Production Systems 2020

Global challenges and winning strategies for the mechanical engineering industry

Roland Berger
Strategy Consultants

Short version, January 2011

Executive Summary (1/2)

- Having been **hit severely by the global recession** in 2009, the mechanical engineering industry is expected to **fully recover until 2012 on a global level**
- For individual industry segments and regions, the **recovery's timeframe will be different** (e.g., Germany: 2008 levels will be reached not before 2013)
- Over the next decade, there will be a **continued but also structural shift** of machinery demand and production from developed countries to emerging countries, mainly into China
- Increase of demand for high-quality consumer goods in China and development of industrial production structures drive a **strong upgrade process for newly installed machinery** towards "mid-end" quality and performance
- This opens up new export opportunities worldwide for Chinese OEMs, with **focus on easily-accessible markets** in South-East Asia, Middle East, and Africa in the first step

Source: Roland Berger

Executive Summary (2/2)

- Key challenge for **Chinese OEMs** is to **master the technological upgrade process** for their products (in terms of know-how generation and financing)
- **Western European OEMs** will continue dominating their home markets (at least until 2020), but have to **improve their cost position** for participating in emerging markets' growth
- **Energy efficiency** and other "green" concepts are getting **more important in developed countries**, but are remaining a marketing issue for many applications in the near future

Source: Roland Berger

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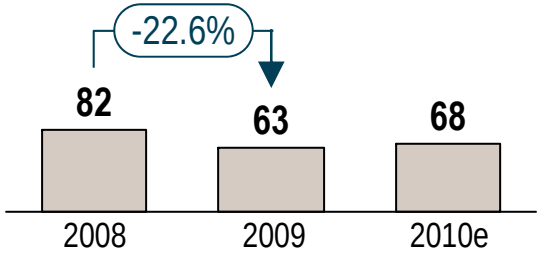
Very different impact of recession on major machine building countries around the globe

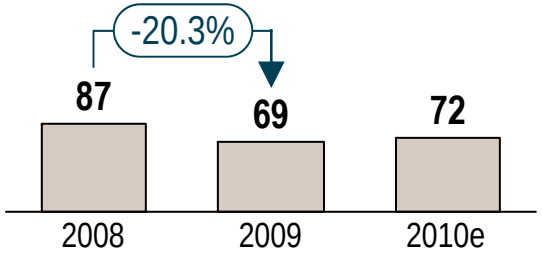
Status quo of key countries in machine building[1] [EUR bn]

Germany



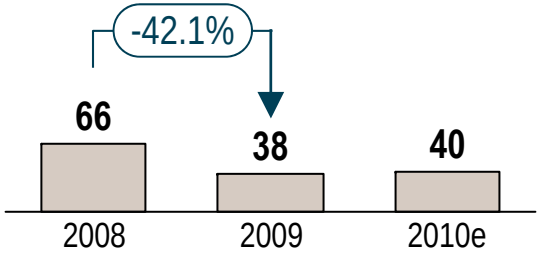
German machine building industry hit hard but now recovering

USA



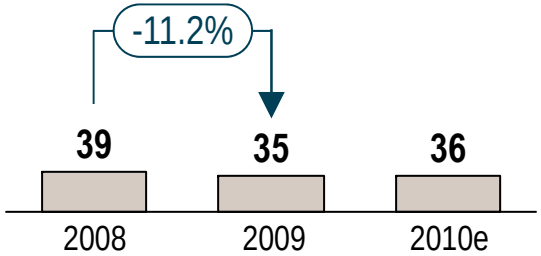
US experienced the worst recession in 6 decades but is picking up

Japan



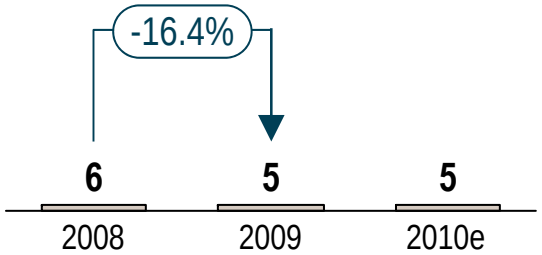
Japanese machinery industry was hit the hardest by the crisis, slight recovery period

Italy



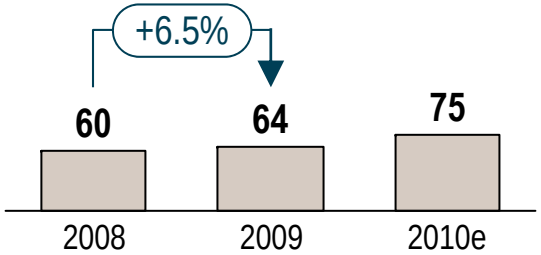
Italian producers are back on a slow- growth track

