriebstechnologien, alternative Energieträger, Biotechnologie, Energieeinsparung und Umweltschutz, High-end Produktions-/Fertigungsanlagen, Next Generation IT sowie neue Werkstoffe) definiert.



Die Schlüsselindustrie High-End Produktions-/ Fertigungsanlagen ist von besonderer Relevanz für die acht in dieser Studie untersuchten Fachzweige des Maschinenbaus (Gießereimaschinen, Holzbearbeitungsmaschinen, Hütten- und Walzwerkeinrichtungen, Kompressoren, Druckluft- und Vakuumtechnik, Pumpen und Systeme, Textilmaschinen, Thermoprozesstechnik sowie Werkzeugmaschinen und Fertigungssysteme), da in diesem Sektor zahlreiche relevante Maschinen- und Anlagensysteme aus der Nomenklatur des VDMA enthalten sind.

In einer „Querschnittsanalyse“ wurden die Studienergebnisse in Bezug auf die wesentlichen Wertschöpfungsstufen übergreifend für die acht Fachzweige verglichen. Dabei kristallisierten sich in den betrachteten funktionalen Kernbereichen entlang der Wertschöpfungskette folgende Strategien der chinesischen Wettbewerber heraus:

#### **Forschung und Entwicklung**

Die jährlich steigenden Forschungsausgaben der chinesischen Maschinenbau-Unternehmen in den acht untersuchten Fachzweigen beliefen sich im untersuchten Zeitraum 2011–2012 auf durchschnittlich vier Prozent des Jahresumsatzes (vgl. im Durchschnitt 5,4 Prozent bei Unternehmen im deutschen Maschinenbau in 2011).

Steigende Kundenbedürfnisse chinesischer Konsumenten nach dem Maßstab ausländischer Maschinen sowie der politisch geförderte Vorstoß in margenstärkere höhere Marktsegmente gelten als Haupttreiber für den technologischen Aufschwung und die Innovationsfähigkeit im chinesischen Maschinenbau. Fehlende Erfahrung des Fachpersonals, eine unterentwickelte Patentrechtslage sowie mangelnde Prozesskenntnisse im Forschungssystem sind die

Haupthindernisse für den Aufbau eigener, mit westlichen Maßstäben vergleichbarer F&E-Zentren bei chinesischen Maschinenherstellern.

Paradoxerweise wird das unterentwickelte Patentrecht, welches in der Vergangenheit den technologischen Aufschwung z.B. durch Technologie-Kopien ermöglicht hat, durch seine investitions-hemmende Wirkung zunehmend zu einem Hindernis für lokalen Forschungs- und Entwicklungsfortschritt in der chinesischen Maschinenbauindustrie.

Aufgrund regierungsseitiger Stimulierungen bei einer steigenden Lernkurve chinesischer Hersteller hat sich die „Lücke“ technologischer Wettbewerbsnachteile des chinesischen Maschinenbaus im Vergleich zu deutschen Anbietern verringert.

#### **Produktion**

Im Fertigungsbereich beklagen die chinesischen Maschinenbau-Unternehmen ihre größten Defizite im Bereich Qualitätskontrolle und Montage und begründen diese mit mangelndem Fachpersonal und fehlenden Prozesskenntnissen. Nach Eigeneinschätzung des chinesischen Wettbewerbs stellen mechanische Bearbeitungsprozesse keine wesentlichen Herausforderungen dar.

Die Bearbeitung des mittleren Marktsegments erfolgt meist über den Einbau von ausländischen Komponenten in eine Basismaschine, das untere Marktsegment wird mit vollständig lokal hergestellten Materialien und Komponenten bedient.

Die Produktionsstrategie ist deutlich im Verbund mit steigenden Lohnkosten sowie technologischen Defiziten (z.B. Toleranzen, Präzisionsgrade, etc.) zu sehen: Erreichung westlicher Produktionsstandards durch höhere Teil-/Vollautomatisierung, Beratung durch ausländische Produktions- und Prozessberatungen sowie Benchmarking ausländischer Maschinen-/Leistungsmerkmale sind die Haupt-Gegenmaßnahmen der Chinesen im Rahmen der Kosteninflationierung.

### Service

Der Funktionalbereich Service zeigt ein abweichendes Ergebnis insofern, als dass die chinesischen Wettbewerber sich gegenüber ausländischen Konkurrenten als wettbewerbsfähiger einschätzen. Dieses Resultat gilt ausnahmslos für sämtliche acht Fachzweige.

Hauptgrund für dieses Ergebnis: Die chinesischen Wettbewerber definieren ihre Serviceleistung ausschließlich über zwei Kriterien: Servicekosten und Reaktionszeit. Lokale Kunden verstehen Maschine und Service als Gesamtprodukt und sind nur bedingt bereit, ein Premium für Training, Ersatzteile und Reparaturen zu bezahlen.

Intelligente Servicekonzepte bieten somit ein zukünftiges, strategisch notwendiges Feld für den deutschen Maschinenbau zur Stärkung der Wettbewerbsfähigkeit in China. Auch die Versorgung mit kostenattraktiven, lokalisierten Ersatzteilen ist ein konkretes Handlungsfeld. Denn chinesische Unternehmen haben erkannt, dass nichtreparaturbedingte Serviceleistungen vor Ort der Kundenbeziehung nutzen und somit vertriebsunterstützend wirken.

### Kooperationen

Die vom Staat geförderten „Strategischen Allianzen“ zwischen Unternehmen und wissenschaftlichen Instituten werden aus Sicht der chinesischen Unternehmen nicht zur Entwicklung und Förderung von Innovationen durchgeführt, sondern dienen primär zur Generierung von Fördermitteln, Reputation und Personal. Innovationserfolge der Kooperationen sind nicht erkennbar, als Hauptgrund kritisieren die Chinesen eine fehlende Praxiserfahrung der Forschungsinstitute und Universitäten.

### Mergers & Acquisitions

Anorganische Wachstumsstrategien durch Akquisitionen im Ausland stehen insgesamt nicht prägend im Vordergrund der strategischen Agenda – im Durchschnitt bestätigt die Mehrheit (83 Prozent) der chinesischen Maschinenbau-Unternehmen keine aktuellen M&A-Pläne, lediglich elf Prozent haben bereits M&A-Transaktionen durchgeführt und sechs Prozent bestätigen aktuelle M&A-Projekte.

Aktiv sind vor allem die Unternehmen der Hütten- und Walzwerkeinrichtungen, Kompressoren, Druckluft- und Vakuumtechnik sowie Werkzeugmaschinen und Fertigungssysteme. Als Hauptmotive für die Übernahme westlicher Unternehmen gelten der Zugang zu F&E-Know-how und entwickelten Märkten sowie die Akquisition internationaler Marken.

Tendenziell erscheint die „Outbound M&A-Euphorie“ etwas gedämpft. Kulturelle und integrationstechnische Probleme nach den Transaktionen stellen chinesische Unternehmen mit M&A-Ambitionen zunehmend vor große Herausforderungen.

### Internationalisierung

Die Internationalisierungs-Strategien der chinesischen Wettbewerber sind hingegen offensichtlich: 52 Prozent planen einen gezielten Ausbau der Exportaktivitäten in den nächsten fünf Jahren. Zurzeit forciert die Maxime der Zentralregierung zur Förderung der Binnennachfrage die lokale Marktbearbeitung.

Die Studie identifiziert eine „Zwei Phasen Internationalisierungs-Strategie“: In der „ersten Welle“ stehen südostasiatische Exportmärkte und Indien im Fokus, ab 2015 sollen in einer „zweiten Welle“ auch europäische und amerikanische Länder mit Maschinentechologien aus dem mittleren Marktsegment penetriert werden.

### Fazit

Trotz technologischer Defizite liegt ein erklärtes Ziel der chinesischen Regierung sowie auch der Industrie darin, die Marktposition im heimischen Markt sowie in asiatischen als auch westlichen Märkten auszubauen.

Durch gezielte Förderprogramme, Know-how-Transfer und Eigenentwicklungen (z.B. Basismaschinen mit importierten Schlüsselkomponenten) wird diese Strategie insbesondere im mittleren Marktsegment umgesetzt. Im 12. Fünfjahresplan konkret als „Schlüsselindustrie“ manifestiert, gilt es mittelfristig als erklärtes Ziel, „High-End Produktionsausrüstungen“ zu entwickeln.

