



**Buck  
Consultants  
International**

# Trends and Changing Location Requirements in Manufacturing

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# Agenda

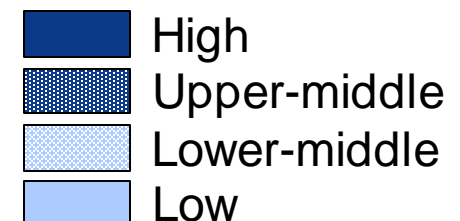
- 1 Framework**
- 2 Technology Development**
- 3 The Talent Factor**
- 4 The Global Manufacturing Landscape**
- 5 Attractiveness of Europe**
- 6 Location Choices**
- 7 Your Role in a Location Decision Process**

# 1 Framework

## Manufacturing is diverse: five broad groups with very different characteristics and requirements

Group	Industry	R&D intensity	Labor intensity	Capital intensity	Energy intensity	Trade intensity	Value density
Global innovation for local markets  34	Chemicals	High	Lower-middle	High	Upper-middle	Upper-middle	Lower-middle
	Motor vehicles, trailers, parts	Upper-middle	Lower-middle	Lower-middle	Lower-middle	Upper-middle	Upper-middle
	Other transport equipment	High	Upper-middle	Lower-middle	Lower-middle	Upper-middle	Upper-middle
	Electrical machinery	Upper-middle	Lower-middle	Lower-middle	Lower-middle	Upper-middle	Upper-middle
Regional processing  28	Machinery, equipment, appliances	Upper-middle	Lower-middle	Lower-middle	Lower-middle	Upper-middle	Upper-middle
	Rubber and plastics products	Upper-middle	Upper-middle	Lower-middle	Upper-middle	Lower-middle	Upper-middle
	Fabricated metal products	Lower-middle	High	Lower-middle	Upper-middle	Lower-middle	Lower-middle
	Food, beverage and tobacco	Lower-middle	High	High	Upper-middle	Lower-middle	Lower-middle
	Printing and publishing	Lower-middle	Upper-middle	Lower-middle	Lower-middle	Lower-middle	Lower-middle

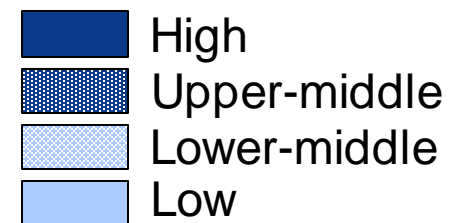
 % of global manufacturing value added



Group	Industry	R&D intensity	Labor intensity	Capital intensity	Energy intensity	Trade intensity	Value density
Energy-/ resource-intensive commodities <b>22</b>	Wood products	Low	High	Upper-middle	High	Low	Low
	Refined petroleum, coke, nuclear	Low	Lower-middle	High	High	Upper-middle	Low
	Paper and pulp	Lower-middle	Upper-middle	Upper-middle	High	Lower-middle	Low
	Mineral-based products	Upper-middle	Upper-middle	Upper-middle	High	Lower-middle	Low
	Basic metals	Low	Lower-middle	High	High	Upper-middle	Low
Global technologies/ innovators <b>9</b>	Computers and office machinery	High	Lower-middle	High	Lower-middle	High	High
	Semiconductors and electronics	High	Lower-middle	Upper-middle	Lower-middle	High	High
	Medical, precision and optical	High	Lower-middle	Upper-middle	Lower-middle	High	High
Labor-intensive tradables <b>7</b>	Textiles, apparel, leather	Lower-middle	High	Lower-middle	Upper-middle	High	Upper-middle
	Furniture, jewellery, toys, other	Lower-middle	High	Lower-middle	Lower-middle	High	Upper-middle

Source: MGI

 % of global manufacturing value added



- **Advanced industries:** industries that conduct significant R&D (i.e. R&D spending per worker ranks among top 20% of industries) and employ an above average number of STEM workers
  - 35 manufacturing industries
  - 3 energy industries
  - 12 service industries
- **Why do advanced manufacturing industries matter?**

- R&D Innovation capacity
- Employs high skilled STEM workforce

**Corporate  
Inputs**

- Productivity
- Profitability
- Exports

**Corporate  
outputs**

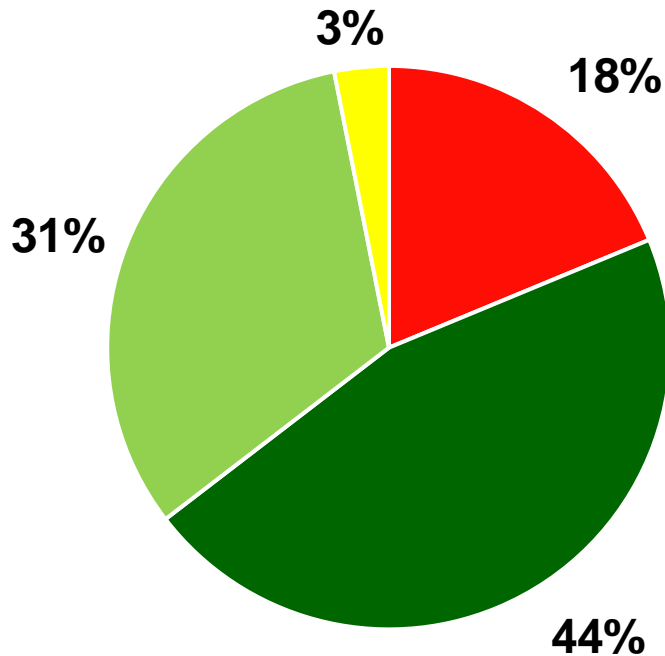
- Well paid jobs
- Economic growth
- Economic multiplier
- Resilience

**Regional  
outputs**

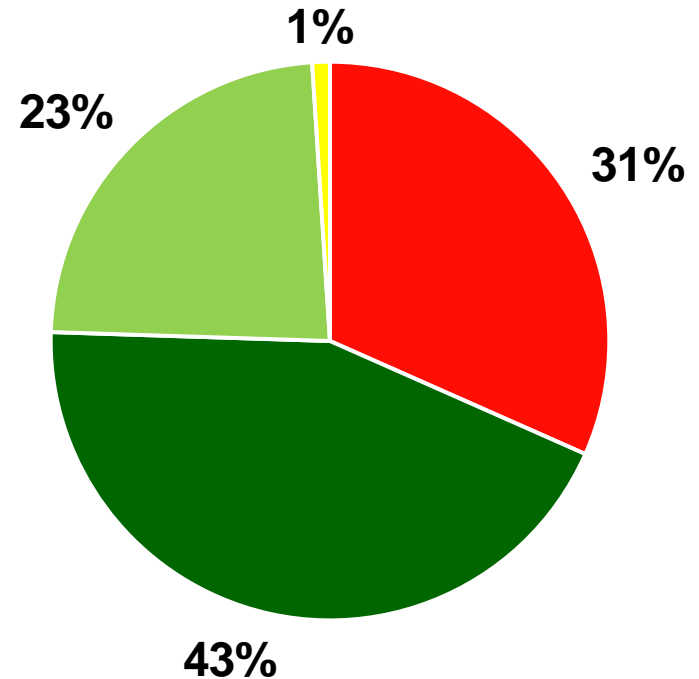
# How important is growth?

Priority for exploiting opportunities for growth (over the past 12 to 24 months and in the next 12-24 months)

Past 12 to 24 months



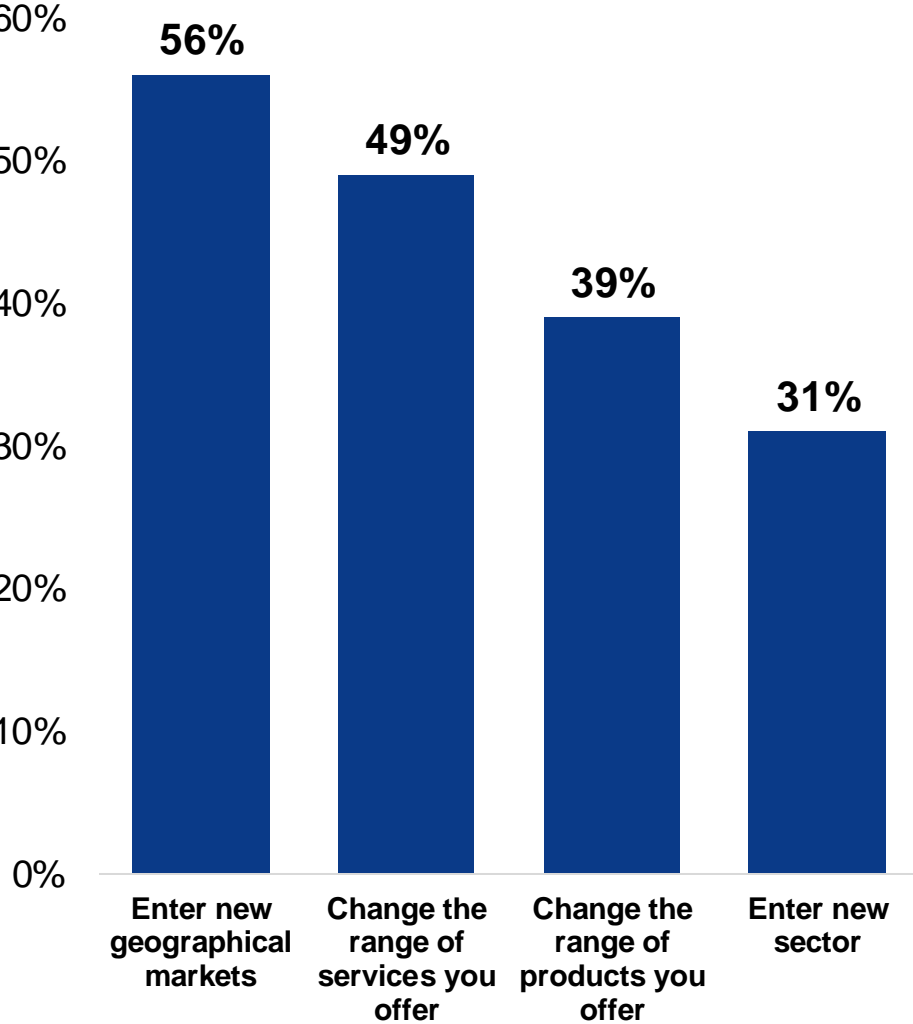
Past 12 to 24 next 12 to 24 months



■ Extremely high priority 
 ■ High priority 
 ■ Medium priority 
 ■ No priority at all

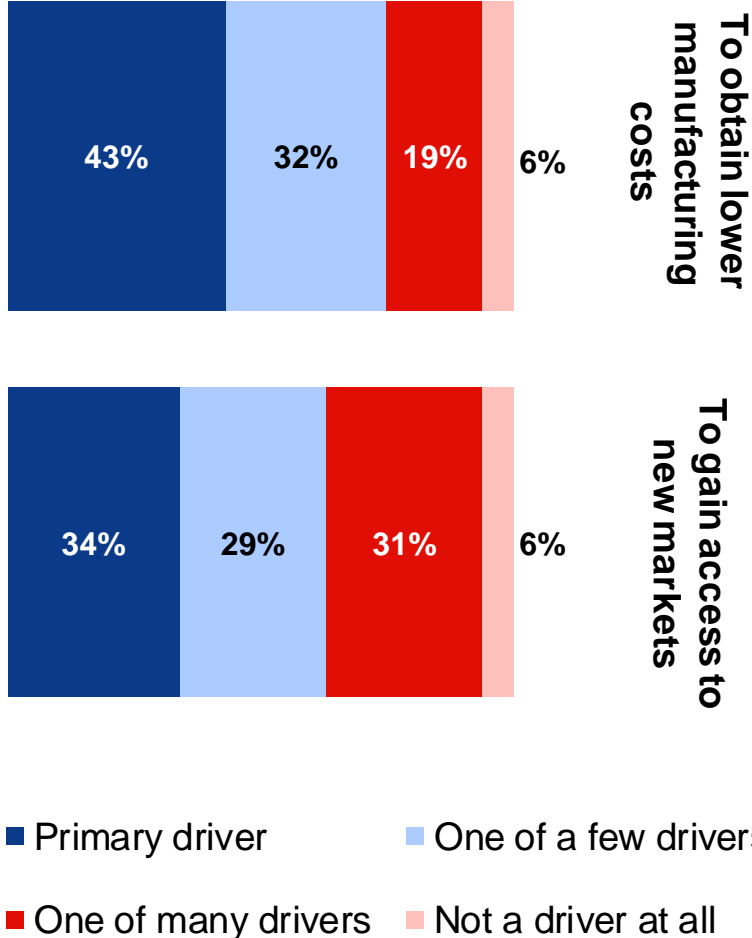
Source: Gates

# Manufacturers are making big moves to achieve growth



Source: Gates

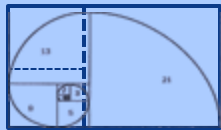
# How significant are the following drivers for your international investments?