Brazil



Although a smaller market, Brazilian production growing again +8% per year

China



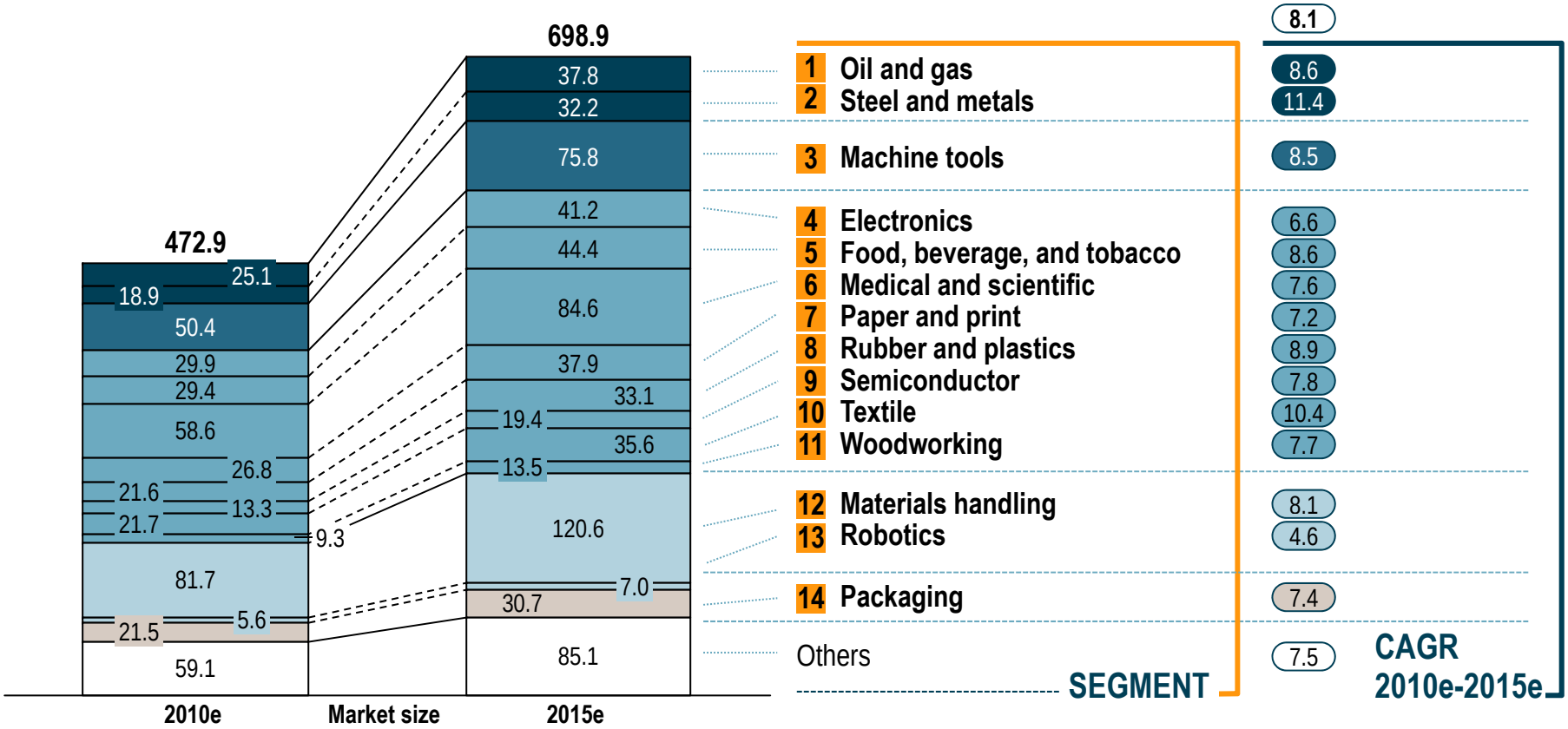
Chinese market barely affected by the economic crisis, currently very dynamic

1) Stationary machinery w/o commercial HVAC; production volumes

Source: IMS; VDMA; Roland Berger

Mid-term growth in the mechanical engineering industry is expected at a yearly average of 8% until 2015

Machine building market forecast per segment[1] 2010e-2015e [EUR bn]



1) Stationary machinery w/o commercial HVAC; production volumes

Source: IMS; VDMA; Roland Berger

Three global mega trends are dominating the future development of the mechanical engineering industry

Key industry trends

1 Shift to Asia

> China is becoming #1 machine building country worldwide

> Performance and quality requirements are getting closer to European levels

2 Game change in the mid-end

> Mid-end performance segment is growing the fastest, becoming a full global battlefield

> Competition in this segment is highly cost-driven

3 Go Green

> Increasing importance of energy efficiency in Europe and Japan

> Substantial energy savings can be achieved at selected applications, while just a marketing issue in other fields

Source: Roland Berger

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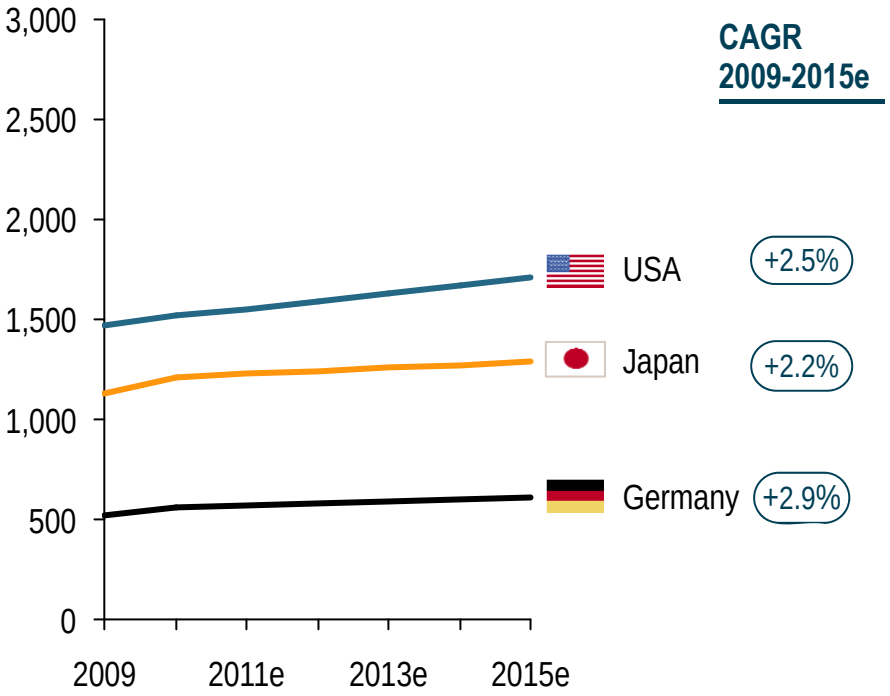
Strategy Consultants