Für den deutschen Maschinenbau bedeuten die Studienergebnisse, dass trotz noch bestehender Technologie- und Qualitätsvorteile akuter Handlungsbedarf in der Überprüfung der einzelnen Wertschöpfungsstrategien im China-Konzept bestehen, wie z.B.:

- F&E: Lokalisierung von Forschungs- und Entwicklungsaktivitäten außerhalb der High-Tech-/Grundlagenforschung in China
- Einkauf/SCM: Kritische, permanente Reflektion bestehender Lokalisierungs- und Optimierungspotentiale zur Erreichung einer maximalen lokalen Beschaffungsquote
- Produktion: Fertigung von marktgerechten Maschinen-/Anlagekonzepten für das mittlere Marktsegment in China sowie Export in Emerging Markets
- Vertrieb: Signifikante Verstärkung der Vertriebssysteme insbesondere auch in den westlichen Tier II/III-Marktregionen – ggf. durch Akquisition von Distributoren
- Service: Kurzfristige Konzeption und Umsetzung von schlagkräftigen „Service Excellence“-Strategien und Aufbau lokaler Service-Plattformen z.B. mit anderen Maschinenbau-Unternehmen

Zusätzlich muss die fortschreitende Internationalisierung der chinesischen Anbieter in den strategisch wichtigen asiatischen Regionen sorgfältig und individuell analysiert werden und Gegenmaßnahmen zur Verteidigung der eigenen Marktposition (z.B. durch Akquisitionen) eingeleitet werden.

## 1.2 METHODIK

Forschungsumfang der Studie von IMPULS-Stiftung und EAC-Euro Asia Consulting waren die Auswirkungen der Strategien chinesischer Wettbewerber auf deutsche Maschinenbau-Unternehmen in den folgenden acht Fachzweigen:

- Gießereimaschinen
- Holzbearbeitungsmaschinen
- Hütten- und Walzwerkeinrichtungen
- Kompressoren, Druckluft- und Vakuumtechnik
- Pumpen und Systeme
- Textilmaschinen
- Thermoprozesstechnik
- Werkzeugmaschinen und Fertigungssysteme

Die Studienergebnisse basieren auf Primär- und Sekundärforschung. Um eine umfassende Einsicht in die Wettbewerbsstrategien der chinesischen Wettbewerber zu erreichen, wurden zwischen Oktober 2012 und Juli 2013 319 Primärgespräche in 122 Unternehmen sowie 53 Expertengespräche in China geführt.

Die Auswahl der Interviewpartner sowie der Zusammensetzung der Stichprobe aus Staatsunternehmen, privaten Unternehmen und „Hidden Champions“ erfolgte in enger Abstimmung mit den jeweiligen Fachzweigen. Die Auswertung der Primärgespräche erfolgte zum einen nach den „subjektiven“ Aussagen chinesischer Wettbewerber, zum anderen nach der „objektiven“ Wahrnehmung von EAC.

Die Sekundäranalyse wurde auf Basis von Industrierichtern, statistischen Erhebungen und internen Datenbanken durchgeführt.

Die folgenden strategischen Fragestellungen wurden in dieser Studie im Hinblick auf die Wettbewerbsfähigkeit chinesischer Marktteilnehmer in den acht ausgewählten Industrien untersucht:

- In welchen Marktsegmenten sind chinesische Maschinenbau-Unternehmen derzeit positioniert?
- Wie bewerten sie ihre eigene Markt- und Technologiesituation?
- Was sind ihre Strategien um zur deutschen Maschinenbauindustrie aufzuschließen?
- Was sind die Auswirkungen dieser Strategien für den deutschen Maschinenbau?

# 2 INTRODUCTION

## 2.1 STATUS QUO MACHINERY MANUFACTURING IN CHINA

China's machinery industry faces two major challenges to achieve its goal of restructuring and upgrading defined in the 12th Five-Year Plan: Continued dependence on foreign technology and lack of innovation capability.

The analysis shows that a significant market for imported high-end machines will remain in China for years to come, even though domestic manufacturers increasingly catch up with Western technology.

German machinery manufacturers need to carefully reflect on how to participate in China effectively in the context of a rapidly developing competitive landscape.

### Market Size

The combined market size of the eight investigated sectors amounts to 66.2 bln Euro in 2011 (Figure 2.1-1). In the past few years, production,

domestic consumption and export recorded similar developments, whereas imports showed less stable growth.

Being the smallest market among the eight selected sectors, the woodworking machinery market in China – exemplary for other sectors – grew by 22 percent annually over the last four years.

### Imports and Exports

The majority of imports for all selected sectors still originate from developed countries such as Germany, Japan, USA and Italy. For example, Germany is the key import partner for the Chinese Compressor and Vacuum Technology industry with a 37 percent share and a total value of 554 mio Euro in 2012.

In contrast, export regions are highly fragmented due to the opportunistic nature of Chinese machinery manufacturers' export strategies.

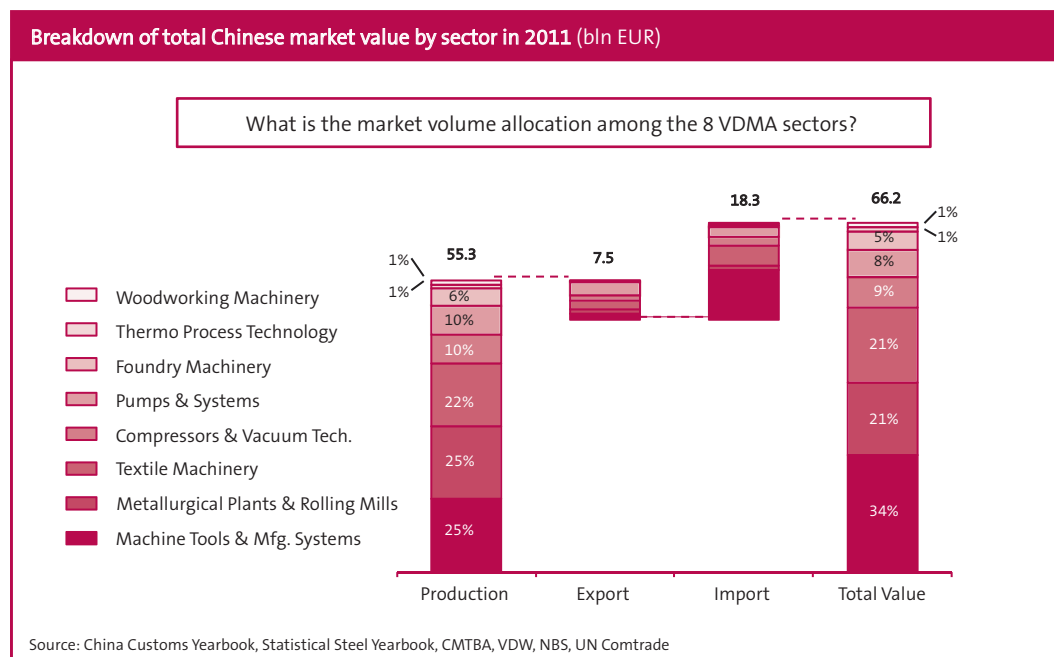


Figure 2.1-1

Source: EAC Research

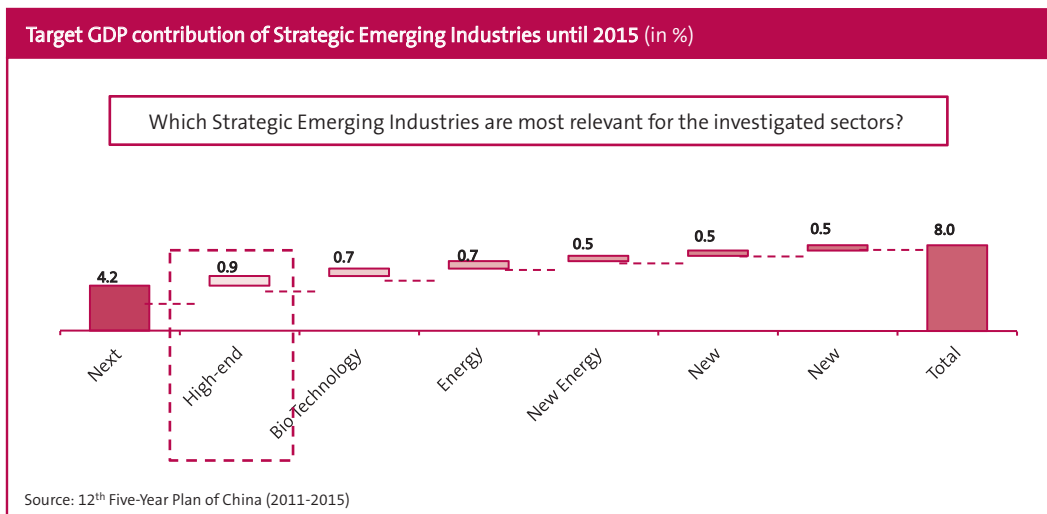


Figure 2.1.1-2

Source: 12th Five-Year Plan of China

### Political Impact

The 12th Five-Year Plan indicates a restructuring of the industrial system with a focus on high-end equipment and energy efficient production.