# 2 Technology Development

## Technological Forces Transforming Industry

Changing the way products come to life



Generative design



Intelligent models

Changing the way products are realized



Intelligent automation



Additive manufacturing

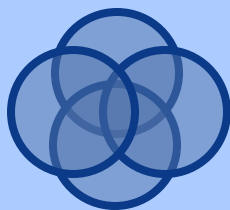
Changing the way products evolve



Cloud technology



Knowledge automation



Systems of systems











Advanced robotics



Big data analytics



# Nine technologies are reshaping production

 <b>Advanced robots</b>	<ul style="list-style-type: none"><li>• Autonomous, cooperating industrial robots, with integrated sensors and standardized interfaces</li></ul>
 <b>Additive manufacturing</b>	<ul style="list-style-type: none"><li>• 3D printers, used predominantly to make spare parts and prototypes</li><li>• Decentralized 3D printing facilities, which reduce transport distances and inventory</li></ul>
<b>AR<sup>+</sup> Augmented reality</b>	<ul style="list-style-type: none"><li>• Digital enhancement, which facilitates maintenance, logistics and SOP's</li><li>• Display devices, such as glasses</li></ul>
 <b>Simulation</b>	<ul style="list-style-type: none"><li>• Network simulation and optimization, which use real-time data from intelligent systems</li></ul>
 <b>Horizontal and vertical system integration</b>	<ul style="list-style-type: none"><li>• Data integration within an across companies using a standard data transfer protocol</li><li>• A fully integrated value chain (from supplier to customer) and organization structure (from management to shop floor)</li></ul>
 <b>The Industrial Internet of Things</b>	<ul style="list-style-type: none"><li>• A network of machines and products</li><li>• Multidirectional communication among networked objects</li></ul>
 <b>Cloud computing</b>	<ul style="list-style-type: none"><li>• The management of huge volumes of data in open systems</li><li>• Real-time communication for production systems</li></ul>
 <b>Cybersecurity</b>	<ul style="list-style-type: none"><li>• The management of heightened security risks due to a high level of networking among intelligent machines, products and systems</li></ul>
 <b>Big data and analytics</b>	<ul style="list-style-type: none"><li>• The comprehensive evaluation of available data (from CRM, ERP and SCM systems, for example, as well as from an MES and machines)</li><li>• Support for optimized real-time decision making</li></ul>

# Ranking of future importance of advanced manufacturing technologies

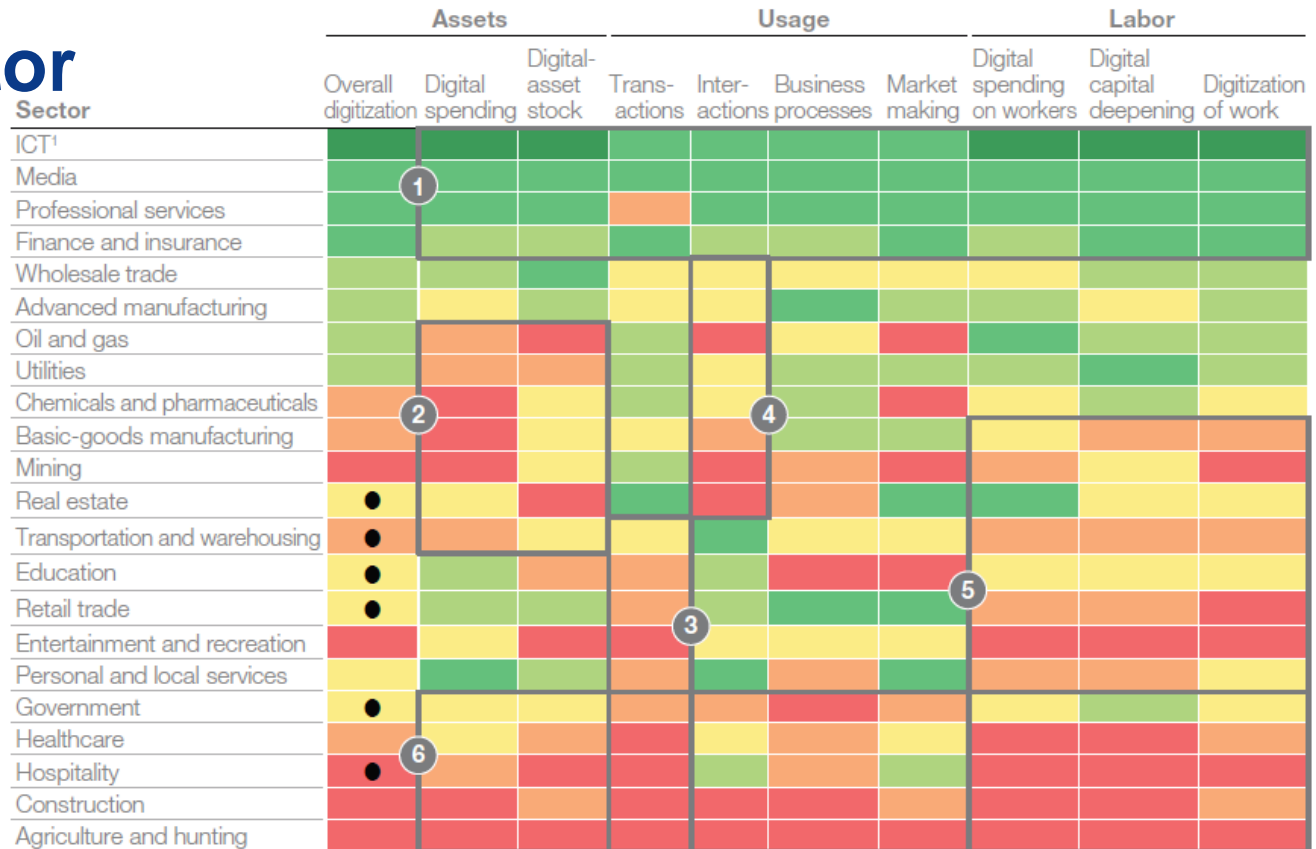
Advanced Manufacturing Technologies	United States	China	Europe
Predictive Analytics	1	1	4
Smart, Connected Products (IoT)	2	7	2
Advanced Materials	3	4	5
Smart Factories (IoT)	4	2	1
Digital Design, Simulation and Integration	5	5	3
Advanced Robotics	7	8	6
Additive Manufacturing (3D printing)	8	11	9
Open-source Design/ Direct Customer Input	9	10	10
Augmented Reality (to improve quality, training, expert knowledge)	10	6	8
Augmented Reality (to increase customer service & experience)	11	9	11

Source: GMCI, 2016

# Extent of digitization varies per sector

MGI Sector Digitization Index – US example  
2015 or latest available US data

Relatively low digitization  Relatively high digitization  
● Digital leaders within relatively undigitized sectors



- 1 Relatively small, knowledge-intensive sectors, highly digitized
- 2 Large, capital intensive, potential to further digitize assets and expand productivity
- 3 Large service sectors, with long tail of small firms having room to digitize customer transactions
- 4 B2B sectors, with potential to digitally engage and interact with customers and users
- 5 Large, labor intensive, with potential to digitally enable workforce, transform, and increase productivity
- 6 Large, localized, low productivity, could transform for productivity and delivery of services

Source: McKinsey, 2017



## Four dimensions of IoT's impact

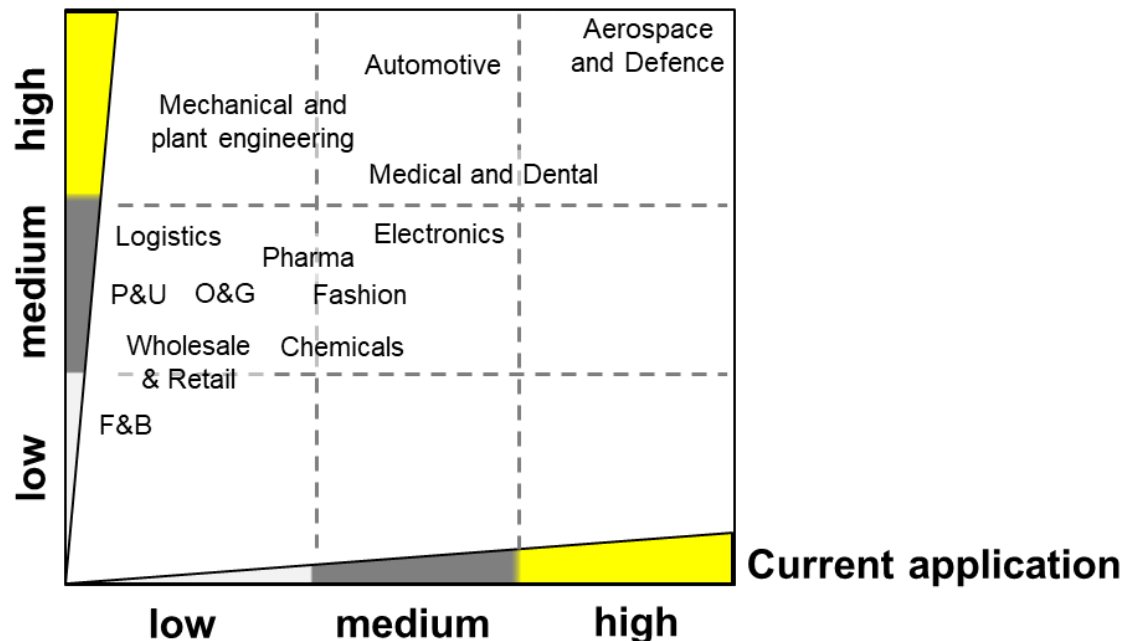
- Connectivity
- Speed
- Accessibility
- 'Anchoring'

# Additive Manufacturing

**Additive manufacturing** involves essentially a one-step fabrication process near the point of end using raw materials and a computer-generated 3D blueprint in place of multi-tiered global supply chains engineered to procure materials, parts and components for processing and assembly by low-cost laborers

## Current application and future potential of 3D printing by industry

Future potential

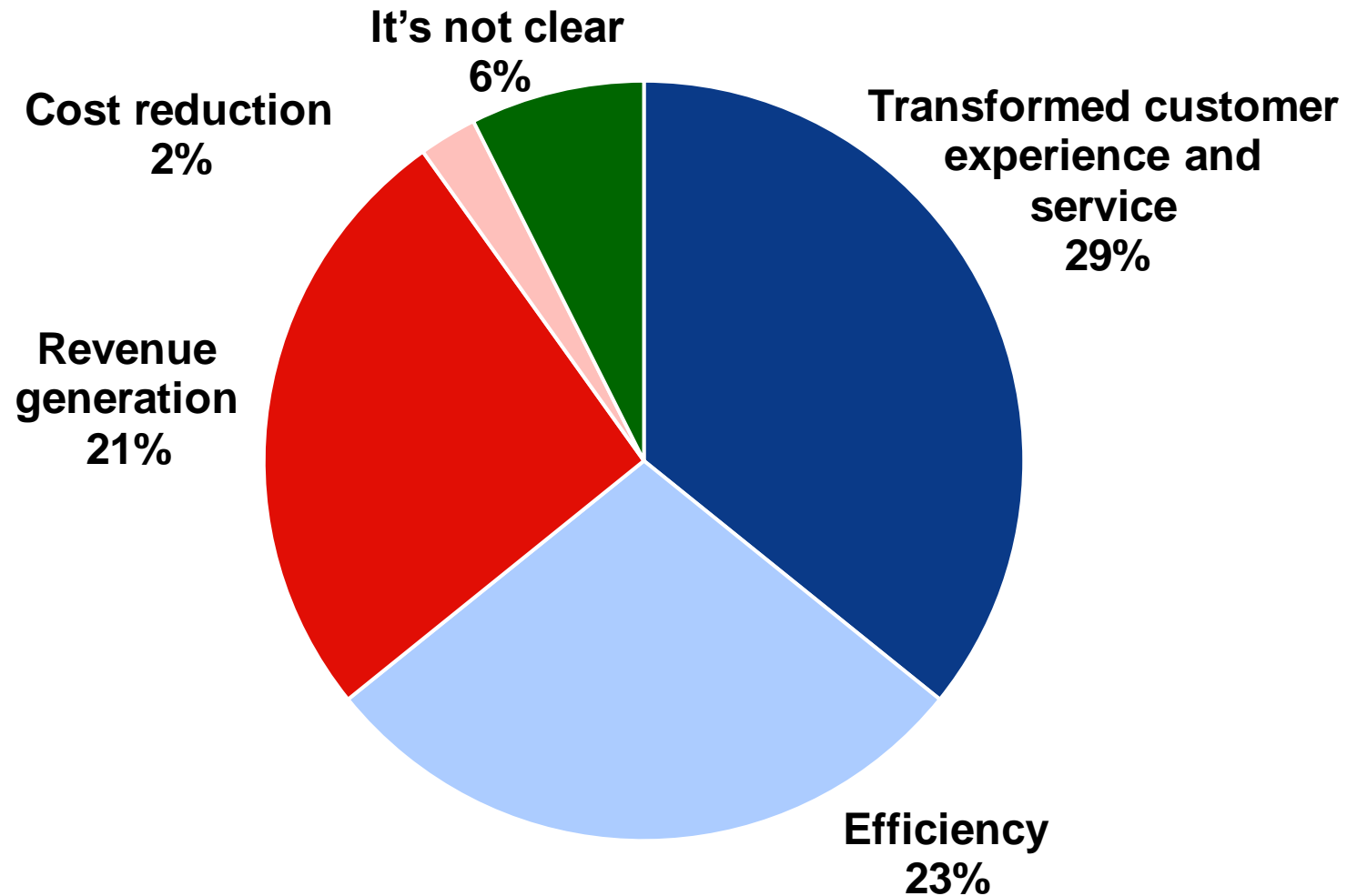


Source: EY

# Supply chain view of the primary value of 3D printing



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Source: Gartner Inc.