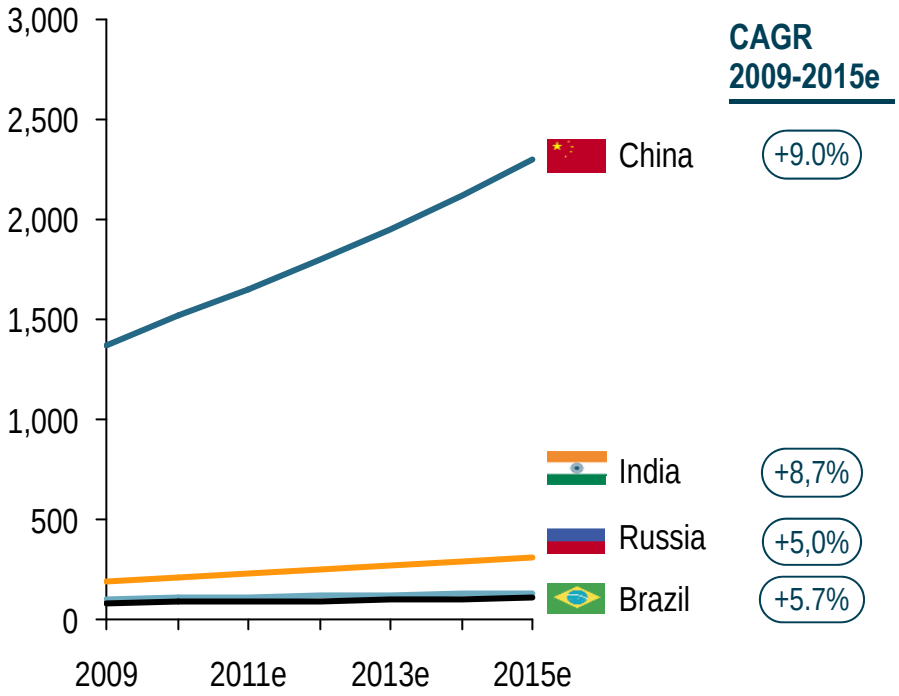
Especially China shows impressive ongoing growth in production volumes and is expected to pass USA in the next few years

Size of local production industry 2009-2015e[1)] [EUR bn]

Established nations



BRIC countries



1) Including mining, quarrying, manufacturing, construction and utilities; in constant prices and exchange rates 2009

Source: Economist Intelligence Unit (EIU)

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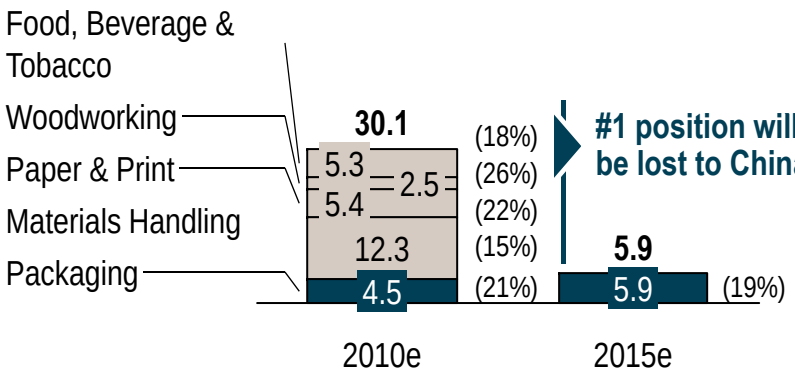
Germany will be loosing its market-leading position to China in most segments of the machine building industry

Domestic volume[1] of machine segments with # 1 position and world market share [%]

Germany [EUR bn]

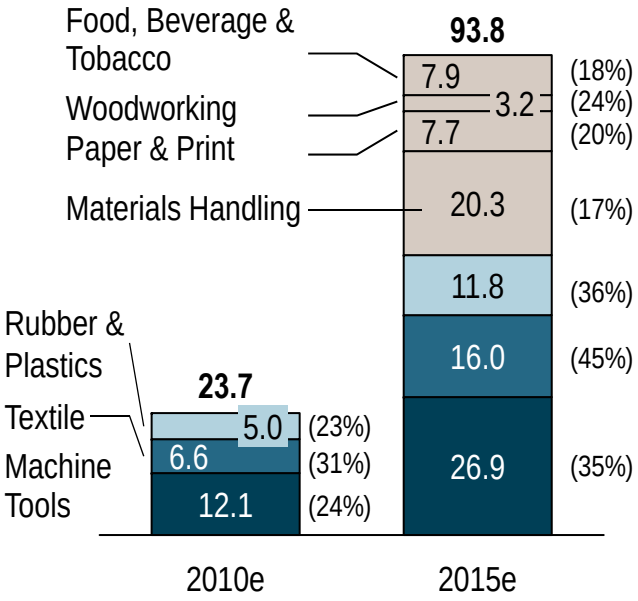
Number of segments with # 1 position[2]

5 → 1



China [EUR bn]

3 → 7



1) Production volumes

2) Out of a total of 14 stationary machinery segments

Source: Roland Berger; IMS; VDMA

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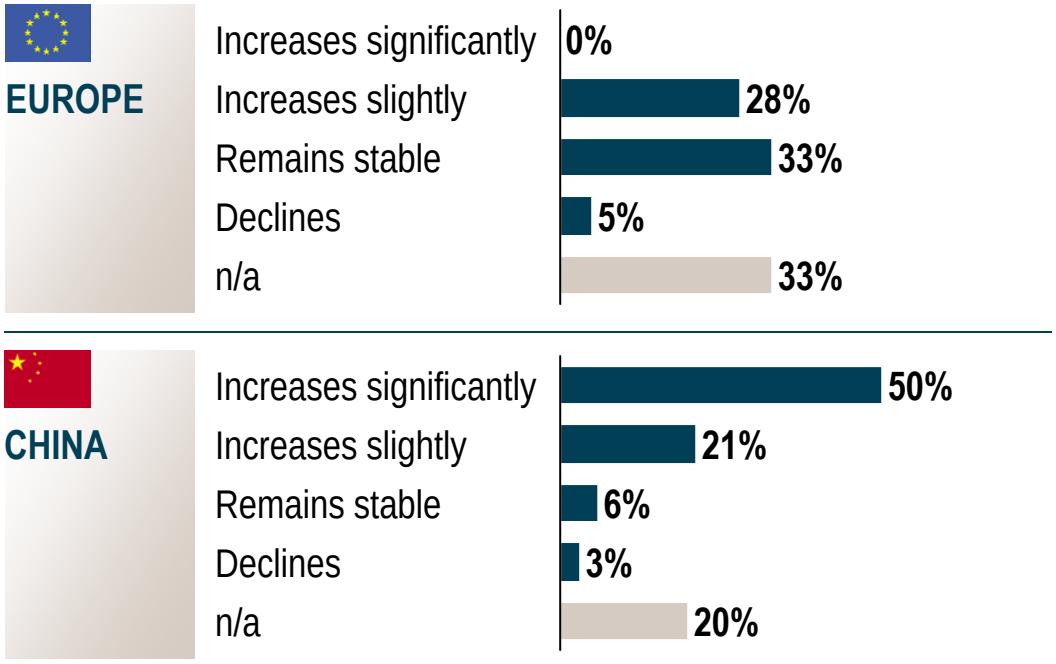
While European operators plan to maintain their technological levels, Chinese operators are planning to increase them significantly

