Next Generation Manufacturing

Location matters: A case study

Roland Berger

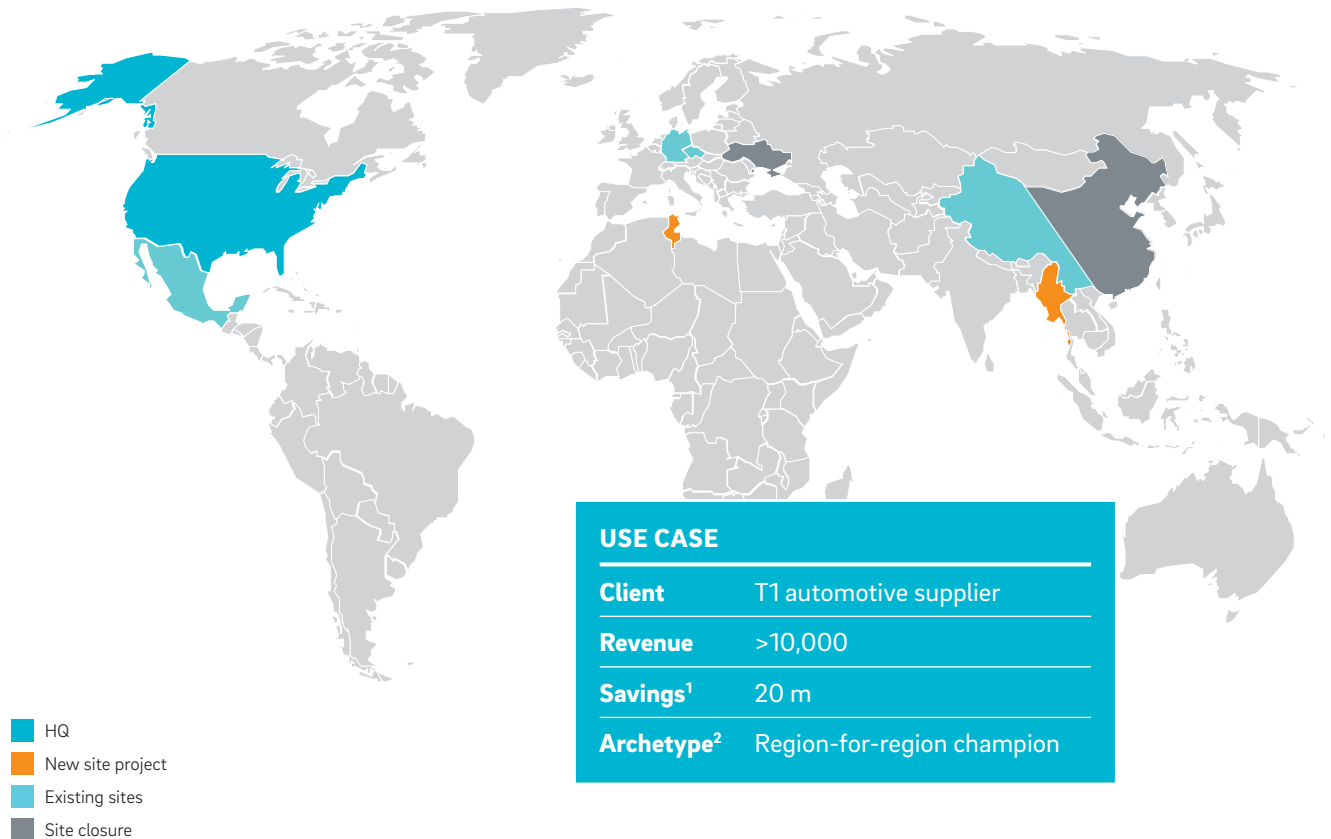# Designing a global Next Generation Manufacturing footprint
A case study

Ongoing changes in global trade mean that today's manufacturing companies are increasingly rethinking their production network strategies. To help them through this challenging process, Roland Berger has developed an effective and holistic approach to redesigning your manufacturing footprint, including a comprehensive suite of frameworks and tools that look beyond traditional site selection criteria and envisions future scenarios and competitor moves.

In the case study presented here, we supported a Tier-1 automotive supplier that had recently acquired another supply company, resulting in a global manufacturing footprint of more than a dozen plants, with more than 25 different product types. Many of these plants were at or nearing capacity, and were affected by geopolitical and supply chain issues, while the overall product portfolio was projected to have significant growth. We performed a holistic footprint optimization exercise that considered all six of the Next Generation Manufacturing trends (see following slides). The outcome? A strategic manufacturing site plan for the company that included an overall optimization across the existing network as well as three new greenfield or brownfield developments by 2026, and – better still – identified more than USD 20 million in potential recurring annual savings.