Key target of the Chinese government is to change the machinery market landscape towards high-end production. The envisioned industry restructuring contains a shutdown of small companies to consolidate the machinery market.

To accelerate the technological upgrade various subsidies are defined, e.g. tax incentives are given for component imports to further encourage the development of advanced machinery.

These preferential policies also cause problems: Local government implementation of industrial policies almost exclusively supports selected state-owned companies (SOEs) as well as major local employers in key industries with direct and indirect incentives.

This is a major cause for market inefficiencies in the machinery industry and for overcapacities especially in the Thermo Process Technology and Metallurgy sectors.

#### 2.1.1 Implications of the 12th Five-Year Plan

In March 2011 the National People's Congress ratified the 12th Five-Year Plan (2011–2015). It combines a clear growth agenda with progressive changes in the structure of the economy.

The 12th Five-Year Plan targets to encourage domestic demand, improve income distribution and the development of social services. It indicates a turning point from the country's previous emphasis on headline growth and defines selected key industries for further development.

### Strategic Emerging Industries

China's targeted shift to a high-tech industry does not turn its back on manufacturing. It does specify strategies to develop "Strategic Emerging Industries" (SEIs) with potential for major technological breakthroughs with long-term impacts on economic and social development.

The Plan lists seven selected SEIs:

- Bio technology
- Energy conservation
- High-end equipment manufacturing
- New energy
- New energy automobile
- Next generation IT
- New materials

According to the Plan, the added value by SEIs to GDP should amount to eight percent by the end of the Plan's period in 2015.

Figure 2.1.1-2 shows the planned allocation by SEI: Several SEIs affect the eight selected machinery sectors of this study, especially high-end equipment manufacturing as the second largest position with 0.9 percent of GDP.

### Research and Development

Historically, the R&D share of GDP rose from 1.3 percent in 2005 to 2 percent in 2010. By 2012 it was already 2.3 percent and the Chinese government predicts to spend 2.5 percent of GDP by 2015. In comparison, Germany invested 2.5 percent of GDP in 2003 and increased it to 3 percent in 2012.

The defined scope for R&D closely follows the market trends:

- Energy saving
- Green manufacturing
- High speed processing
- Intelligent technology
- Network manufacturing

### State-owned Enterprises

The Chinese government targets to transform SOEs into leading private corporations. The roots of this development go back to the 1993 enterprise reform policy, which allowed inefficiently run SOEs to become private entities with mixed ownership. This reform has already led to a rapid decline in the number of SOEs.

In sectors of special strategic importance, SOEs are still playing a significant role: They are protected from competition, enjoy special privileges such as monopolies over scarce resources and are a vehicle for the government to invest into the economy.

### Impact on Chinese Companies

The majority of study participants perceive the 12th Five-Year Plan as a general guideline for strategic orientation and technological direction. Many interviewed companies have already participated in national projects related to the Plan and it is common practice to align the corporate strategy with the Plan. However, major motivation to crosscheck the Plan with R&D activities is to benefit from governmental support and R&D subsidies.

### Global impact

The 12th Five-Year Plan has a clear focus to enhance the competitiveness of Chinese companies towards foreign enterprises. For the woodworking machinery players for example, the Chinese government offers a cash incentive of 20 percent of the total acquisition price when purchasing a foreign high-tech company.

#### 2.1.2 Current Machinery Market Drivers

The main growth drivers for the machinery industry in China are several megatrends including political support and further globalization of trade.

#### Megatrends

Fundamental drivers for the growth of the selected machinery sectors in China are urbanization, rising income levels, and increasing domestic demand.

The foundry industry, for example, is driven by automobile industry and its weight reduction trends. Wood processing is driven by construction, refurbishment and real estate market growth.

#### Governmental Factors

The Chinese government still maintains control over important industries through its ownership of a core group of SOEs, despite the continuing liberalization of many industries. Government investment is focused on key industries such as steel, oil and gas as well as agriculture and machinery.

Several leading Chinese enterprises in the eight sectors of this study are SOEs with certain privileges compared to private companies. However, the impact of governmental funding is quite low since SOEs generally lack process and management efficiency.

### Trade Factors

The recent “Economic Cooperation Framework Agreement” (ECFA) caused an export boom for Taiwanese machinery manufacturers to China. The ECFA is a preferential trade agreement between China and Taiwan that aims at reducing tariffs and commercial barriers between the two countries.

All products in the “Early harvest list” enjoy zero tariffs for export to Mainland China since January 2013. This is an important policy for Taiwanese players, which sell 27 percent of the total machinery exports to the Mainland.

Furthermore, free trade agreements with ASEAN states are considered to optimize trade volumes in these important strategic export markets. Reflecting import tariff policies, textile machinery component import policy shows that the government enhanced flexibility and speed in protecting the domestic market: Component tariffs can be adjusted in a period of three months according to degree of technology of domestic component suppliers.

## 2.2 PERFORMANCE LEVEL OF CHINESE MACHINERY MANUFACTURERS

Chinese manufacturers increasingly focus on their technology offerings to take market share from foreign competitors by further expanding in the midend market and entering the high-end market.

### Perceived Performance Differences

Figure 2.2-3 shows the perceived performance differences of Chinese manufacturers to their German peers across all eight machinery sectors.

The largest variances are found in precision/accuracy, productivity and lifetime. Chinese manufacturers see their lack of process know-how, missing local availability of key components and the talent shortage as reasons for their limited performance.