Development of technological level of production equipment

"How will the technological level of newly installed machines develop until 2020? [% of respondents per region]



N = 43

COMMENTS

- High technological levels reached
- Target is to satisfy growing requirements in the mid-end segment

- Clear target is to increase performance, quality, and technological level
- However limited willingness to spend significant budgets for that

Source: Roland Berger expert panel

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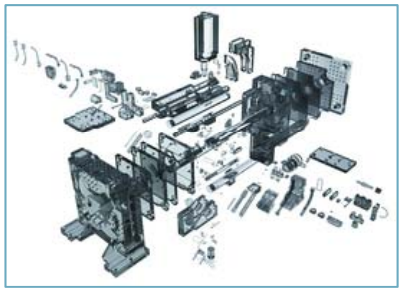
Strategy Consultants

OEMs in both regions are driven by customer groups with changing but approximating requirements

Challenges for OEMs[1)]

EUROPE



- **Continue strong innovation**, to keep technological advantage towards emerging countries
- **Provide suitable products** for **emerging markets** (e.g. simplified design, less features)
- **Shape and realize growth globally**, carefully develop global footprint
- Provide service globally, **set up local service hubs** in emerging markets

CHINA

- Strongly **generate know-how,** to deliver required level of performance
- **Improve quality / reliability** of products to satisfy increasing needs of operators
- **Manage competitiveness** while cost of labor are strongly rising
- Develop **sales and service footprint** in export markets

1) Machine building companies

Source: Roland Berger expert panel

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Established and emerging OEMs will meet in the mid-end, with high quality but no-frills machines for standard tasks

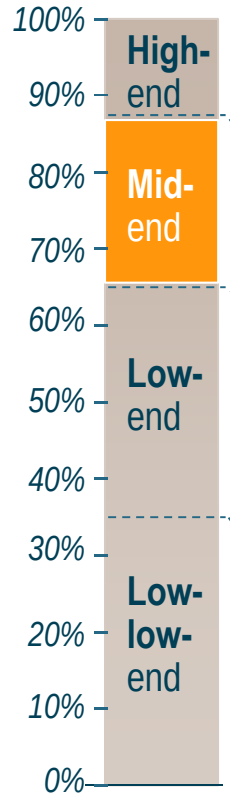
Technology and performance levels[1)]

Established OEMs

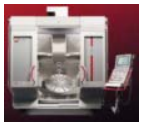
"From high-end to mid-end"

Emerging OEMs

"From low-end to mid-end"



High-end



- Lots of features for **complex tasks** with multiple process steps
- **24/7 availability**, long lifetime, full precision/safety, max output
- High flexibility, automation, and process stability
- **Tailor-made single machines or lines**

Mid-end

- Basic features for **standard tasks**
- **24/7 availability**, long lifetime, full precision/safety, high output
- Reduced flexibility, process stability, lower level of automation
- **Standard** or slightly customized **single machines** or lines

Low-end

- Minimal features for **simple tasks**
- **Availability <<24/7**, limited lifetime, precision, output & safety
- Limited flexibility and process stability, minimal automation
- **Standard single machines**

Low-low-end

- Minimal features for **simplest tasks at low precision**
- **Availability << 24/7**, reduced safety features & lifetime
- **No automation**, minimal flexibility
- Standard single machines

1) 100% = innovative highest performance available on today's market, 1% = manual lowest-cost lowest-performance

Source: Roland Berger expert panel; Company information

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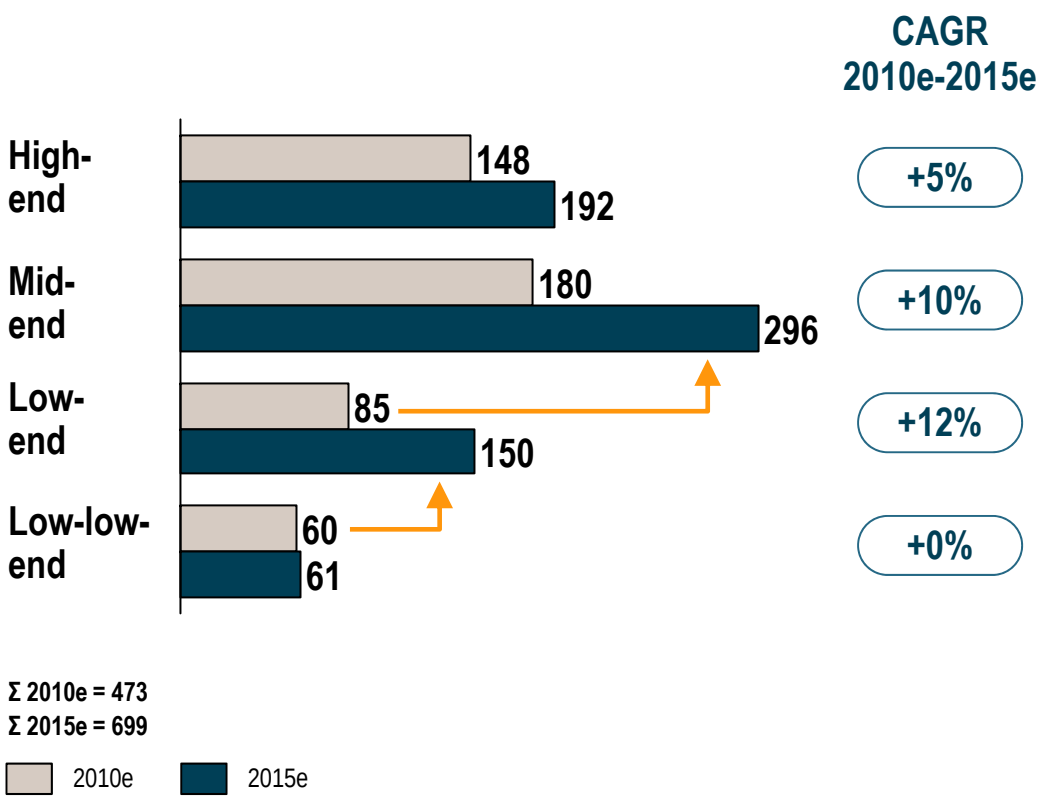
Mid-end technological segment will leave all other segments considerably behind, high-end expected to continue growing moderately