WE DESIGNED A GLOBAL MANUFACTURING FOOTPRINT OF A TIER-1 SUPPLIER IN THE AUTOMOTIVE INDUSTRY
Footprint development

USE CASE	
Client	T1 automotive supplier
Revenue	>10,000
Savings[1]	20 m
Archetype[2]	Region-for-region champion

- HQ
- New site project
- Existing sites
- Site closure

[1] Recurring annual EBIT effects due to footprint optimization   [2] After footprint optimization

Source: Roland Berger

We consider all six Next Generation Manufacturing trends
An approach tailored to the client

We systematically measured the performance of the company's production network along all six dimensions of our Next Generation Manufacturing (NGM) framework. For each dimension, we looked at the specific needs of the client: How was it affected by **geopolitical risks,** for example? What did **industry disruption** mean for the company? To what extent was the industry affected by **sustainability** concerns? Using a variety of tools, we then developed a series of targeted actions aimed at improving the performance of the client's manufacturing by redesigning its manufacturing network footprint.

NEXT GENERATION MANUFACTURING TRENDS

Performance of production set-up before and after footprint optimization

Digitalization · Sustainability · Industry disruption · Location matters · Individualization · Rise of populism
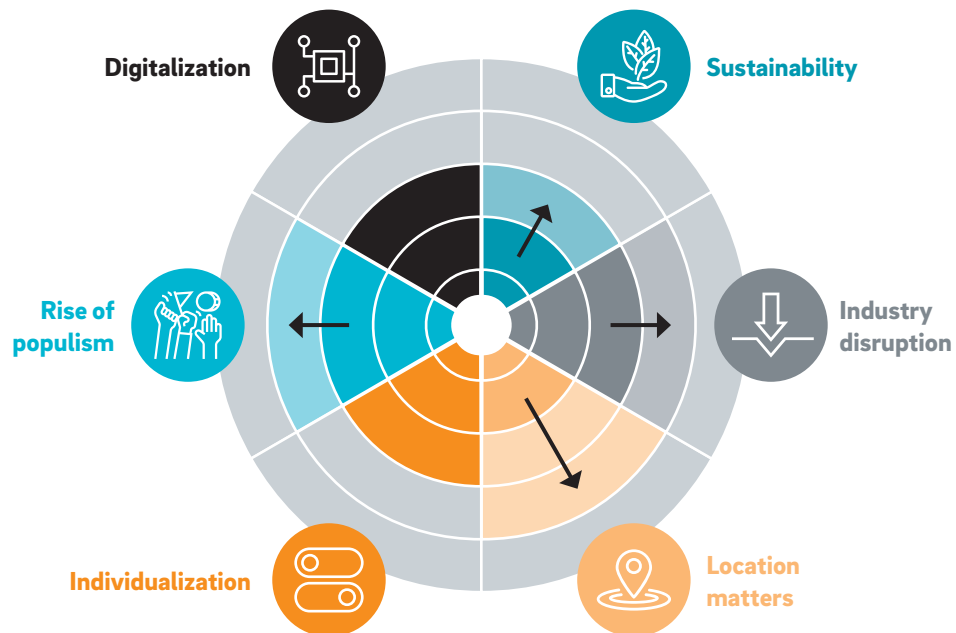
Client's NGM trend considerations

Location matters: Customers demand short lead times — footprint needs to match supply and demand at a regional level, while also taking into account labor costs and customer proximity.

Rise of populism: OEMs demand delivery reliability and safety — focus on closing plant in Ukraine and moving Europe-bound production out of China for risk mitigation.

Industry disruption: Customers are ramping up battery electric vehicle production — new battery-related products (cooling plates) for BEVs and their specific requirements must be considered in the footprint.

Sustainability: CO_2 footprint is increasingly relevant for automotive OEMs — supply chain needs to be optimized to reduce transportation and enable region-for-region production.

Individualization: Increasing number of variants on customer side — new value streams/products with higher customization are a key consideration for acquisition and footprint.

Digitalization: Customers have increasing quality and efficiency requirements — identify Industry 4.0 use cases and best practices during plant visits for scaling.