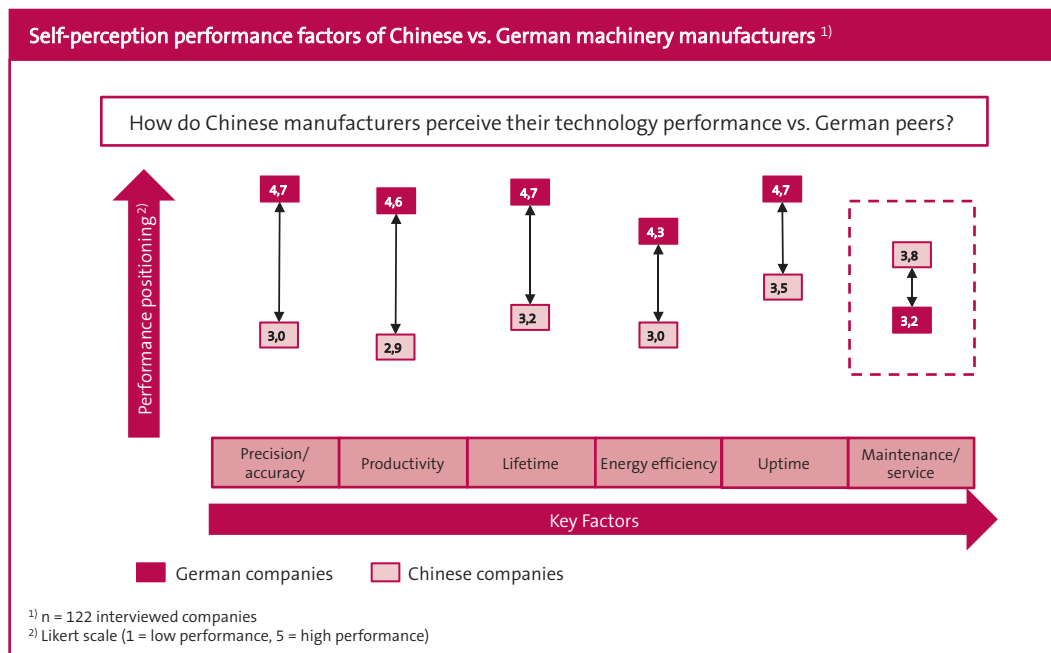


Figure 2.2-3

Source: EAC Primary Research



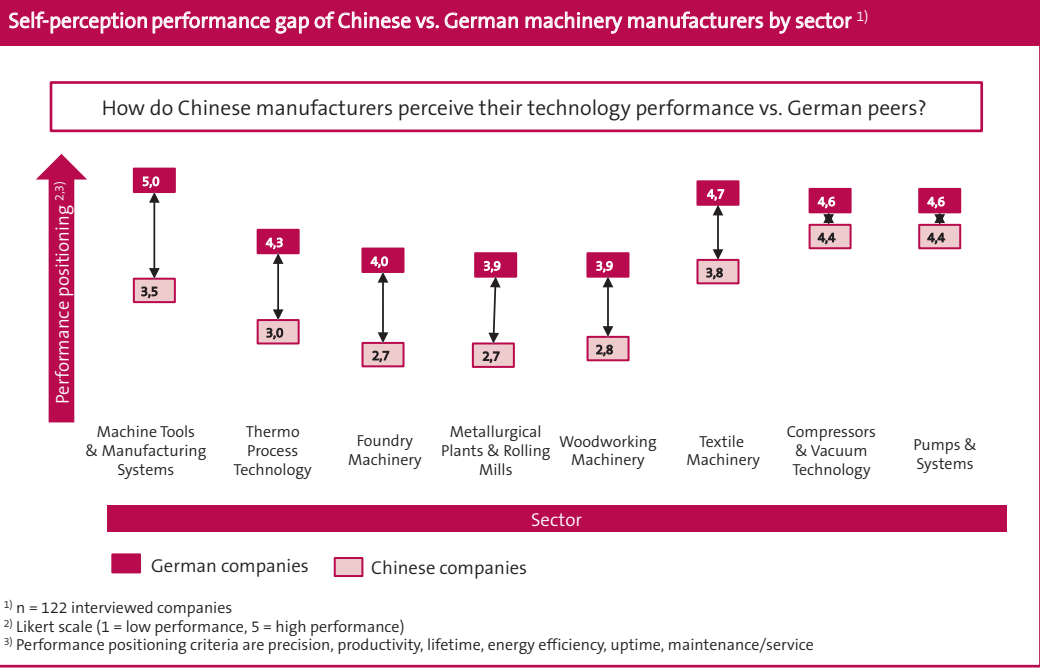


Figure 2.2-4

Source: EAC Primary Research

Major advantage of Chinese machinery manufacturers is their self-perceived better performance in maintenance and service: Chinese customers expect high maintenance and service performance for machinery providers, which is still insufficiently delivered by German peers. Chinese competitors define their competitive advantages in services mainly in terms of “costs” and “speed”.

**Product Customization**

So far customization has been an established method for Chinese manufacturers to address different customer requirements: To reach low-end customers, offered machines contain only locally made components, which are sold at up to three times lower end-user prices than foreign machines.

Mid-end/ high-end machines frequently contain critical parts produced by foreign manufacturers, which consequently increase performance and price.

Paradoxically, this strategy is quite similar to the foreign practice of “Reverse Engineering”; however, instead of artificially downgrading the products, Chinese peers artificially improve their basic machines using foreign technology.

**Perceived Positioning by Sector**

In Figure 2.2-4, Chinese manufacturers evaluated their positioning in comparison to German competitors in terms of precision, productivity, lifetime, energy efficiency, uptime and maintenance/service.

In the Machine Tools, Thermo Process, Foundry, Metallurgical, Woodworking and Textile sectors, Chinese competitors perceive large performance gaps whereas in Compressor and Pumps sectors they see only small gaps when compared to German machinery manufacturers.

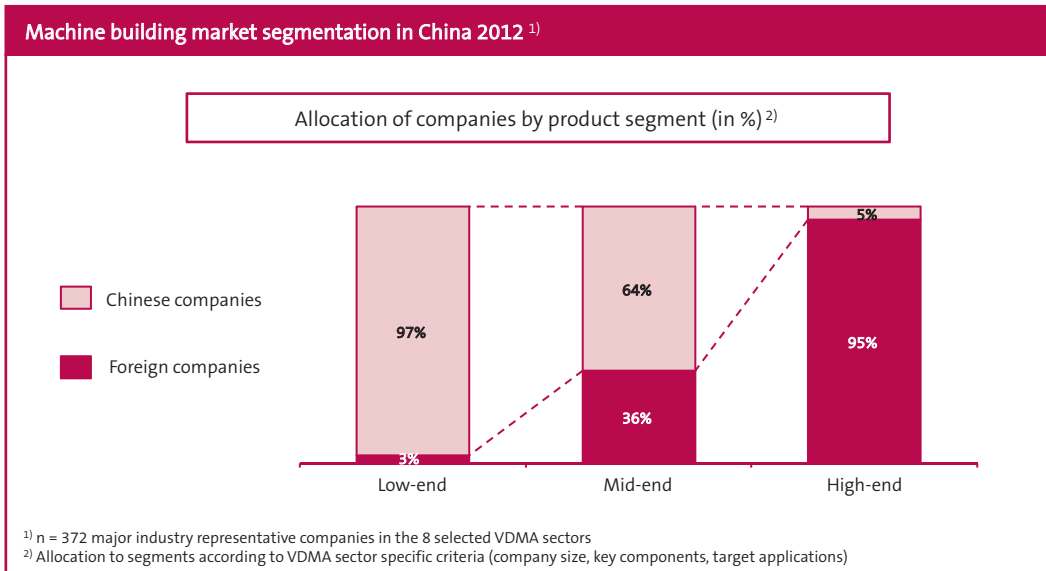


Figure 2.2.1-5

Source: EAC Analysis

### Targets and Ambitions

The interviewed Chinese enterprises target to catch up with their German peers through implementation of business process management models and increase of innovation capacity.

Chinese companies which are looking to enter the mid-/high-end markets increasingly invest in own R&D activities. Upcoming areas for innovation such as energy efficiency, emission reduction and productivity are closely aligned with the 12th Five-Year Plan and supported by Chinese government funding.

### 2.2.1 Performance Positioning and Target Markets

The government intends to make China a global leader in various strategic sectors, to develop “National Champions” and to reach target market shares for its domestic players.

#### Market Segmentation

International technology leaders are dominating the premium segments in the analysed industries. Figure 2.2.1-5 shows the market segmentation of the eight selected industries.

Chinese peers have a strong foothold in the mid-end segment despite weaker performance in terms of precision, reliability and efficiency. These product differences are neglected by Chinese customers due to price advantage and service offerings of Chinese machinery companies.

Chinese machinery companies face challenges in terms of quality, stability, life-time and technology.

At the operational level, Chinese machinery manufacturers are in need for improvements in:

- Control system and process standardization
- Efficiency and process management
- Production processes for key components
- Mechatronic system and software design

42 percent of Chinese executives participating in the study are highly ambitious to upgrade their current positioning to the next level, while only 24 percent of the companies plan to remain at their current market position (see Figure 2.2.1-6).

### Main Strategy

Chinese technological progress has so far followed the mantra of “learning, absorbing and upgrading”. With a considerable gap to German technology for most sectors, Chinese manufacturers focus on a “good enough” strategy in line with Chinese mid-end customer requirements. An executive of foundry machinery manufacturer Yong Hong explained the company’s strategy in the words: “Good quality machines offered at half price of leading foreign manufacturers”.



Figure 2.2.1-6

Source: EAC Primary Research

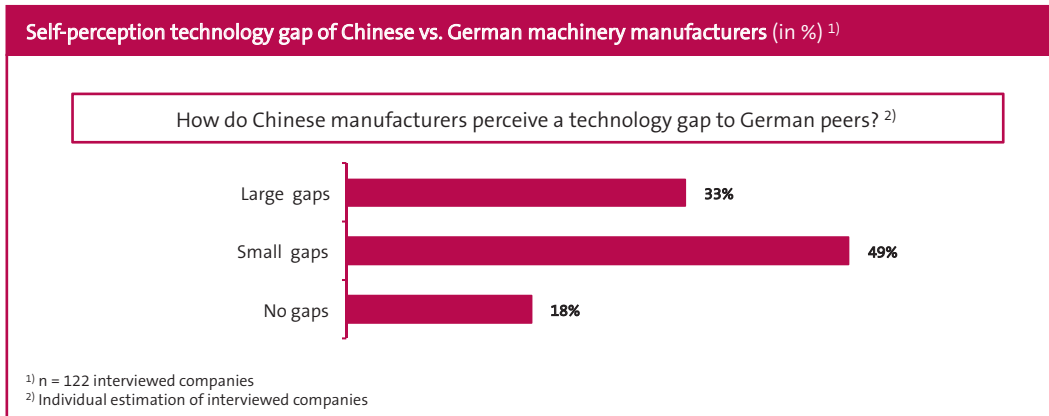


Figure 2.2.2-7

Source: EAC Primary Research

### 2.2.2 Performance Perception and Gap Analysis

Chinese study participants recognize that high-end users do not accept their machines due to quality and stability issues (e.g. it is difficult for Chinesebuilt machines to support three shifts per day).

Chinese machinery manufacturers are also struggling to maintain local machining centers accurate and reliable enough to manufacture critical parts. Due to a focus on volume growth rather than technological upgrade in recent years, executives complain about a missing attitude towards incremental improvement of precision standards within the companies.

### Comparison

Chinese manufacturers see major differences to German machines in their higher developed technology level and their superior performance in precision, accuracy, stability, uptime and life-time. Figure 2.2.2-7 shows that nearly all investigated companies (82 percent) perceive at least a small technological gap to their German peers.