Structural shift of world market volume[1)] [EUR bn]



1) Stationary machines for discrete manufacturing; w/o commercial HVAC; production volumes

COMMENTS

- High-end technologies slightly below average
- Especially mid-end and low-end growing above world market growth
  - Mainly driven by emerging markets
  - But increasing volumes expected for developed countries as well
- Low-low-end drying up in the long term

Source: Roland Berger research; Roland Berger expert panel

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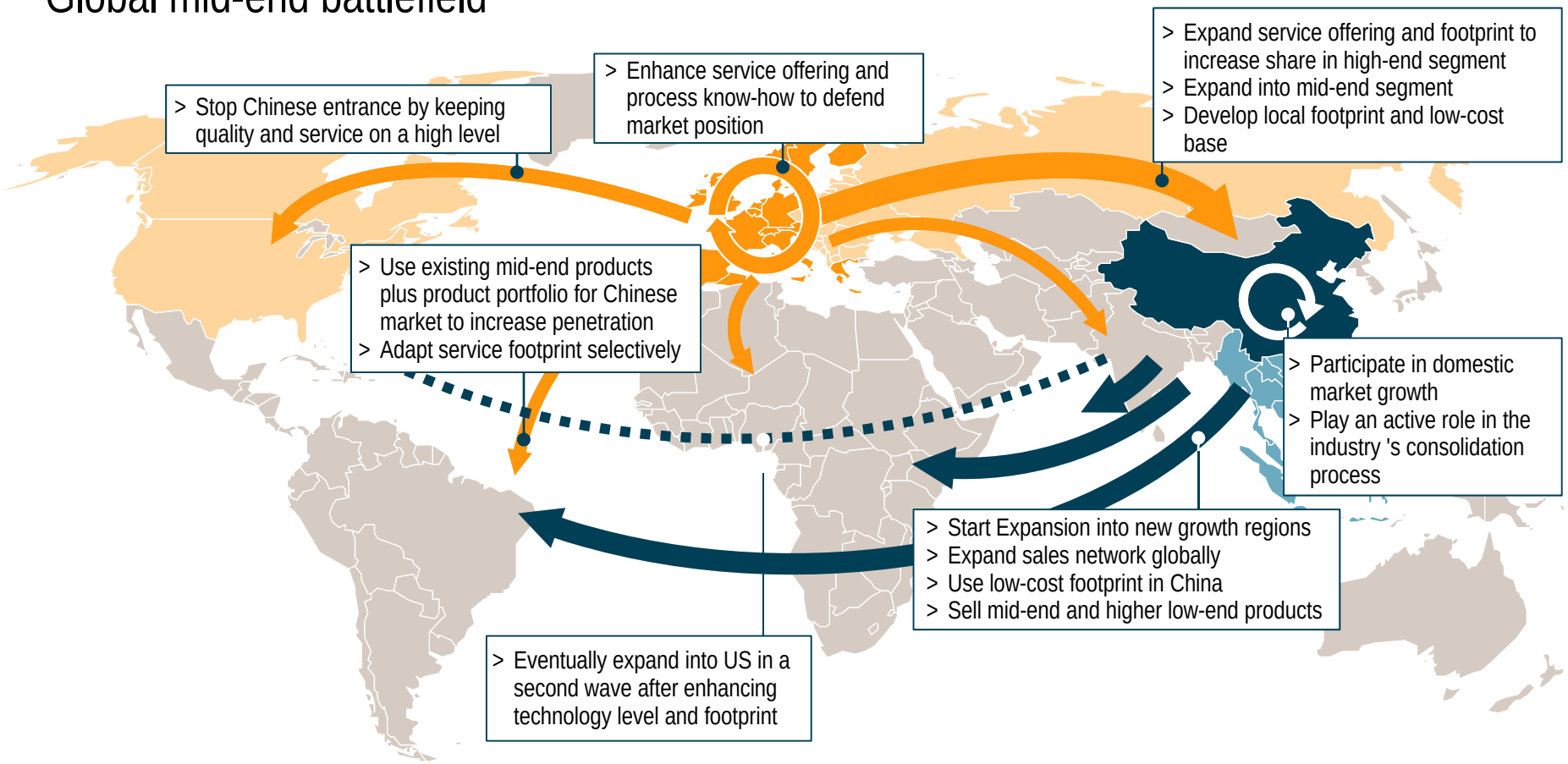
Strong competition between European and Chinese OEMs in most of the accessible growth regions expected

Global mid-end battlefield



Source: Roland Berger

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Three main drivers for the mechanical engineering industry to increase energy efficiency

Go Green – Motivations for energy efficiency

Cost savings

> Energy-efficient processes can **save** a significant amount of **operational expenses**
> This is a **global driver depending** on the **application industry** – Applications with high energy consumptions require efficiency

Regu-lations

> Regulations define requirements for **power efficiency**
> **Especially Europe** (mainly due to notification of Kyoto Protocol) has strict regulations on that, China has not implemented strict standards yet
> This driver is valid for **all application** industries

"Green" image

> Some companies use the topic of energy efficiency to **market** their brand towards their **clients**, the brand to the **general public**