# Additive manufacturing offers significant benefits



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## Design and engineering

### Faster time to market

- Fast prototyping
- Fast design adjustments

### Greater customization

- New customized applications
- More differentiated products

### Product enhancements

- Better functionalities/ product performance
- New designs
- Less weight

## Manufacturing

### Faster/more flexible manufacturing process

- Not setup time in production
- Fewer production steps/ interfaces
- Fewer required parts
- Less assembly time
- More flexibility and better load balance
- Inherent quality assurance process
- Fewer dedicated machines

### Higher material productivity

- Less material waste
- New material features

## Service

### Simplified supply chain

- Localized production
- Elimination of obsolete parts
- Refurbishment for specific components
- Less dependence on suppliers

### More efficient sales process

- Customized product exemplification

## Relevant for

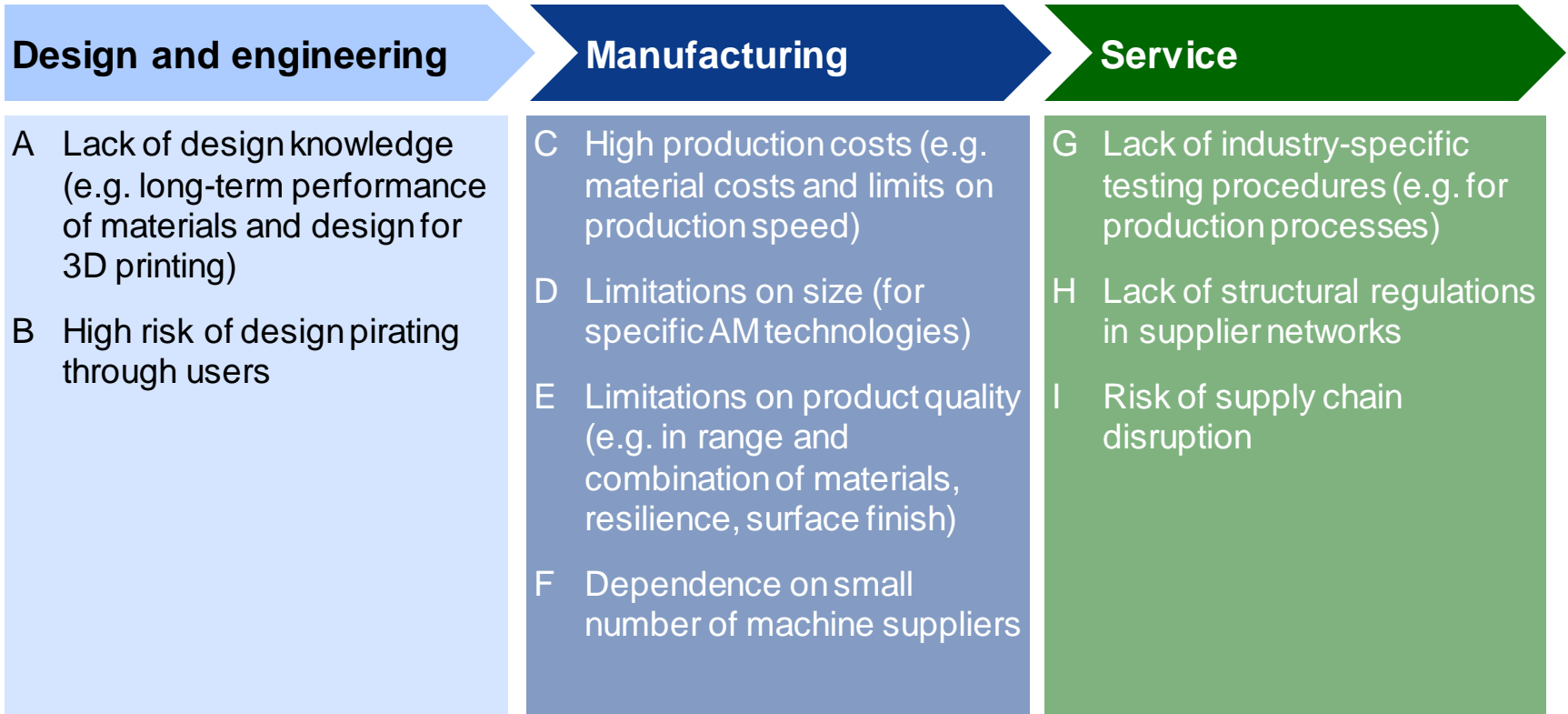
Engineering-  
intensive business

High-value/  
Low-volume business

Spare parts-  
intensive business

Source: Bromberger,  
2017

# Despite additive manufacturing's many benefits, there are still technological limitations to be overcome



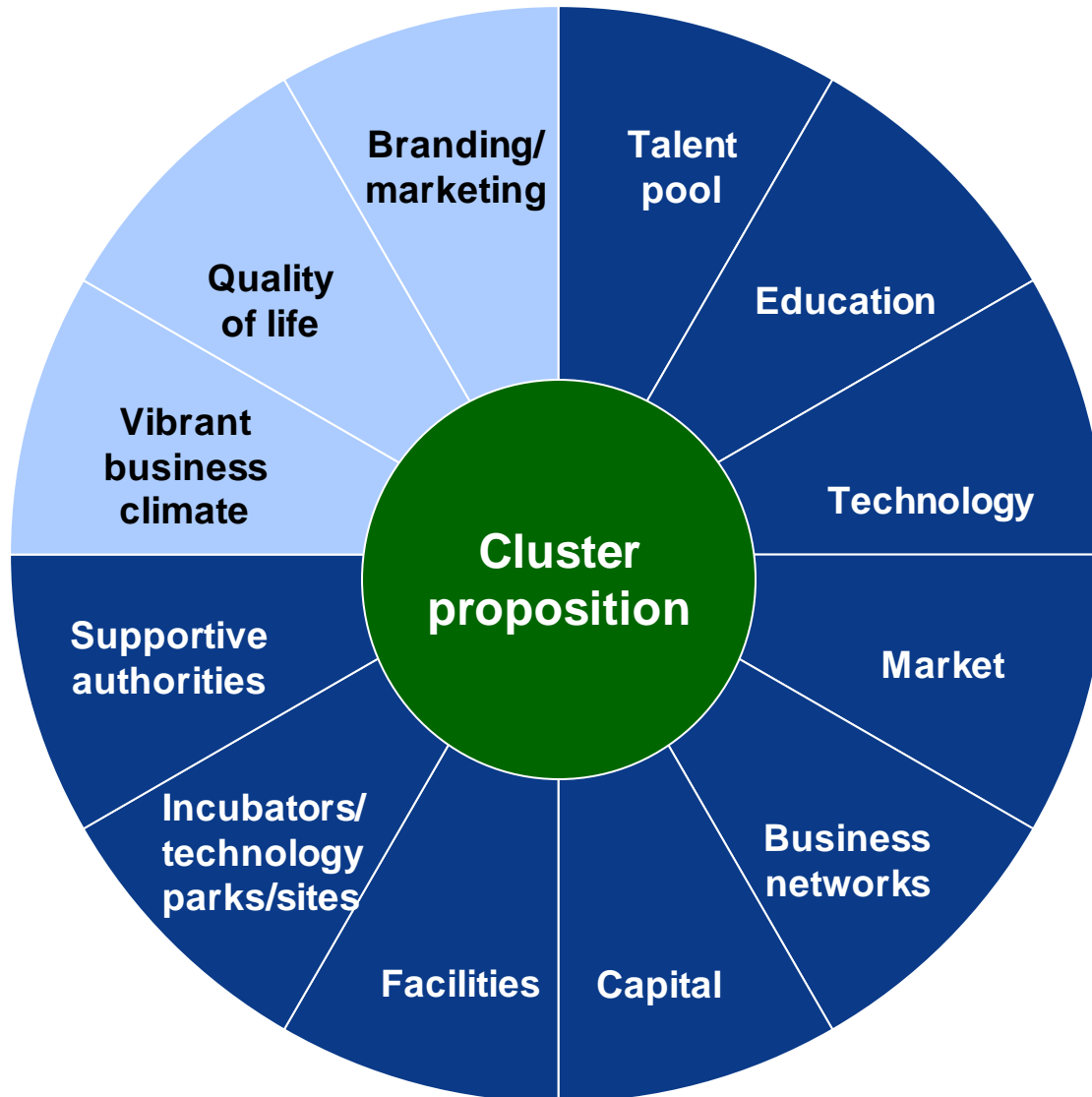
Source: Bromberger, 2017



# How can technology driven companies benefit from ecosystems and clusters?

- **Ecosystem** : conditions to stimulate economic activities, not sector or technology related  
Example: start-up ecosystem in a city
- **Cluster** : defined geographical area where triple-helix partners (enterprises - knowledge institutes/ universities - governments/EDOs) are interconnected and work together in specific sectors/ technology domains in order to create more innovation, export, start-ups, educational opportunities

# The BCI Cluster Proposition Clock



# Key building blocks of a successful cluster

<b>Talent Pool</b>	Availability, skills and experience of the workforce in the specific priority target sector
<b>Education</b>	Availability & reputation of educational institutes at various levels in the specific priority target sector
<b>Technology &amp; Know How</b>	Assessment of the specific technologies available at academic and research institutes as well as within R&D centers of companies. What are the key strengths?
<b>Market</b>	What is the regional/national market for this specific sector, including launching customers
<b>Business networks</b>	Presence, size and activities of (big and small) firms in this particular target sector; life-cycle development stage and level of organization of relevant existing clusters in the sector
<b>Capital</b>	Available venture capital & loans available for business activities in the specific priority target sector
<b>Facilities</b>	(Shared) Advanced research and business facilities open for third party use in this target sector
<b>Office, R&amp;D &amp; industrial sites</b>	Dedicated research, manufacturing and/or office space available in innovation-oriented surroundings, preferably including presence of manifest knowledge intensive organization (public or private)
<b>Supportive authorities</b>	Coherent supportive programs on local and regional level to enhance the development of start-up companies and SME's and to promote the cluster

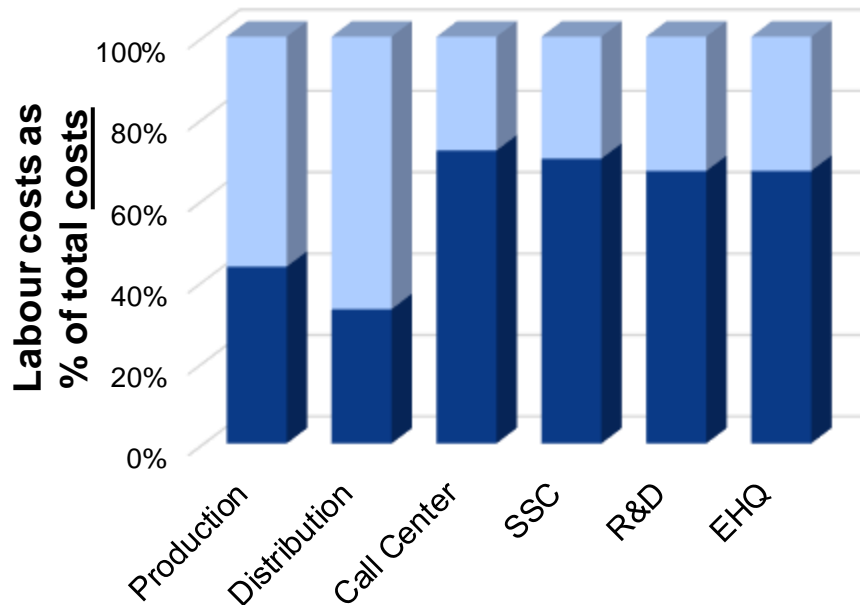
## Secondary supporting building blocks for successful clusters