One third of the interviewees quoted that their companies face a significant technology gap, whereas almost half evaluated the gap as narrowing with regards to their latest technology improvements.

# 3 STRATEGIES OF CHINESE MACHINERY MANUFACTURERS

In most sectors, Chinese mid-/high-end machinery manufacturers still rely on imports of critical machinery parts. Driven by the governments' domestic growth strategy, leading Chinese players increasingly show independent innovation efforts to further enhance internal capabilities.

## Competitiveness Assessment

Figure 3-8 illustrates the positioning of the eight selected machinery sectors by their relevance in the 12th Five-Year Plan and their competitiveness. Whereas almost all industries have high potential for future development, Machine Tool and Metallurgical sectors are of highest relevance according to the Plan. All investigated sectors are highly fragmented, but each sector already has two to three strong leading local companies potentially capable to compete with German players on a global base in the medium term.

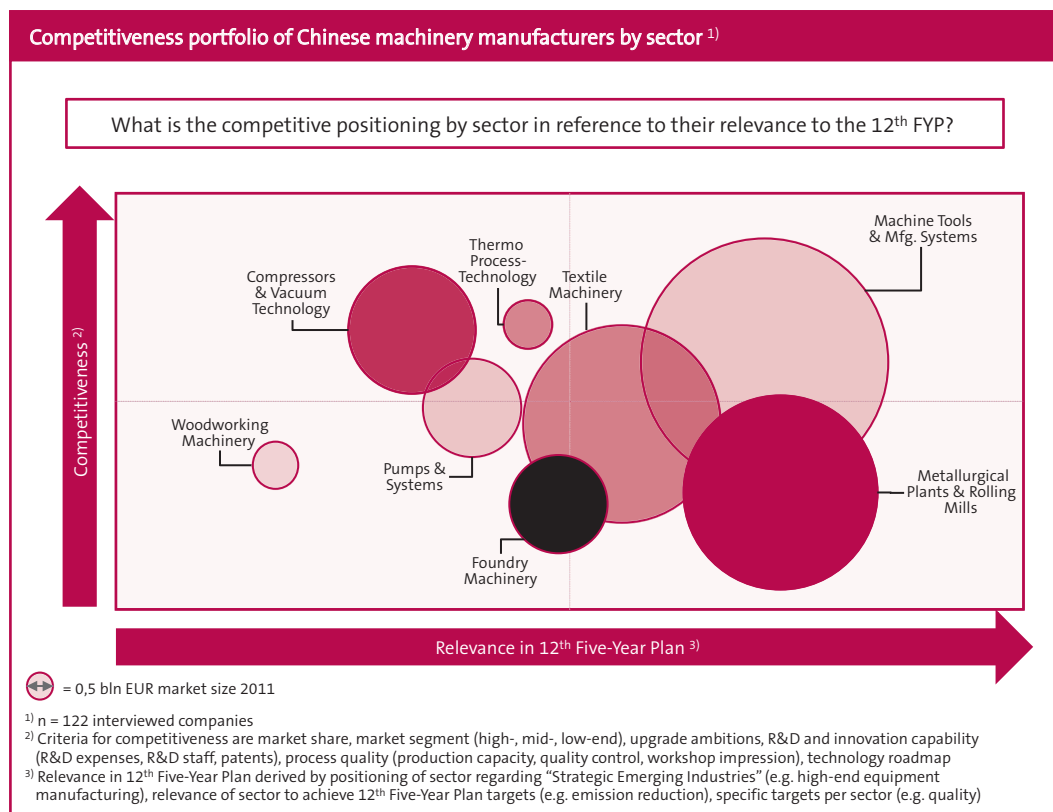


Figure 3-8

Source: EAC Research

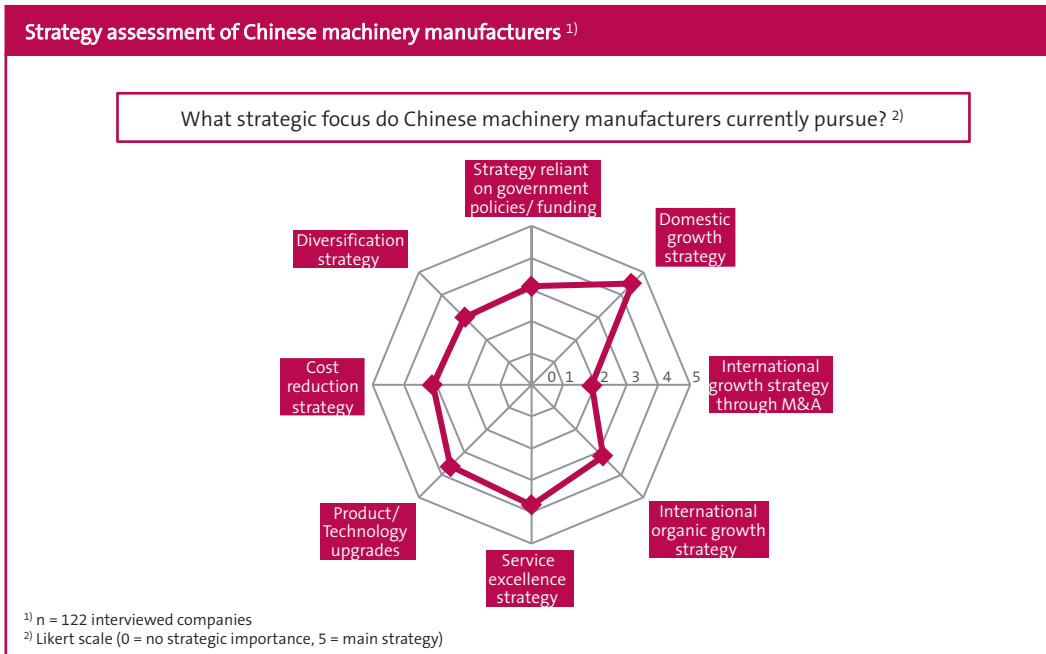


Figure 3.1-9

Source: EAC Primary Research

### 3.1 KEY SUCCESS FACTORS OF CHINESE COMPETITORS

Chinese machinery manufacturers achieved their current position in the midend market through incorporating foreign components and technologies as well as government-driven innovation efforts.

Figure 3.1-9 shows the current strategic focus of Chinese peers: Domestic growth is the core target of most companies, internationalization is mainly a topic among already well positioned players, whereby organic growth is the preferred way.

There are limited strategic efforts directed at high-end customers; a “Good Enough” product strategy for the domestic mid-market segment provides sufficient opportunities to grow in a familiar market environment not only in the key market China but also in export markets.

The following subchapters focus on strategies for six areas along the value chain:

- Research and Development
- Production
- Service
- Cooperations
- Mergers and Acquisitions
- Internationalization

### 3.2 RESEARCH AND DEVELOPMENT

In 2011, Chinese machinery manufacturers in the eight selected industries spent on average 4 percent of their total revenue on innovation (German machinery manufacturers on average 5,4 percent) and employed on average 8 percent of their total workforce in R&D (German machinery manufacturers on average - 12 percent).

Figure 3.2-10 shows the variations in R&D spending among the sectors: Foundry has the highest invest in percentage of revenue yet the lowest number of R&D personnel. Machine Tools, Textile together with Compressors have the highest ratio of R&D spending by workforce, whereas R&D in the the Thermo Process sector receives the least spending.

R&D efforts of Chinese machinery manufacturers by sector in 2011 <sup>1)</sup>		
	R&D investment of revenue (in %)	R&D staff of total work force (in %)
Foundry Machinery	6%	3%
Machine Tools & Mfg. Systems	5%	15%
Textile Machinery	5%	10%
Compressors & Vacuum Tech.	5%	10%
Pumps & Systems	4%	8%
Metallurgical Plants & Rolling Mills	3%	8%
Woodworking Machinery	3%	8%
Thermo Process Technology	3%	6%
Total average 8 sectors	4%	8%

<sup>1)</sup> n = 122 interviewed companies  
(Foundry Machinery n = 15, Machine Tool & Mfg. Systems n = 12, Textile Machinery n = 15, Compressors & Vacuum Tech. n = 15, Pumps & Systems n = 16, Metallurgical Plants & Rolling Mills n = 15, Woodworking Machinery n = 19, Thermo Process Technology n = 15)

Figure 3.2-10

Source: EAC Primary Research

#### Self-Perception

Chinese peers perceive themselves as comparatively weak on capability for technical innovations, yet ranked the ability to execute new technological breakthroughs as most critical for their company's success. Interviewees also stated limited competence in IPR protection, however a growing focus on patenting activities.

#### IPR Problem

For a growing number of Chinese machinery companies domestic IPRs are seen as a way to secure own R&D. This development is triggered by an increasing understanding of patent protection through global cooperation and competition.