Improvement of machine energy efficiency

> Increase of efficiency factor
> Energy recuperation
> Emission reduction

Source: Roland Berger

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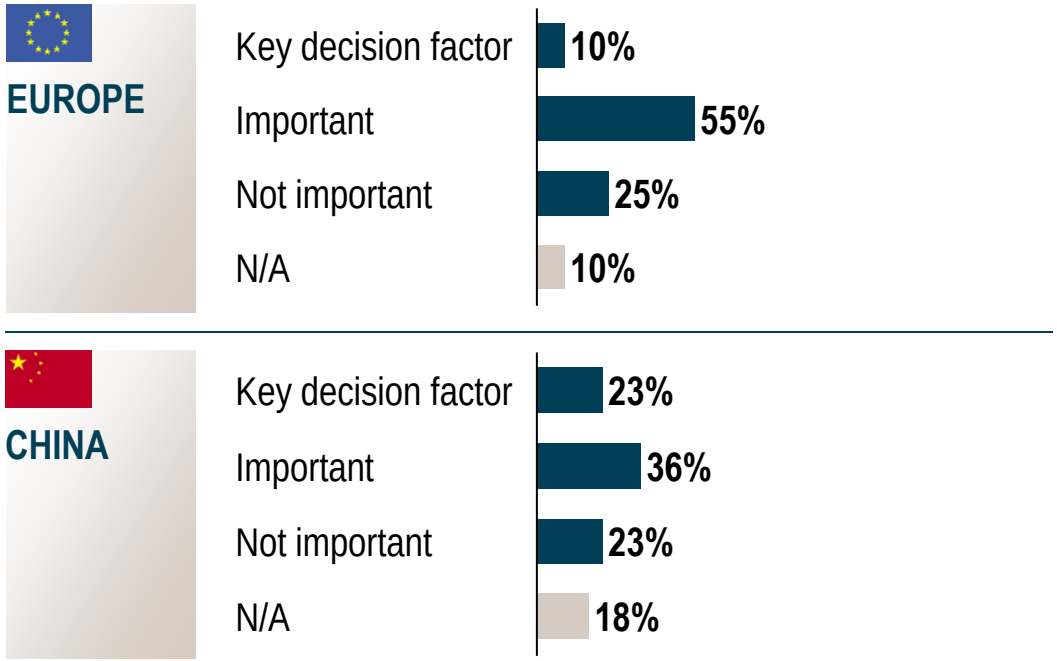
Many operators consider energy efficiency as important purchasing criteria but not all are willing to pay a price premium

Importance of energy efficiency of new machinery

"How important is energy efficiency in the purchase decision?" [% of respondents]



N = 43

COMMENTS

- Importance of energy efficiency in purchase decision depends on typical energy consumption of process
- Feature is often asked for in Europe, but operators are rarely ready to pay a premium for it
- Price premium only of energy-intensive applications

Source: Roland Berger expert panel

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Tailor-made strategy of European OEMs required, depending on individual product/market position

Base strategies for European OEMs

Current position	Niche	Mass market
High-End	 > Further develop existing product/ market position > Strengthen export business by slight footprint adjustments ✓	 > Drive innovation in core business > Build "defense line" in the upper mid-end ?
Mid-End	 > Include cost focus into existing (technology-driven) business model > Develop niche globally > Watch potential entrants from emerging markets carefully ?	 > Switch from technology to cost focus > Rebuild entire footprint to cope with LCC competitors > Check for business expan-sion options into high-end segment !
Low-End	*(Barely European OEMs in this sector)*	

✓ = Sustainable Position ? = To be reviewed ! = Need for action

Source: Roland Berger

Technology-leading high-end OEMs should carefully enhance business into mid-end to participate in this fast growing segment

Reference strategy for European high-end special machine and line producer

GROWTH STRATEGY

1 **Maintain position** in core markets

2 **Extend product range** into upper mid-end

3 **Slightly expand** footprint into emerging markets

PRODUCT/MARKET POSITION

> Continued innovation in products and solutions
> Further development of solutions for entire application process
> Development of highly standardized mid-end products, based on cross-series platform concept

VALUE-ADDED FOOTPRINT

> Improve cost position by increasing LCC production and sourcing
> Further strengthen sales, service, and application engineering footprint in emerging markets
> Keep R&D, basic engineering, production of advanced assemblies and high-end solutions in Europe