<b>Vibrant business climate</b>	Overall economic growth and level of innovation in the area
<b>Quality of Life</b>	Quality of life for knowledge workers, including ex-patriates
<b>Branding / marketing</b>	Effort to brand and market the region (and its priority target sectors) on a national and international level

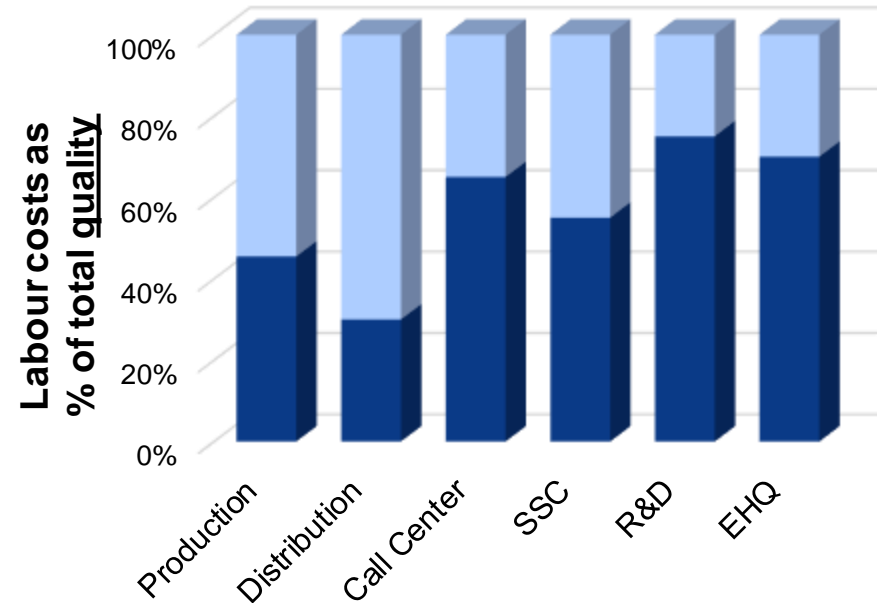
# 3 The Talent Factor

## Sample of recent projects of Buck Consultants International

### Cost



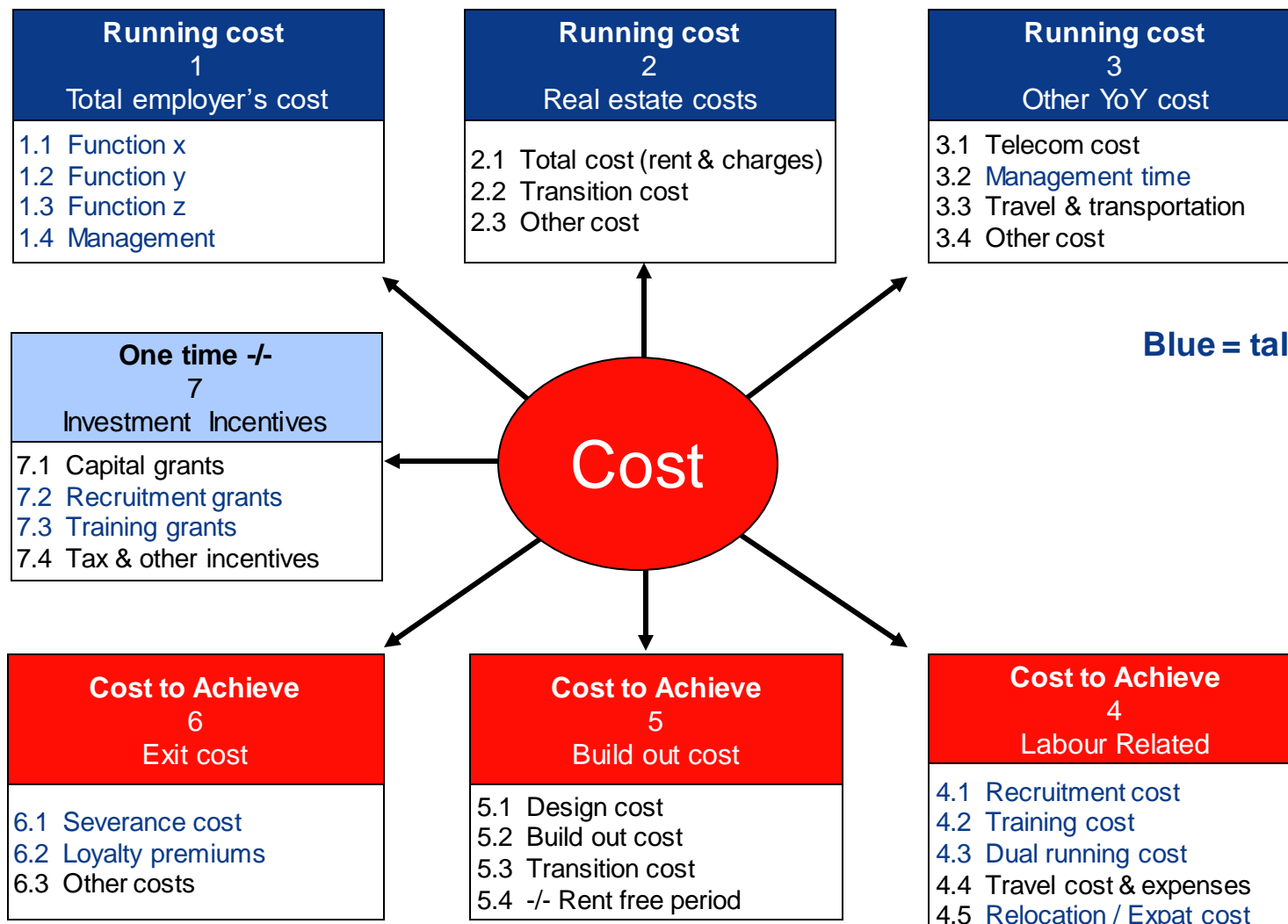
### Quality



■ Talent related  
■ Other factors



# Detailed Cost location factors (example)





# Detailed Quality location factors (example)



# 4 The Global Manufacturing Landscape



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## Global CEO survey: Global Manufacturing Competitiveness Index rankings by country

2016 (Current)

Rank	Country	Index score (100=High) (10=Low)
1	China	100.0
2	United States	99.5
3	Germany	93.9
4	Japan	80.4
5	South Korea	76.7
6	United Kingdom	75.8
7	Taiwan	72.9
8	Mexico	69.5
9	Canada	68.7
10	Singapore	68.4
11	India	67.2
12	Switzerland	63.6
13	Sweden	62.1
14	Thailand	60.4
15	Poland	59.1
16	Turkey	59.0
17	Malaysia	59.0
18	Vietnam	56.5
19	Indonesia	55.8
20	Netherlands	55.7

2020 (projected)

Rank	2016 vs 2020	Country	Index score (100=High) (10=Low)
1	+1	United States	100.0
2	-1	China	93.5
3	↔	Germany	90.8
4	↔	Japan	78.0
5	+6	India	77.5
6	-1	South Korea	77.0
7	+1	Mexico	75.9
8	-2	United Kingdom	73.8
9	-2	Taiwan	72.1
10	-1	Canada	68.1
11	-1	Singapore	67.6
12	+6	Vietnam	65.5
13	+4	Malaysia	62.1
14	↔	Thailand	62.0
15	+4	Indonesia	61.9
16	-1	Poland	61.9
17	-1	Turkey	60.8
18	-5	Sweden	59.7
19	-7	Switzerland	59.1
20	+3	Czech Republic	57.4