However, the legal basis for protecting IPRs in China is still underdeveloped and many companies complain that a lawsuit for infringing IPRs is difficult due to high cost, long court proceedings and limited reference cases.

#### Innovation Drivers

R&D efforts of Chinese machinery companies are driven by an increasing quality of export goods, the need to overcome competition in the mid-end market and to achieve market shares in the high-end segment.

The main innovation lever for Chinese R&D efforts is the government which channels subsidies mainly through state-owned enterprises as part of its innovation strategy. The government directly links subsidies and the "high-tech company" status to the number of filed patents.

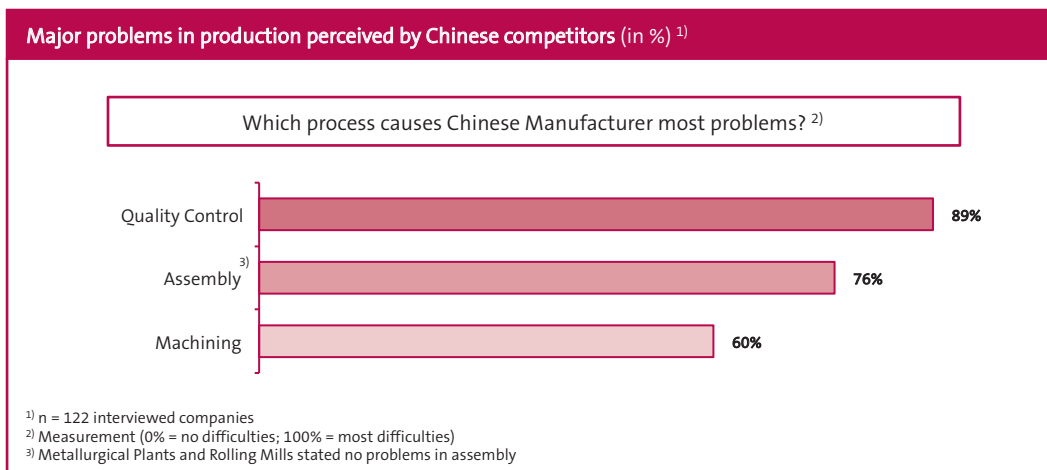


Figure 3.3-11

Source: EAC Primary Research

### R&D Bottlenecks

Availability of skilled R&D staff, underdeveloped IPR protection and high costs are the key obstacles to R&D among Chinese peers. Highly experienced staff is perceived as the key concern in the future. To counteract the shortage of skilled engineers and researchers in the short-term, Chinese machinery companies turn to the following recruiting measures:

- Recruiting experts from abroad
- Recruiting foreign educated local experts
- Recruiting experts from foreign competitors

For the long-term, a large number of interviewed Chinese peers plan to employ more university graduates and train them in-house.

### Governmental Support

The 12th Five-Year Plan aims to support domestic innovation and to reduce the dependency on foreign technology. Many Chinese companies use the governmental incentives for cooperation with institutes and universities as pretence to receive monetary incentives. The actual innovation power generated through these cooperations is therefore limited.

### R&D Cooperations

Chinese enterprises are also gaining technical know-how from close cooperation with foreign partners in addition to establishing independent R&D centers in selected sectors (e.g. woodworking player Jiecheng Baihe runs three parallel technology cooperations with German companies Pallmann Maschinenfabrik and Binos as well as a JV with Imal-Pal in Italy).

## 3.3 PRODUCTION

The performance gap between German and Chinese machinery manufacturers in the field of production is shrinking considerably due to a steep learning curve of Chinese companies and the use of high-quality machinery.

### Critical Steps

Figure 3.3-11 shows that within the production process, quality control (QC) presents the interviewed Chinese machinery manufacturers with the greatest difficulties. Main reason is the persistent perception of QC as a required non value-add side process to the actual Chinese production organization.

Assembly is another critical production step: Due to the lack of experienced mechanics, Chinese players are not able to implement a sustainable assembly process. Problems with machining are perceived as less problematic by survey participants.

### Production Process

In an effort to catch up with Western product technology, lean production concepts increasingly receive attention. Together with the gradual adoption of business process management, the target of Chinese manufacturers is to achieve tangible quality improvements and to enhance the process control in each process step.



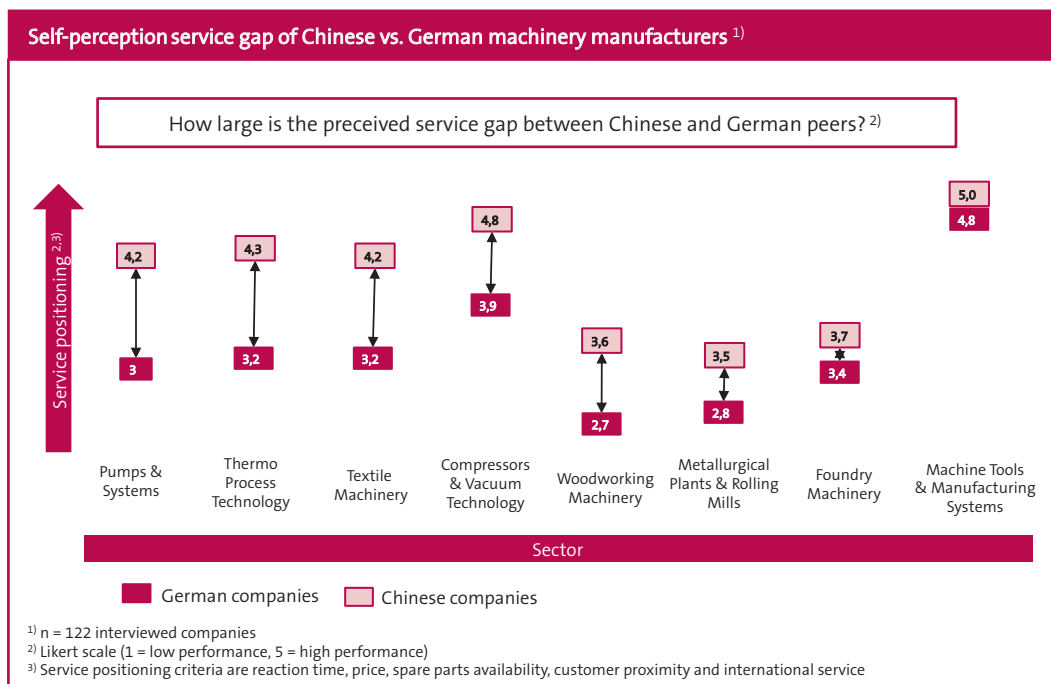


Figure 3.4-12

Source: EAC Primary Research

To avoid increasing labour costs, several interviewed Chinese machinery companies consider to outsource non-critical processes and to upgrade to automatic assembling machinery in the near future. Chinese players are also increasingly consulting foreign experts to guarantee the professional implementation of new production processes.

### 3.4 SERVICE

In the Chinese machinery market, service is the single most important differentiator for Chinese players. Across all eight analysed sectors, German players are perceived by Chinese peers to considerably lag behind in service aspects.

#### Local Services

Chinese machinery manufacturers place customer service in the center of their strategy in an attempt to gain market advantages and follow-up business from increased customer contact.

Chinese machines are generally considered to have lower quality but to come with better customer service support compared to imported machines. The survey shows that Chinese players compensate the lack of high-end technology by focus on local customer service, which requires a solid understanding of customer preferences.

Instead of a high-margin aftersales service product, Chinese peers perceive service as added value for the customer and a differentiation to foreign players.

#### Service Performance by Sector

Figure 3.4-12 shows that interviewed local players state customer service as their main distinguishing competitive advantage to foreign manufacturers – one of the key takeaways of this study.

Gaps between the customer service performance of German and Chinese players are perceived differently depending on the industry: According to the interviewed Chinese companies, German players have a significant customer service disadvantage in the sectors Pumps, Thermo Process, Textile, Compressors and Woodworking.

In the sectors Metallurgical and Foundry the Chinese service advantage is perceived to be less apparent, in the Machine tool sector the service gap is very small.

### Service Reaction Time

The interviewees defined fast reaction time and cost-aggressive service fees as central elements of the Chinese service advantage.

Figure 3.4-13 shows that 48 percent of the local manufacturers stated a guaranteed on-site service within 48 hours after the initial service call; 38 percent even within a period of 24 hours. All companies stated that service personnel would be on-site within 72 hours.

This degree of service reliability is rooted in a highly developed structure of local service centers and a regional network of service hubs. Through their local presence, Chinese machinery manufacturers create customer proximity, while foreign companies lag behind in response times and costs for repair parts.