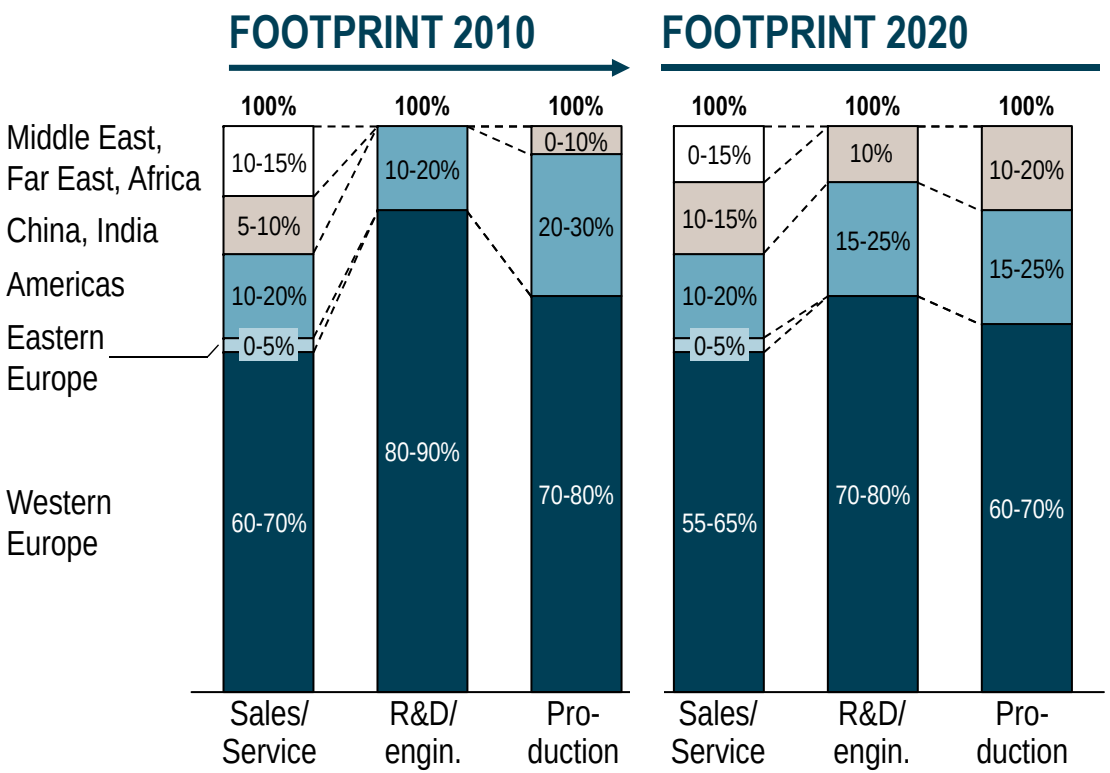
NEW MARKET EXPANSION

> Improved customer access by strong local subsidiary
> Localize parts of components, to have local content and to get access to low-cost supply sources
> Foster organic growth, without acquisitions, JVs or partnerships

Source: Roland Berger

European high-end OEMs keep biggest part of their footprint in Western Europe

Typical OEM footprint of European high-end special machine and line producer



COMMENTS

- **Global sales network already established**, mainly steered out of Europe
- Production focused in Europe
- China & India footprint to be extended
  - **Increase in sales/service** and production capacity
  - Set-up of **first R&D** units
- **BUT: Majority** of value-add will remain in **Western Europe**

Source: Roland Berger expert panel

European Mid-end OEMs have to aggressively expand their business into emerging markets

Reference strategy for European mid-end standard machine producer

GROWTH STRATEGY

1. **Adapt product range** to operators' needs in emerging markets
2. **Grow aggressively** in emerging markets
3. **Selectively expand** into high-end niches

PRODUCT/MARKET POSITION

> Localize and partly simplify established products, to have comparable cost level
> Keep machine quality level, consulting, and solution capabilities
> Establish "global" product construction kit

VALUE-ADDED FOOTPRINT

> Transfer production and engineering capacities into LDCs
> Keep only core know-how in R&D, manufacturing, and selected sub-assemblies in Germany
> Expand sales & service network globally

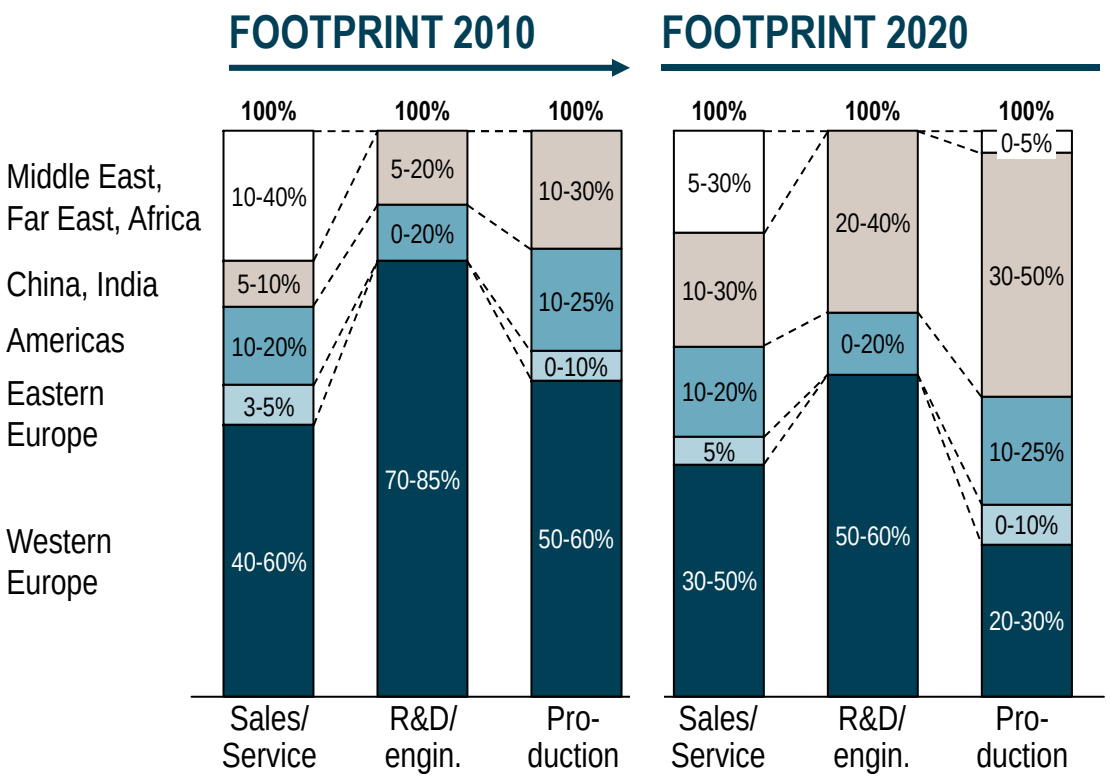
NEW MARKET EXPANSION

> Support operators in establishing professional production process (based on high-quality equipment)
> Provide basic services
> Product/assemble products for the domestic market locally
> Leverage German brand and value proposition

Source: Roland Berger

European mid-end OEMs do already have a global footprint – Further transfer of R&D into emerging markets

Typical OEM footprint of European mid-end standard machine producer



COMMENTS

> Especially sales and services plus production are **already global today**

> **Further transfer of R&D** into emerging regions in the next 10 years

> **Second wave of production off-shoring** to India, Malaysia, Vietnam etc. in next 10 years