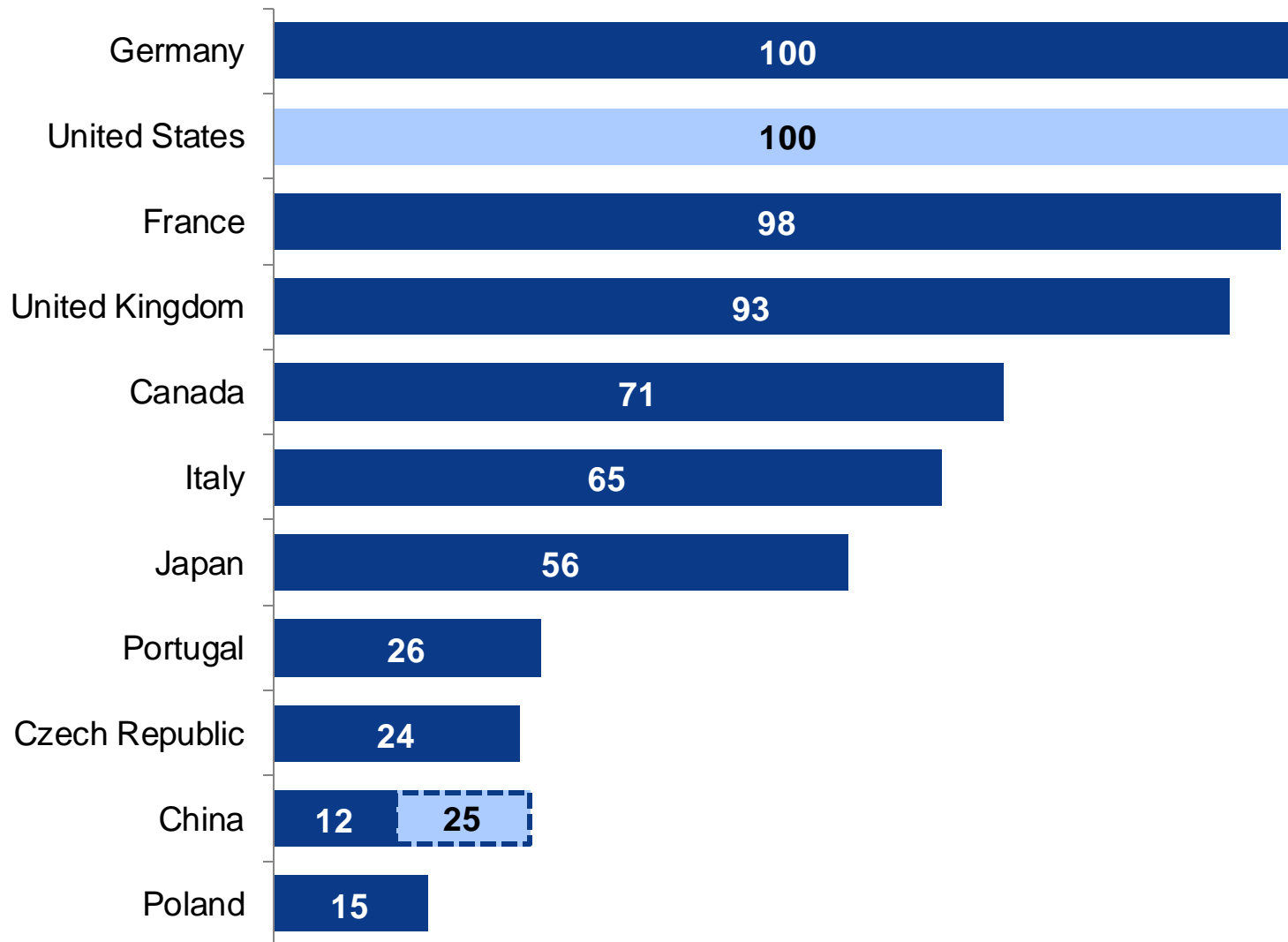
Source: DTTL, 2016

# International comparison labour cost per hour

## Manufacturing



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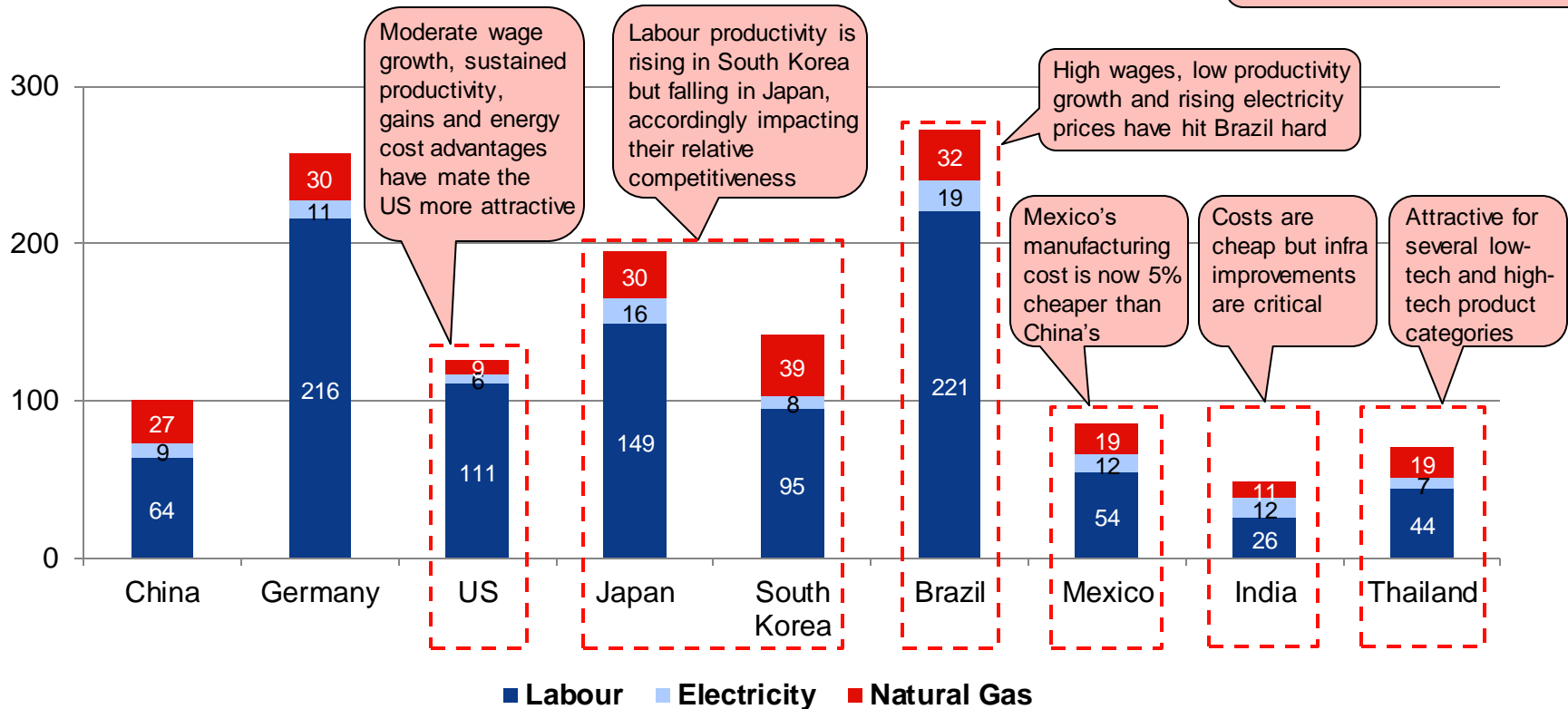
Source: IDW/BCI



# Lower cost alternatives versus China

## Input cost comparison\* across selected major global manufacturers

China's total input cost (labour, electricity and natural gas) is assigned a value of 100



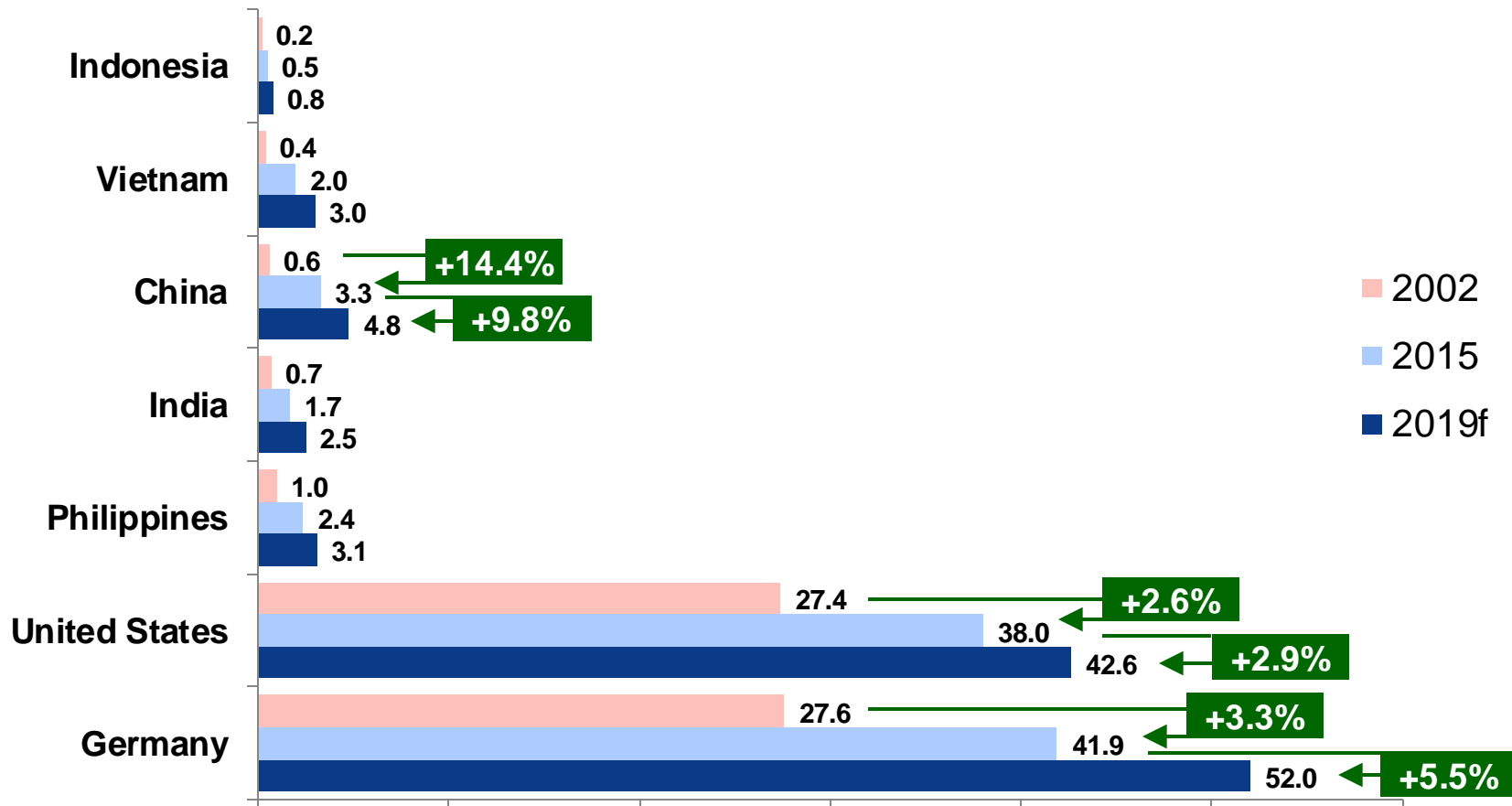
\* Note: To facilitate a cost input comparison across economies, China's total cost (i.e. sum of labour, electricity and natural gas) is assigned a value of 100 within the index and the costs in other economies are scaled accordingly

Source: TBA



# China's cost advantages are starting to slip

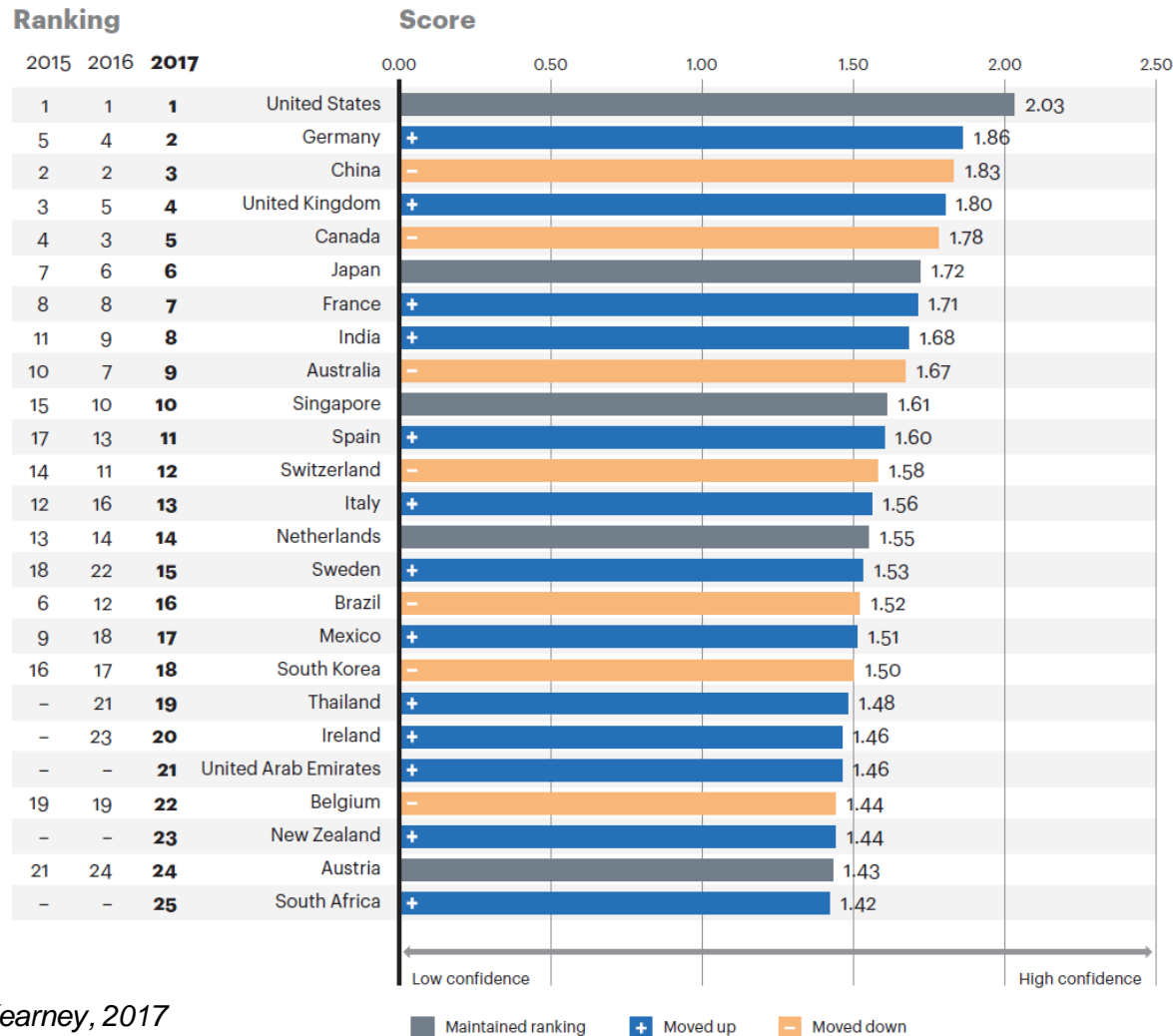
## Manufacturing labor costs USD per hour (annual growth)