Some of the interviewed Chinese companies even offer 24/7 service, free installation, on-site training for up to two years, free of charge repairs plus spare parts including delivery.

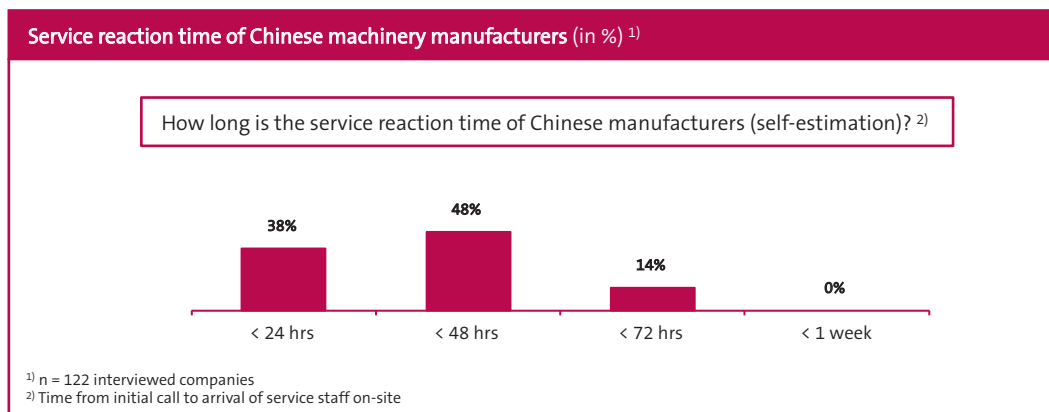


Figure 3.4-13

Source: EAC Primary Research

### International Service

International service set-ups are up to now quite unusual among Chinese players, due to distance, language barriers and labour costs.

Selected Chinese players have slightly adapted their service strategy as they start to expand in other South East Asian markets such as Indonesia and Vietnam.

In more industrialized markets higher labour costs force Chinese competitors to handle their international service through distributors or trading companies, since distributors lack specific machinery know-how this is the cause for insufficient service quality. Only selected international key customers are handled by Chinese companies directly.

### Conclusion

Service is perceived as one of the strongest strategic levers for Chinese machine manufacturers to compete with foreign quality leaders. Foreign manufacturers seem to neglect that Chinese peers are successfully compensating their lack in quality with the build-up of enduring service relationships.

## 3.5 COOPERATIONS

Over one third of the interviewed companies are running constant projects with scientific institutions. Major motive of Chinese machinery manufacturers to enter cooperations with universities or other scientific institutions are financial incentives by the government, which targets to stimulate companies to engage in

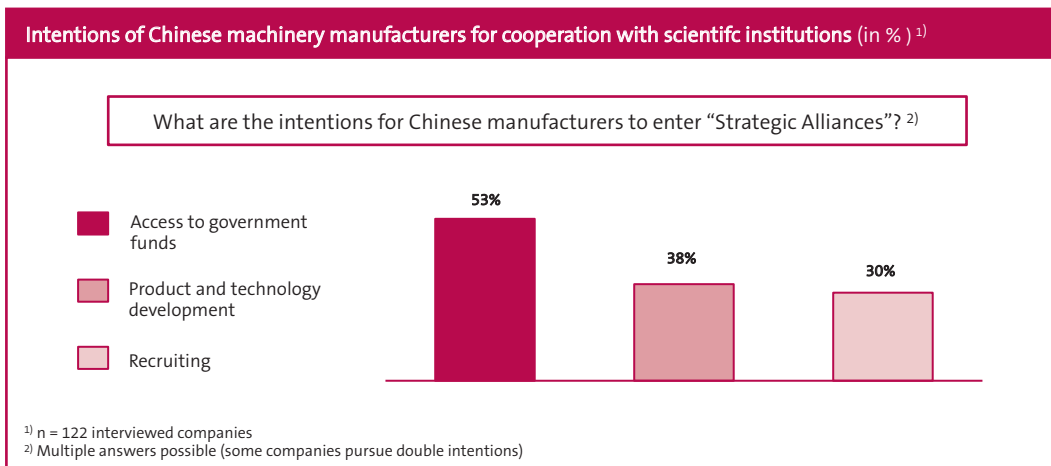


Figure 3.5-14

Source: EAC Primary Research

independent research rather than to rely on know-how transfer by foreign companies. The interviewees perceive the innovation power of these cooperations as very limited – major reason stated: Lack of practical experience of universities and scientific institutions.

#### Major Challenges

The main problem reported by Chinese machinery manufacturers is inefficiency of the scientific institutes. Chinese companies generally do not expect great outcomes from such cooperations, most remain on paper due to missing responsibilities about the results.

Figure 3.5-14 shows the intention of Chinese companies for cooperating with scientific institutions: More than half of the participants regard these cooperations as a channel to governmental funding; only 38 percent use them for the actual R&D reason.

### 3.6 MERGERS AND ACQUISITIONS

The rise of Chinese companies is expected to trigger an upcoming Merger and Acquisition (M&A) cycle in the medium-term. German enterprises are an attractive target for Chinese investments due to their highly skilled and experienced work force, highly developed technologies and well established brands.

#### Experience

Figure 3.6-15 shows the tendency towards M&A activities throughout the relevant sectors: Except for Thermo Process Technology, all sectors were already active in acquisitions. Metallurgical and Compressor players are most open to M&A activities, highest number of transactions were completed in the Machine Tools sector.

#### Motivation

According to the study, almost all participants have similar motivations for cross-border acquisitions:

- Gain technology and R&D capabilities
- Acquire qualified and experienced staff
- Use established brands to improve global reputation
- Widen product portfolio
- Enter new markets

Only a limited number of interviewed Chinese machinery manufacturers see potential acquisitions as an efficient way to support their expansion strategy. Reason for this is the perception that cross-border deals often do not lead to the expected success due to cultural differences and difficulties in integrating corporate cultures.

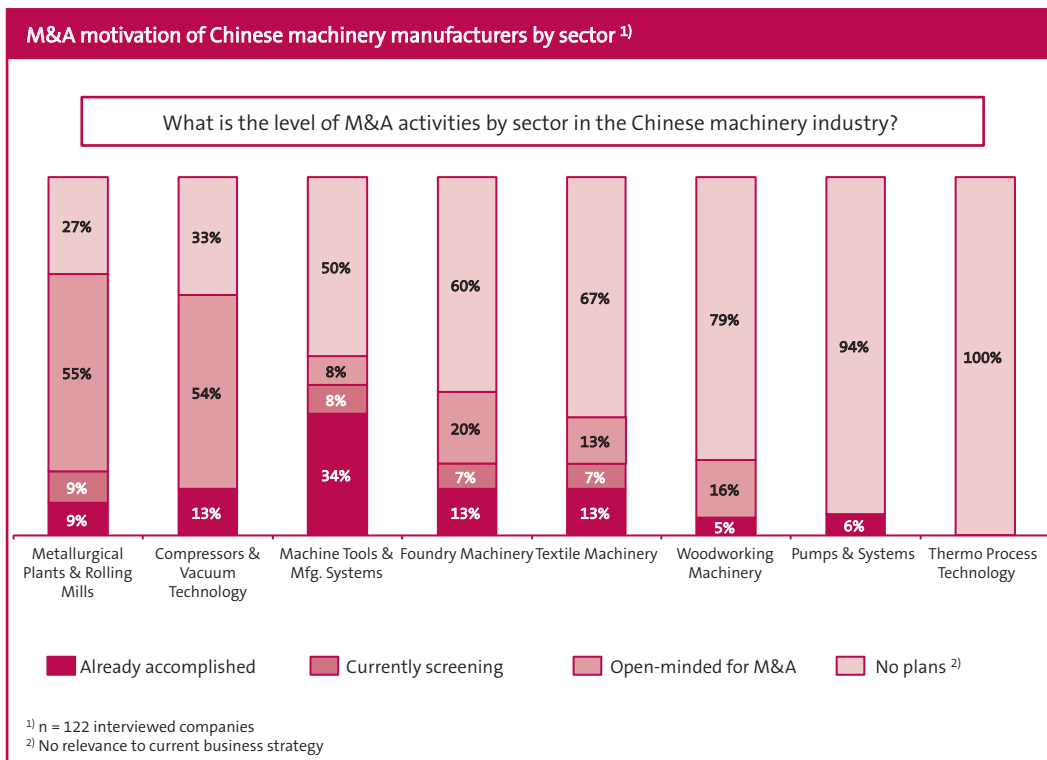


Figure 3.6-15

Source: EAC Primary Research

### 3.7 INTERNATIONALIZATION

As Chinese machinery manufacturers gain a foothold in the domestic mid-end market, they continuously increase their exports of “good enough” machines mainly to emerging markets.