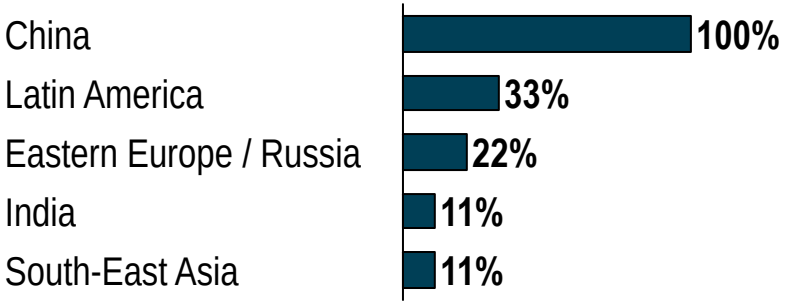
Source: Roland Berger expert panel

Chinese OEMs tackle the large potential in their home market – Mainly by improving their technological offerings

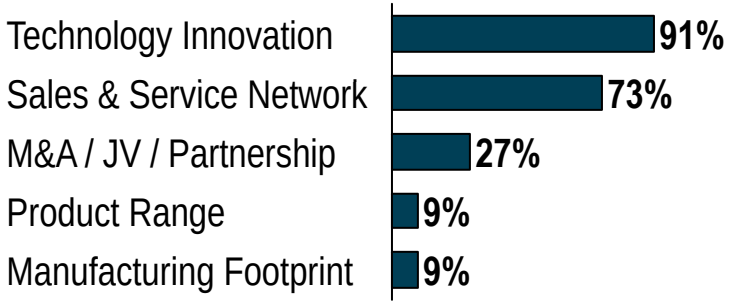
Growth strategy of Chinese OEMs

"How do you intend to grow over the next decade?"
[% of respondents]

Top-5 growth regions[1)]



Key enablers[1)]



1) Multiple nominations possible
N = 13

COMMENTS

> Technology, functionality, and quality **upgrade of product range** into lower mid-end

> Development of **sales and service networks** abroad, preferably by partnerships or acquisitions

> Focus on easily accessible export markets in the first step, **skip Western Europe** for the time being (as entry barriers are too high)

> **Production** fully remaining in mainland China

Source: Roland Berger expert panel

Chinese OEMs have to adopt their further strategy according to their current product and market position

Base strategies for Chinese OEMs

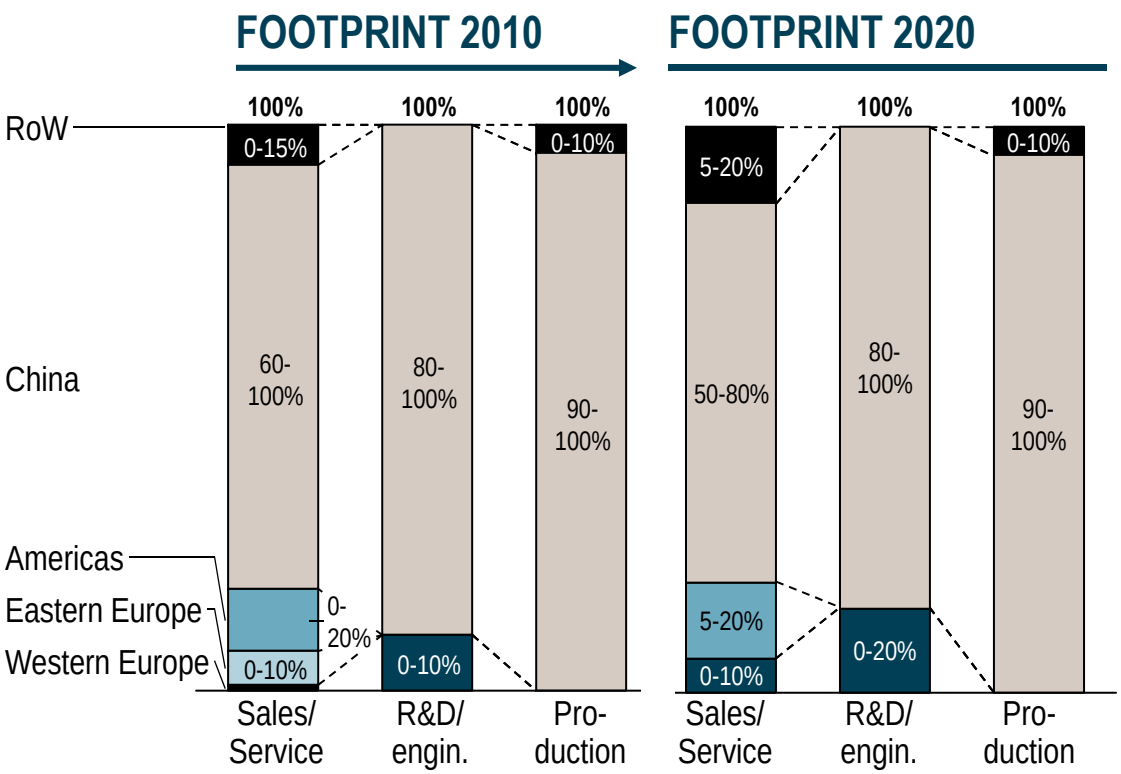
Current position	Niche	Mass market
High-End	*(Barely Chinese OEMs in this sector)*	
Mid-End	*(Barely Chinese OEMs in this sector)*	 > Continue technological upgrade process > Enhance domestic market position and develop service capabilities > Push export business in easily-accessible markets ✓
Low-End	 > Further develop existing niche position > Watch out for growth opportunities in other niches and entry options into the mid-end ✓	 > Participate in domestic market growth > Carefully start technological upgrade process of product portfolio ?

✓ = Sustainable Position ? = To be reviewed ! = Need for action

Source: Roland Berger

Current footprint of Chinese mid-end OEMs is very local except sales and services – Expansion of R&D planned in some cases

Typical OEM footprint of Chinese mid-end climber



COMMENTS

- Large OEMs with global sales network, but still **no real global reach**
- **Service capabilities** abroad to be further enhanced
- **R&D** done in **China** for upper low-end segment and **selectively** in **MDCs** for mid-end segment
- **Manufacturing** focused on **China** only few parts produced abroad
- **Strengthen** international **sales network** by **2020** as key target

Source: Roland Berger expert panel