Source: Roland Berger

We carry out a structured location search process
Roland Berger Location Search Engine, Part 1

The advantage of the Next Generation Manufacturing framework is that it forces companies to rethink their footprint in a structured and holistic fashion. For this purpose, we need to carry out a location search – in this case, we used our proprietary Location Search Engine. This supports all types of site and country selection processes. The first step is to pick company-specific relevant categories and KPIs (key performance indicators) based on the specific needs of the project from our KPI longlist. The Location Search Engine includes country-by-country data for more than 60 footprint criteria, allowing us to filter and select potential site locations in a highly structured way. Furthermore, it can be extended by industry specific criteria such as the specific supplier landscape or local sales markets.

PART 1: Choose relevant categories & KPIs based on project/client-specific needs

A — Labor costs
Average wage per hour	✓
Average wage per hour in manufacturing	✓
Wage of plant and machine operators	✓
Wage of technicians and associates	✓

B — Availability of labor
Population density	✓
Total unemployment rate	✓
Youth unemployment rate	✓
Average working days per year	✓
Total labor force	✓

C — Experience & education
Literacy rate	✓
Primary education rate	✓
Secondary education rate	✓
Tertiary education rate	✓
Graduates in engineering, mfg. & construction	✓
Graduates in science subjects	✓

E — Tax[1]
Corporate tax rate	✓
Average inflation growth rate 2019-21	✓
No. of free-trade agreements in eng., mfg. & constr.	✓

+ More client/industry-specific data:
Market and demand side	✓
Existing footprint & customer sites	✓
Subsidies, etc.	✓

D — Logistics & infra-structure
International LPI ranking	✓
Internet bandwidth	✓
Price per 10 liters of premium gas	✓
Industry electricity price	✓
Density of road network	✓
Density of rail network	✓
No. of active seaports	✓
No. of international airports	✓

F — Raw material supply
Aluminum	✓
Refined copper	✓
Steel	✓
Magnesium	✓
Natural rubber	✓
PVC	✓

G — Next Generation Manufacturing
Sustainability	G.1	✓
Industry disruption	G.2	✓
Location matters	G.3	✓
Individualization	G.4	✓
Rise of populism	G.5	✓
Digitalization	G.6	✓

...each NGM dimension consists of multiple KPIs[2]	✓

SELECTION OF EXISTING CRITERIA – EASY TO INTEGRATE ADDITIONAL (CLIENT-SPECIFIC) CRITERIA

[1] Tax and currency   [2] See NGM Country Radar for detailed description

Source: Roland Berger

We select potential countries and prioritize them quantitatively and qualitatively
Roland Berger Location Search Engine, Parts 2 & 3

The next step is to select potential countries based on footprint criteria clustered into categories such as labor costs and availability, infrastructure and raw material costs. We can set "no-go thresholds" and manually exclude certain countries or regions. Jointly, we can align on specific weightings for KPIs – within categories to create a category score, and between categories to calculate a final regional attractiveness score. The result is a list of prioritized countries, ranked according to their attractiveness for the company, followed by a qualitative country and region analysis.

PART 2: Filter countries

**2.1** Choose relevant **no-go thresholds** or **manually exclude** countries/ regions

Average wage per hour	<x USD

2.2 Choose **specific weightings for KPIs** within categories to create a category score and **between categories** to calculate the final **RB regional attractiveness score**

Labor costs	20%
Average wage per hour	60%
...	...

PART 3: Output: Visualization, shortlist & ranking of countries

Project example of T1 automotive player

Low — **Regional attractiveness** — High
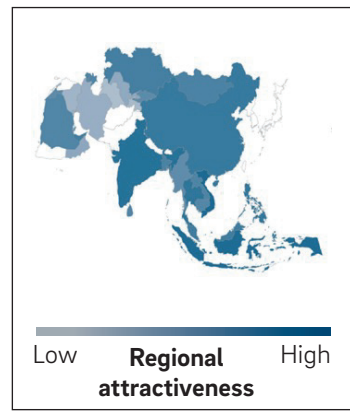
A	Labor cost	20%
B	Availability of labor	20%
C	Experience & education	10%
D	Logistics & infrastructure	10%
E	Tax and currency	10%
F	Raw material supply	20%
G	NGM	10%
Σ	**RB regional attractiveness**	

	Country 1	Country 2	Country 3
	...	...	...
	...	...	...
	...	...	...
	...	...	...
	...	...	...
	...	...	...
	...	...	...
	...	...	...