The interviewed Chinese machinery manufacturers suffer from a reputation of inferior products, despite their progress in quality and price competitiveness. A major bottleneck is the access to qualified international personnel that prevents the implementation of international customer service.

#### Expansion Plans

The majority of Chinese machinery manufacturers follows a cautious approach and exports opportunistically: Figure 3.7-16 shows that only 33 percent are currently exporting systematically.

In the next five years, Chinese peers plan to ramp up their export strategy: More than half plan to export more actively, the remaining plan to continue a passive export approach.

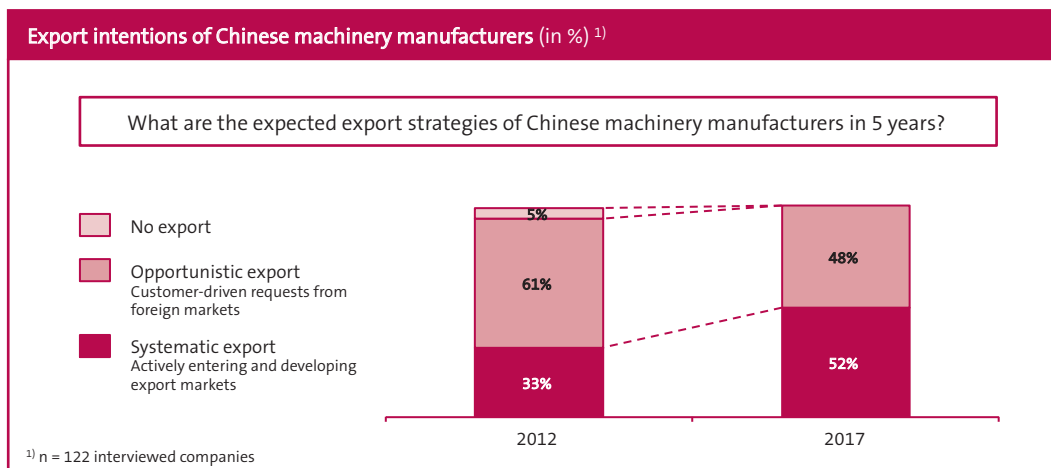


Figure 3.7-16

Source: EAC Primary Research

### Target Markets

The interviewed companies follow a “Two Wave Strategy” (Figure 3.7-17): Until 2015, the investigated Chinese peers are targeting Southeast Asian (SEA) countries (Thailand, Indonesia, Vietnam, Malaysia) and India, mainly due to geographical proximity, market similarities and acceptance of Chinese machinery manufacturers. Besides the SEA countries the first wave includes South America, Africa and Russia.

First wave countries are an ideal fit for Chinese low-/ mid-end machinery, since they are quite similar in terms of price sensitivity and quality requirements. After 2015, Chinese manufacturers aim for developed economies in Europe and the US with mid-/ high-end products in a second wave.

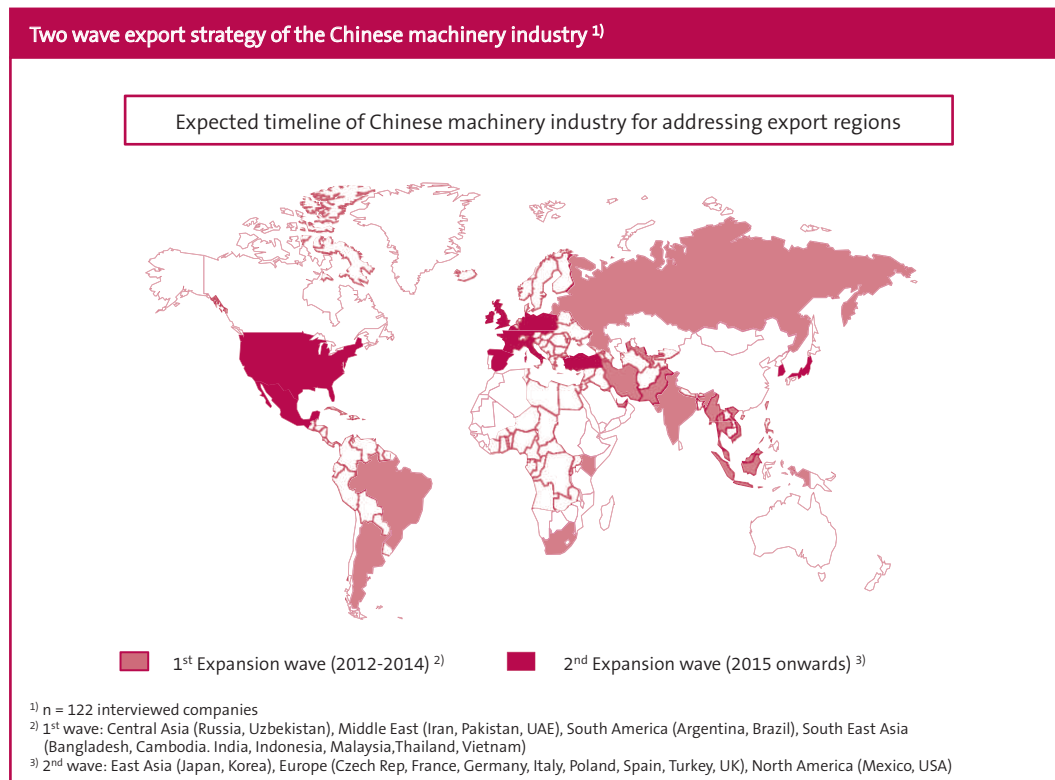


Figure 3.7-17

Source: EAC Primary Research

# 4 IMPLICATIONS FOR GERMAN MACHINERY MANUFACTURERS

With a market volume of 66.2 bln Euro (investigated eight machinery sectors), China remains the strategically most important market for the German machinery industry.

The largest growth potential lies in the mid-end market segment, where Chinese manufactures grow fast despite their backward technology and successfully compete with their foreign counterparts. The reason is a client-centred strategy to offer a “Good Enough” machine and corresponding services at competitive prices.

With these mid-range machine types, the Chinese machinery manufacturers also intend to penetrate export markets – at first, South East Asia and India are targeted, past 2015 Europe and USA.

To defend leadership in the high-end segment and to successfully enter the attractive mid-end segment in China, the German machinery industry is required to develop machine types which fit to local customers’ technical requirements and price expectations through incremental localization of R&D activities.

Critical analysis of cost optimization potentials in existing China facilities of German manufacturers but also of procurement activities is a mandatory task to be undertaken in frequent sequences.

Sales and distribution strategies for exploring western Chinese markets in Tier II/III provinces are of equal importance and can be accelerated by acquisition of qualified dealership networks. In parallel to this, existing technology advantages and excellent brand reputations need to be promoted.

Intelligent service concepts including fast reaction times as well as cost-effective maintenance and spare parts are critical factors in the mid-market. Customer proximity can be created through installation of local service hubs e.g. with other German machinery manufacturers, local partners or dedicated service providers.

# LIST OF ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations	SEI	Strategic Emerging Industry
bln	Billion	SOE	State owned Enterprises
CMTBA	China Machine Tool and Tool Builders Association	Rep.	Republic
e.g.	exempli gratia = for example	R&D	Research and Development
EAC	Euro Asia Consulting	Tech.	Technology
ECFA	Economic Cooperation Framework Agreement	OEM	Original Equipment Manufacturer
EUR	Euro	UAE	United Arab Emirates
F&E	Forschung und Entwicklung	VDW	Verband Deutscher Werkzeugmaschinenfabriken
GDP	Gross Domestic Product	VDMA	Verband Deutscher Maschinen- und Anlagenbau e.V.
IPR	Intellectual Property Right	z.T.	zum Teil
IT	Information Technology		
JV	Joint Venture		
Mfg.	Manufacturing		
mio	Million		
M&A	Mergers and Acquisition		
NBS	National Bureau of Statistics of China		
QC	Quality Control		
SEA	Southeast Asia		

# IN DER SCHRIFTENREIHE DER IMPULS-STIFTUNG SIND BISHER ERSCHIENEN:

- Innovationswege im Maschinenbau.  
Ergebnisse einer Befragung mittelständischer Unternehmen (2001)
- Internationaler Renditevergleich im Maschinenbau.  
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- The emergence of China as an international competitor  
to German Machinery Manufacturers – Textile Machinery (2004)
- The emergence of China as an international competitor  
to German Machinery Manufacturers – Plastic & Rubber Machinery (2004)
- The emergence of China as an international competitor  
to German Machinery Manufacturers – Woodworking Machinery (2005)
- The emergence of China as an international competitor  
to German Machinery Manufacturers – Foundry Machinery (2005)
- The emergence of China as an international competitor  
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