Sources: EIU/ATK

# 5 Attractiveness of Europe

## 2017 FDI Confidence Index

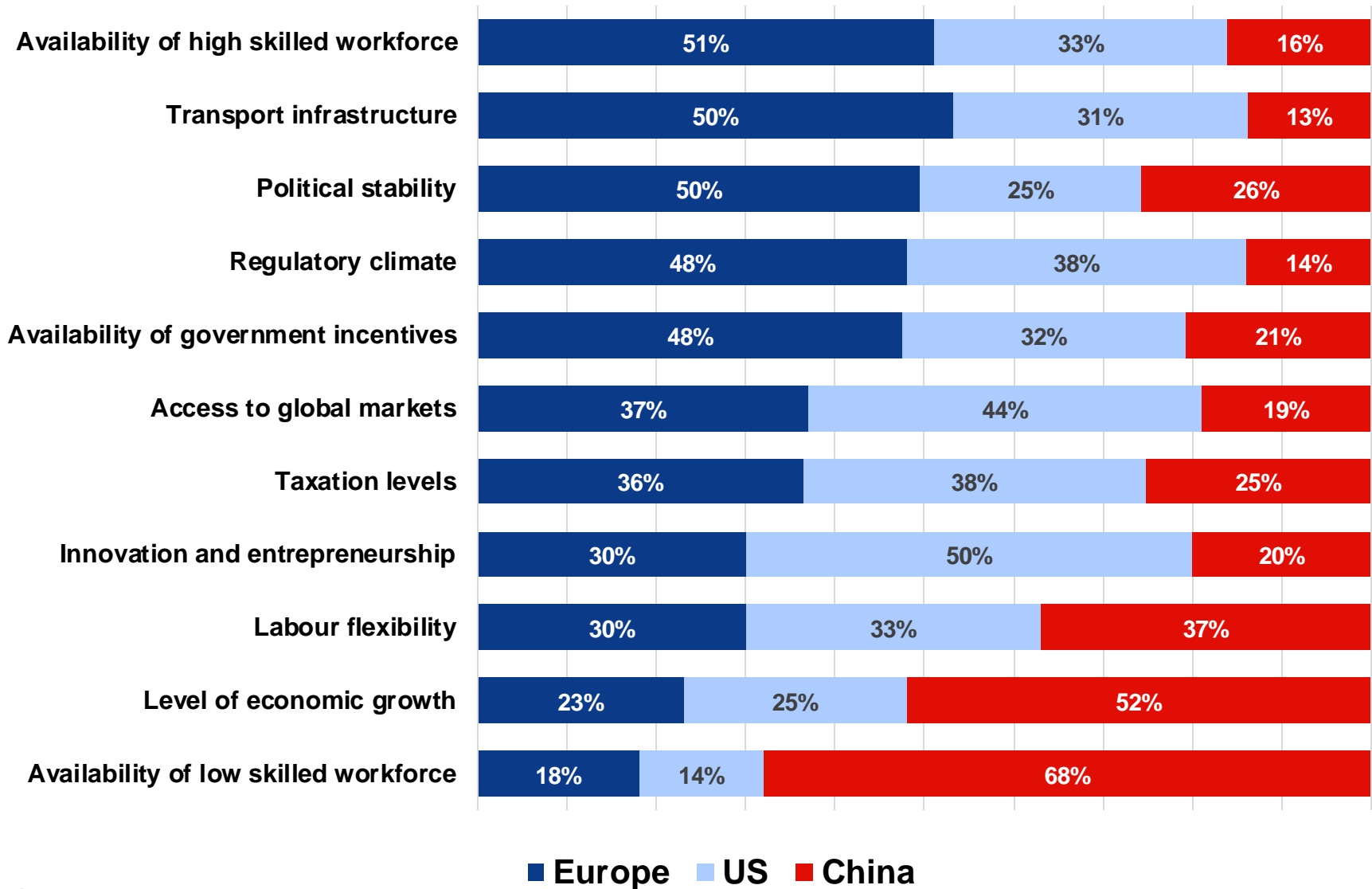


Sources: AT.Kearney, 2017

# Which country/region is the strongest performer?



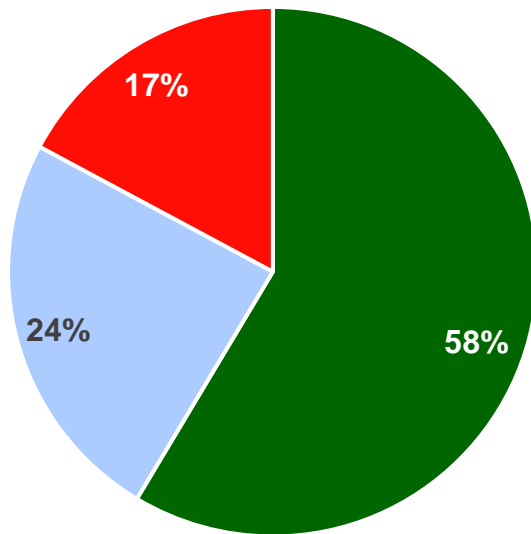
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Source: Ipsos, 2017

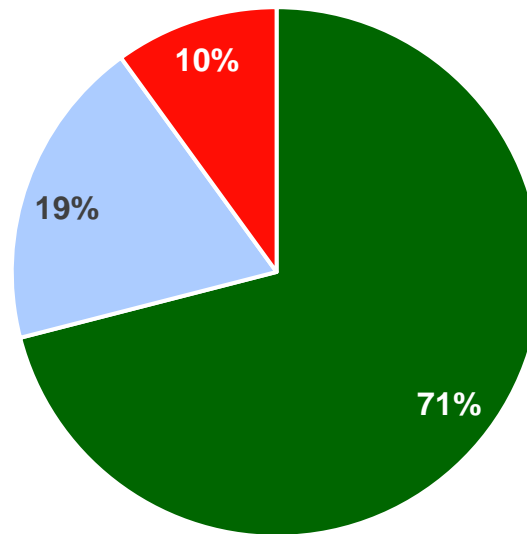
# Most investors say Europe has become more attractive in the last five years as an investment destination

## All companies



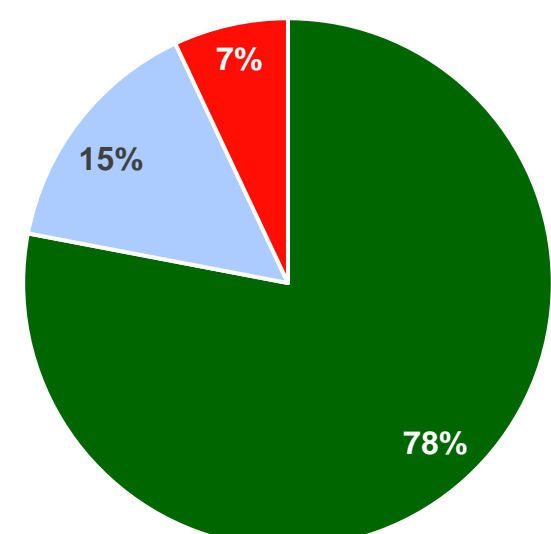
■ % More attractive  
■ % No difference  
■ % Less attractive

## US companies



■ % More attractive  
■ % No difference  
■ % Less attractive

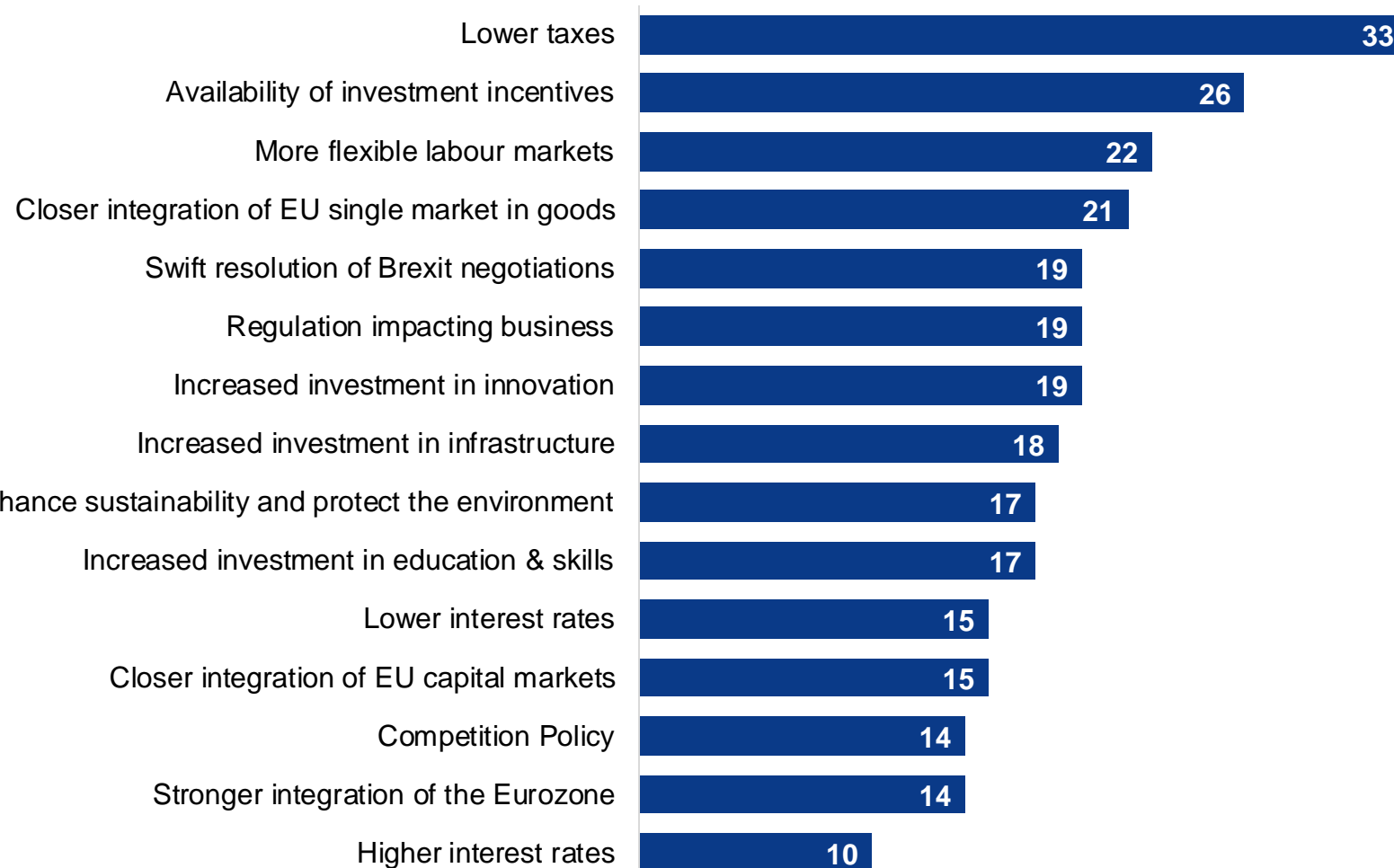
## Chinese companies



Source: Ipsos, 2017

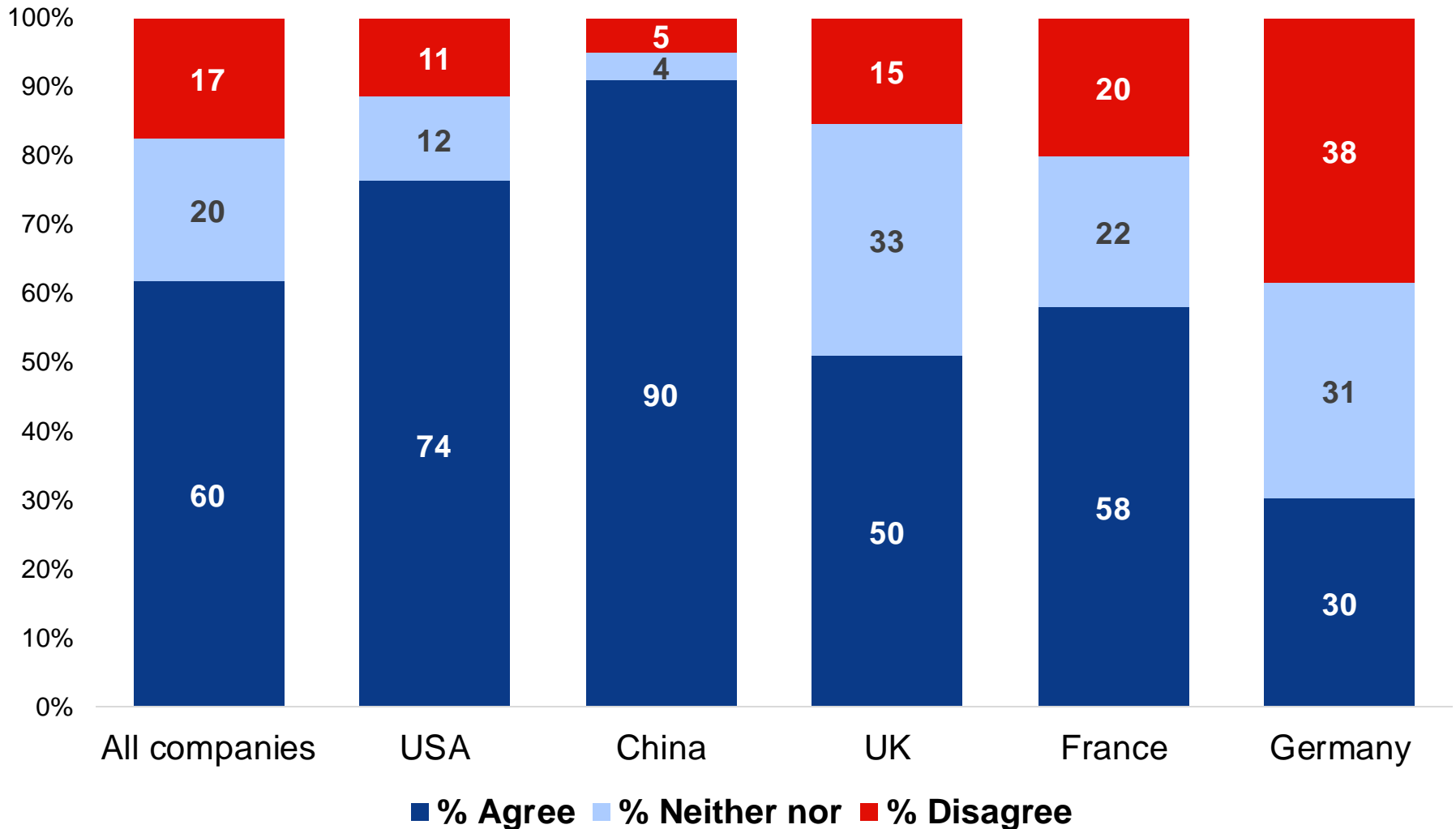
# C-level executives: lower taxation is the most popular way to boost Europe's attractiveness