Source: Roland Berger

We have additional data for 26 NGM indicators
Roland Berger Next Generation Manufacturing Country Radar

Next Generation Manufacturing trends are unique in that they go beyond traditional footprint criteria. However, the enabler of each trend differs from country to country, based on the country's politics, infrastructure and various socioeconomic factors. The Roland Berger Next Generation Manufacturing Country Radar is a framework of KPIs that covers 26 different NGM indicators. With data from 58 countries across five continents, it provides production strategists with an overview of the relevance of trends in specific countries, helping them make informed decisions about their future manufacturing footprint.

OUR REGIONAL NGM COUNTRY RADAR SHOWS THE RELEVANCE OF THE SIX NGM MEGATRENDS ON A COUNTRY LEVEL
Next Generation Manufacturing

DIGITALIZATION
- 26 Share of online retail
- 27 Venture capital investments
- 28 Internal Digital Economy and Society Index

POPULISM
- 23 TIMBRO Authorization Populism Index
- 22 Free trade agreements signed
- 21 Share of adults use of social media as source for news
- 20 Satisfaction with democracy
- 19 Perception of corruption of political parties
- 20 Trade tariffs

INDIVIDUALIZATION
- 17 Hofstede Cultural Dimensions Individualization index

SUSTAINABILITY
- Roland Berger Climate Change Combat Radar 1
- Ratio of female-to-male labor force participation rate 2
- Level of guarantee of fundamental labor rights 3
- Corruption perception index 4

INDUSTRY DISRUPTION
- Level of electric vehicles/total new vehicles 5
- Global innovation index 6
- Number of patents per GDP 7
- Percent of GDP spend on R&D 8
- Car sharing user penetration 9

LOCATION
- Ease of doing business index 10
- Share of trade in GDP 11
- Logistic performance index 12
- Average manufacturing wages 13
- Price of electricity 14
- Average ranking of top 3 universities 15
- Unemployment level 16
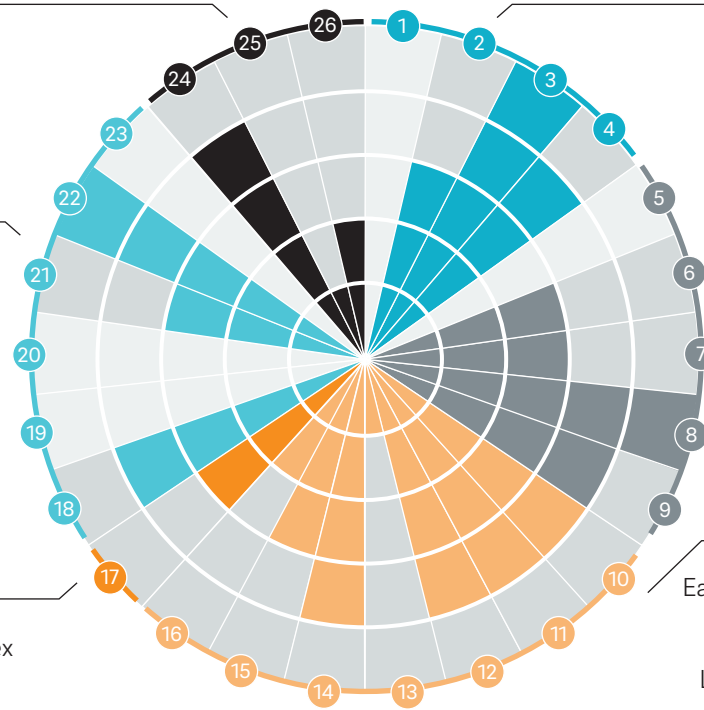
Availability of enabler low in the country   Availability of enabler high in the country   KPI not available

Source: Roland Berger

Key takeaways
A holistic framework

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Our Next Generation Manufacturing framework is universal and comprehensive, bringing together a wide range of different dimensions. It includes a holistic approach and criteria that can be missed or overlooked easily. Moreover, it anticipates major trends and future levers, actively managing change when designing the new production setup. Our approach also makes use of techniques such as war-gaming to envision future scenarios and movements by competitors. All this helps our clients stay ahead of the game in a rapidly changing world.

KEY TAKEAWAYS FROM NGM FOOTPRINT PROJECT

1 **All six Next Generation Manufacturing trends** must be considered in global footprint design and optimization

2 Geopolitical instabilities and unstable supply chains lead to the creation of **new relocation archetypes,** such as the **region-for-region champion**

3 Traditional site selection criteria **do not give the full picture** – new site selection and relocation **criteria take the Next Generation Manufacturing trends into account**

4 **Production war-gaming** using Next Generation Manufacturing tools enables quick manufacturing strategy decisions based on scenario quantification and visualization

Source: Roland Berger

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