(showing % issues selected as priority 1, 2 or 3)



Source: Ipsos, 2017

# Investors will increase their investment in Europe over the next 5 years



Source: Ipsos, 2017

# 6 Location Choice

## Narrow down from long list to site level

### Stage A

Start up:

Definition investment profile and location requirements

### Stage B

Quick scan:

Limiting the search area to target areas

### Stage C

In-depth assessment selected target areas

### Stage D

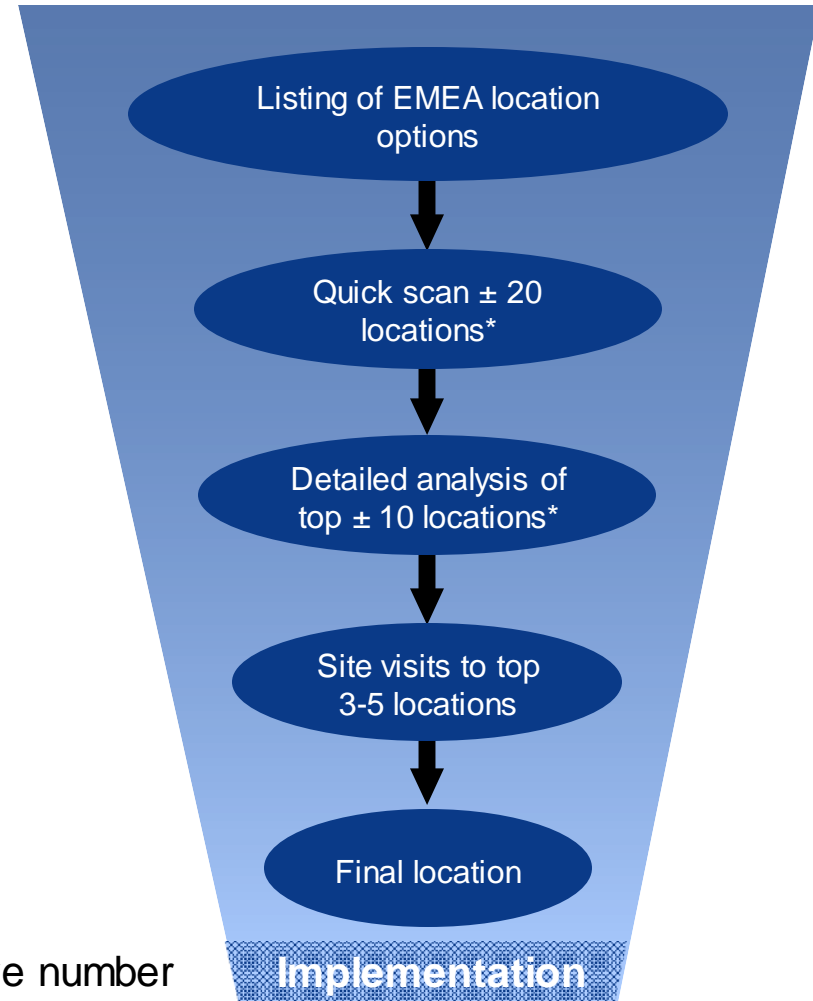
Identification of sites and site visits

### Stage E

Negotiations

### Stage F

Final choice

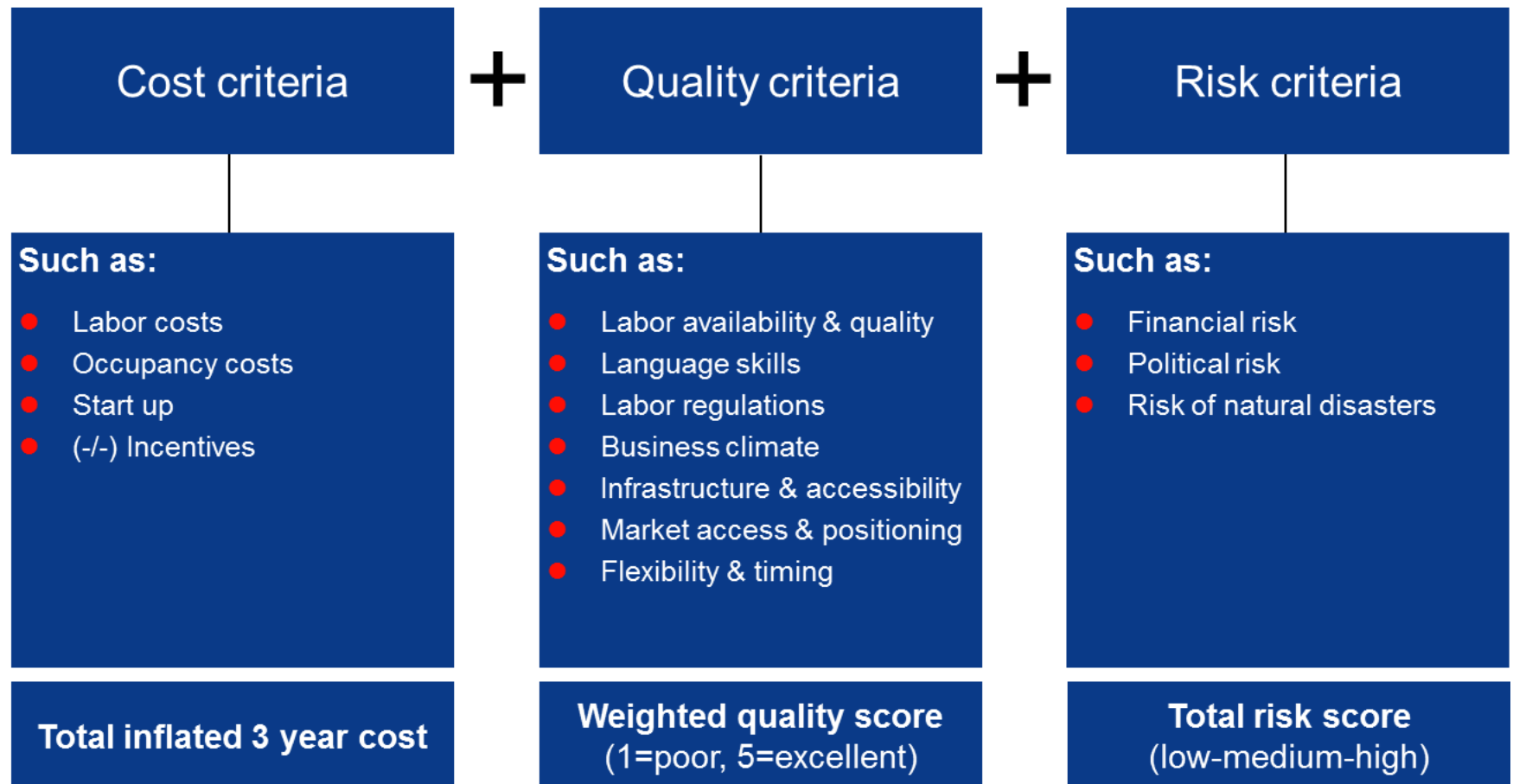


\* Indicative number



# Location criteria are driven by Cost, Quality and Risk factors

In our site selection approach we use cost, quality and risk criteria to develop a complete assessment of regions & locations



# Listing of Cost requirements for a manufacturing plant (example)

Cost Category		
<b>One time capital costs</b>		
1 Land / Site	1.1 Land costs 1.2 Building costs	In USD / Euro In USD / Euro
<b>Annual operating costs</b>		
2 Labor	2.1 Total employers costs manufacturing operator/working hours 2.2 Total employers costs skilled engineer/working hours 2.3 Total employers costs production plant manager/working hours	In USD / Euro In USD / Euro In USD / Euro
3 Distribution	3.1 Outbound transportation costs to customers 3.2 Inbound transportation costs from suppliers	In USD / Euro In USD / Euro
4 Utility costs	4.1 Annual utility costs (electricity, gas, water)	In USD / Euro
5 Taxes	5.1 Corporate income tax/tax deductions	In USD / Euro
6 Incentives (-/-)	6.1 Investment grants 6.2 Employment incentives 6.3 Training grants	In USD / Euro In USD / Euro In USD / Euro
<b>Total</b>		<b>In USD / Euro</b>

Costs will be calculated in Euro/ USD and forecasted for the next 3 years (including inflation, expected wages increase, etc.)

# Listing of Quality requirements (example)



Quality category				
<b>A Talent/ Labor</b>	...%	A1	Medtech base	...%
		A2	Talent pool depth	...%
		A3	Competing employers	...%
		A4	New/expanding employers	...%
		A5	Population trends	...%
		A6	Cost of living	...%
<b>B Labor regulations</b>	...%	B1	Unionization degree	...%
		B2	Hiring/firing regulations	...%
<b>C Proximity to markets/ accessibility</b>	...%	C1	Proximity to markets	...%
		C2	Highways	...%
		C3	Railway connections	...%
		C4	Airport connections	...%
<b>D Sites/buildings</b>	...%	D1	Building availability	...%
		D2	Site availability	...%
		D3	Geographical considerations	...%
<b>E Supplier availability</b>	...%	E1	Sources of ceramic discs	... %
<b>F Utilities</b>	...%	F1	Electric power capacity/reliability	...%
		F2	Natural gas availability	...%
		F3	Telecommunications	...%
<b>G Ease of implementation</b>	...%	G1	Business climate ranking	...%
		G2	Fast track construction	...%
		G3	Ease of permitting	...%
	<b>100%</b>			

The quality requirements will be assessed using scores between 1 (poor) to 5 (excellent)

All data and scores will be made available to ensure transparency of the assessment process

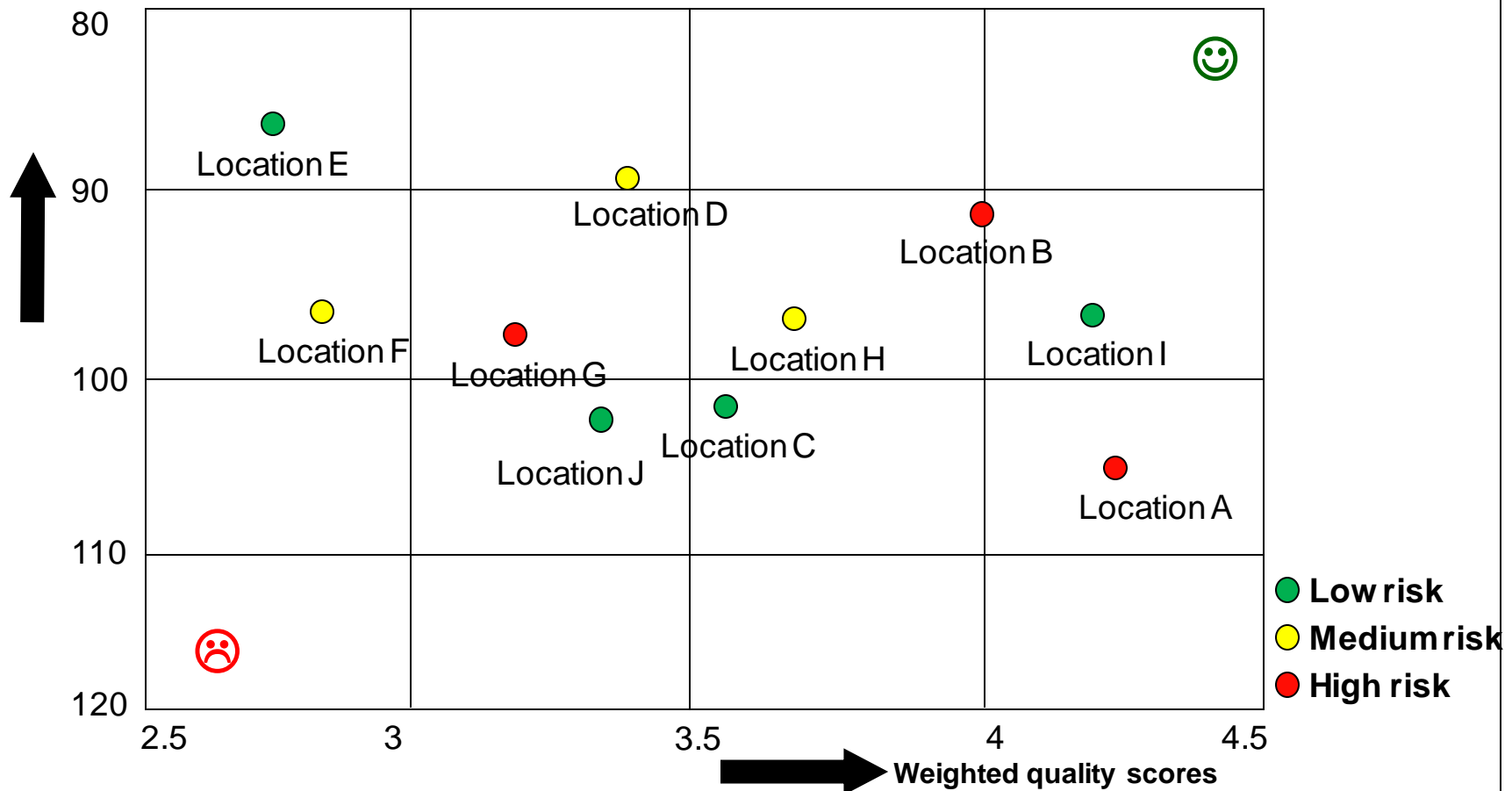
# Listing of Risk requirements (example)

Quality category			Low/Medium/High
<b>A Political Risks</b>	...%	A1 Government stability/ democracy	L / M / H
		A2 Geopolitical conflicts	L / M / H
<b>B Economic Risks</b>	...%	B1 Development economy	L / M / H
		B2 Inflation	L / M / H
<b>C Financial Risks</b>	...%	C1 Financial risk rating	L / M / H
		C2 Currency convertibility	L / M / H
		C3 Exchange rate stability	L / M / H
<b>D Legal Risks</b>	...%	D1 Patent infringements	L / M / H
		D2 Permits	L / M / H
		D3 Data protection	L / M / H
<b>E Transparency Risks</b>	...%	E1 Corruption	L / M / H
		E2 Bureaucracy	L / M / H
<b>F Security Risks</b>	...%	F1 Religious & ethnic tensions	L / M / H
		F2 Terrorism	L / M / H
<b>G Natural Disaster Risks</b>	...%	G1 Climatic catastrophes	L / M / H
		G2 Hydrological catastrophes	L / M / H
		G3 Meteorological events	L / M / H
		G4 Geophysical events	L / M / H
		G5 Health hazards/ pandemics	L / M / H
	<b>100%</b>		

# Cost-Quality-Risk matrix of the locations

**Example:** Project specific site selection results for a production plant in perspective: cost-quality-risk assessment

Total costs in million Euro for first 3 years (all operating costs -/- investment incentives)



# 7 Your Role in a Location Decision Process



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## Phase A:

Identification of location options

## Phase B:

Quick Scan

## Phase C:

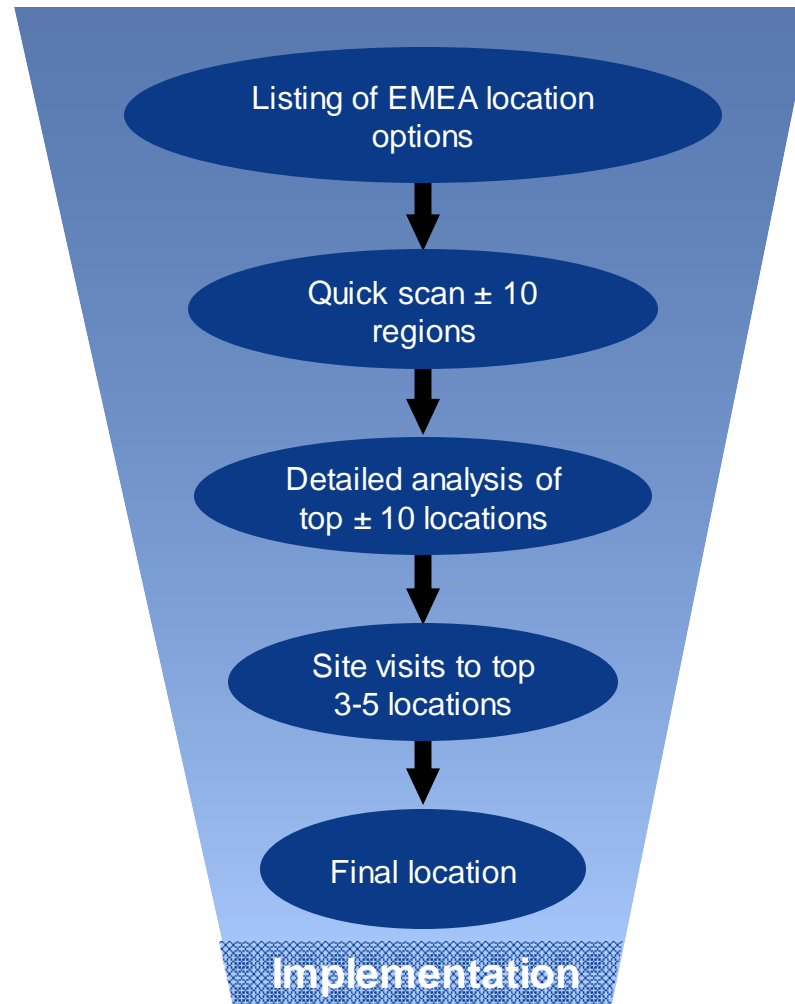
Detailed analysis

## Phase D:

Site visits

## Phase E:

Negotiations



## Your input

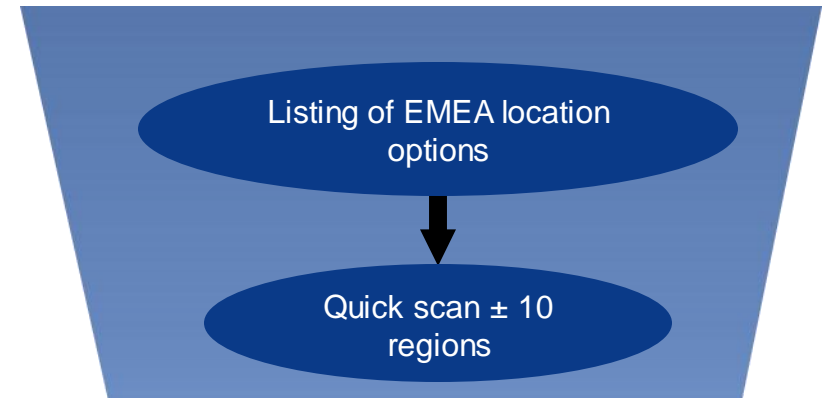
1 Request for information (RFI)

2 Detailed RFI

3 Site visits

# Request for information

## Phase B Quick scan



## Objective

- Selection of cost effective, high quality and secure regions, in order to narrow down to a short list

## Actions

- Consultant/ company carries out desk research and develops a RFI
- You receive a RFI (project profile and specific questions) and respond to the questions within a certain time period

# Experiences

- Prompt response from all, confirming the receipt of the RFI
- Most of the agencies respond pro-actively and provide us with tailored answers to the RFI
- Most agencies simply respond, others contact us and go through the query, adding suggestions and asking for more background information (~20% of the agencies)
- Some agencies often refer to their website, however the required information is not of the quality we need (example: labour cost and availability of specific job titles)
- Difficult questions are avoided (e.g. multilingual skills and native speakers)
- Some agencies offer tailor made assistance and models to calculate potential impacts of incentives



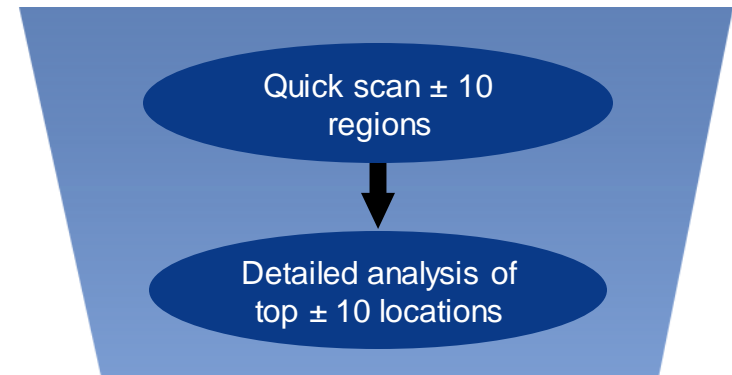


## Tips

- Be on 'mental map' of consultants / intermediaries
- Appoint a project officer/account manager
- Confirm receipt of RFI
- Provide feedback on profile and questions in order to make sure you understand rationale
- Confirm deadline
- Provide answers based upon the latest figures
- Add references/sources and year

# Detailed RFI

## Phase C Detailed analysis



## Objective

- More detailed analysis of less locations
- Narrowing down to a site level of 3-5 locations to visit

## Actions

You receive a more detailed RFI in general on:

- Labour issues such as: costs, quality, skills, availability, competition, etc.
- Buildings such as: accessibility (physical and telecom), availability, costs and specific needs of the investor
- Incentives



## Experiences

- *'Happy to be on the shortlist'* and confirming the deadline
- Those who did not make it: only 20% asks feedback

## Tips

- Provide answers based upon the latest figures
- Add references/sources
- Fine tune with consultant



## **Key challenges with detailed RFQ**

- A Diversity of information**
- B Time needed to respond**
- C Cost factors often not clear**

## A Large diversity of information supply

### The information varies between:

- One page (A-4) high level, tailor-made response answering all questions to the point
- A 'business case' (up to 10 pages) with tailor-made arguments for the region and detailed answers to all questions asked
- Bits and pieces of readily available studies covering (often touching) the questions asked
- Hard copy info pack by mail

## B Diversity of time needed to provide info

**The timing needed for providing the information varies between:**

- All info days before the dead-line
- Just before or at dead-line (7 days)
- > 10 days, announced or un-announced

### **Tips**

- Save time by focusing on specifics of RFI (e.g. specific building propositions are often not relevant in this phase of the project)
- Send available info a.s.a.p. and come back later with more difficult to obtain info

## C Cost factors often not clear

- Often large ranges in employment costs as there is not enough focus on the provided job profile(s)
- Incentives: often too general information instead of a tailor-made response, if we must assume something, we will be conservative!
- Real Estate cost: Prime A, B and C office/industrial real estate costs. Some already come up with cheaper / creative solutions, this becomes more relevant only later in the process
- Limited focus on a five years perspective for labour cost and labour availability, help the client with their assumptions

# Site visits

## Phase D Site visits



## Objective

- Selection of the best site meeting the requirements

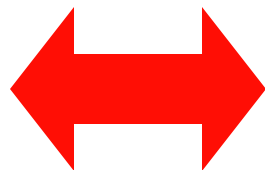
## Actions

- Site visit (often) joint investor/BCI team

## Tips: Do's and don'ts of site visits

### Do's

- Assist
- Organize
- Anticipate



### Don'ts

- Over-organize
- Over-sell
- Over-facilitate



## Site visits - Do's

### **Assist**

- Find the 'match' for the potential investor
- Support, provide information and aid
- Show interest in client, project and project team: ask questions
- Make sure your own people speak languages

### **Organise**

- Prepare information packages and communicate program with consultant
- Prioritise: focus on key issues
- Introduce the company to recent investors (testimonials), labour and recruitment offices and real estate agents

### **Anticipate**

- Have experts available to answer specific or technical questions
- Plan Recaps at the end of the visit: agree on your 'To Do List'

## Site visits - Do's

### General

- Express the region's welcoming attitude and hospitality to accommodate the company in your region
- Facilitate the investor in the best possible way (transport, accommodations, etc.)
- Convince the client that you represent the whole area and do not want to push to less attractive areas

## Site visits - Don'ts

- ### Over-organise
- Don't plan too long lunches and official dinners at the first visit
  - Don't plan evening events (no late wrap-ups nor entertainment): the client wants to evaluate with its team, without you
  - Don't show too many sites: *'If you don't like this site, we'll find another one'*
- ### Over-sell
- Don't over-estimate your region and your region's capabilities: *'We are the heart of Europe, no doubt we are the best region!'*
  - Focus on your own region's qualities and don't slander competitors
  - Don't influence the discussions with other investors too much, trust that company will ask all their relevant questions and hope to get confirmation from party visited

## Site visits - Don'ts

- Over-facilitate**
- Allow every 2-3 hours the company to:
    - make phone calls
    - send e-mails
    - have a bio-break
  - Focus on the major drivers of a location choice and skip the details at the first visit
- General**
- You should be an ambassador of your region so sell it, but don't be too pushy and don't underestimate the (gut) feelings of the potential investors ('feelings are facts too ....' so be open to them)



# Trends and Changing Location Requirements in Manufacturing

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