



Modern public tendering (MEAT): Cornerstone for the rail mobility revolution

Perspectives and success stories

Abridged version of a report to the VDB

DIE BAHNINDUSTRIE.

VDB VERBAND DER BAHNINDUSTRIE IN DEUTSCHLAND E.V.

This is the abridged version of a report that evaluates international case studies of innovative award procedures and is the result of joint research by McKinsey and the VDB. The findings are based on a large number of interviews with representatives of selected VDB member companies and their client companies to determine the advantages and disadvantages of applying MEAT criteria in the awarding of railroad projects. The interviews were documented and coordinated with the relevant companies and their customers. To place the interviews in the context of current challenges in the mobility and transportation sector in Germany, McKinsey also conducted fact-based analyses and research based on data from publicly available sources. Furthermore, a joint VDB and McKinsey steering committee guided the study. VDB thanks McKinsey for the preparation of the final report and the participating member companies and their customers for their broad support.

Modern public tendering (MEAT): Cornerstone for the rail mobility revolution

Germany is striving for a mobility revolution in the rail sector that aims to address two demands that have previously been seen as mutually exclusive – reduce CO₂ emissions in the transport sector by more than 40% by 2030 and increase the volume of transport of both people and goods. By offering rail services that are attractive to passengers, practical for companies, and environmentally friendly, both objectives can be met.






The rail revolution is expected to increase rail's share of the freight transport market by 7 percentage points to 25% by 2030 and double rail's share of passenger transport.¹ This is to be achieved through projects such as the expansion of local public transport (ÖPNV), Deutschlandtakt, digital rail, and line electrification.

Its history of innovation and strength has put Germany's rail industry in a solid position to deliver forward-looking solutions with "Rail 4.0." The prevailing practices in Germany of tendering and awarding contracts on the basis of the lowest purchase price, however, is proving to be an obstacle to this. This practice inhibits competition for the best solution (Exhibit 1), and by not prioritizing certain aspects of manufacturers' expertise, it also inhibits innovation, particularly in complex projects. The shortterm focus on acquisition costs also increases the risk of higher costs in development and throughout the entire life cycle (Exhibit 2) as well as the risk of supplements and budget overruns.

Exhibit 1

The near-singular focus on price brings many disadvantages

Disadvantages due to focus on price

	Low level of product innovation	Innovative technologies are not considered
	Unpredictable life cycle costs	The lowest purchase price disregards all TCO-related effects after delivery
	Negative environmental impact	The lowest price is often linked to a negative environmental impact (e.g., CO ₂ emissions)
	Less focus on qualitative and customer-oriented features	The experience of the end user as well as qualitative aspects such as longevity are neglected
	No guarantee for availability of spare parts	Maintenance issues are the responsibility of the operator and procurer – the manufacturer is not liable

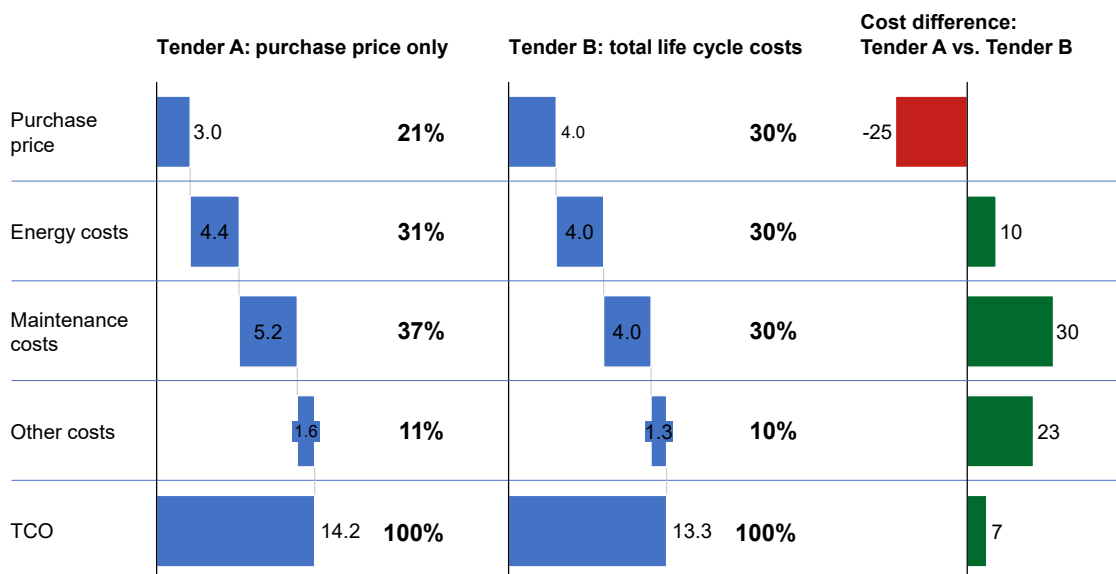
¹ Coalition Agreement 2021 - 2025 between the Social Democratic Party of Germany (SPD), Alliance 90/The Greens, and the Free Democrats (FDP), p. 49; https://www.spd.de/fileadmin/Dokumente/Koalitionsvertrag/Koalitionsvertrag_2021-2025.pdf

Exhibit 2

Focusing solely on the purchase price obscures the fact that energy and maintenance costs could end up being significantly higher

TCO vs. purchase price of an electric locomotive, life cycle costs
EUR millions

% Share of TCO in percent



Source: Expert interviews

Through its MEAT approach, the EU enables the redesign of public procurement

The European Union has recognized the problems that arise from the focus on purchase price – which is, in part, a consequence of current tender law – and, in response, introduced the MEAT (Most Economically Advantageous Tender) evaluation method in 2014.

MEAT can be a key facilitator of innovation in rail because when MEAT criteria are applied, the focus is not on the purchase price but on criteria such as life cycle costs, sustainability, quality in implementation and operation, functionality of the tender, degree of technology support, and design and accessibility.

Nevertheless, in the rail sector, especially in Germany, the acquisition price continues to be the decisive criterion in tenders (Exhibit 3). Recently, however, the chances have increased significantly that the MEAT method can soon play a key role in this country as well: The coalition agreement between the Social Democratic Party of Germany (SPD), Alliance 90/The Greens, and the Free Democrats (FDP) provides for a revision of German public procurement law. The parties aim to specify the requirements of public procurement procedures in Germany in line with European procurement law and ensure that public procurement considers sustainability, innovation, and long-term economic efficiency.²

² Ibid, p. 33

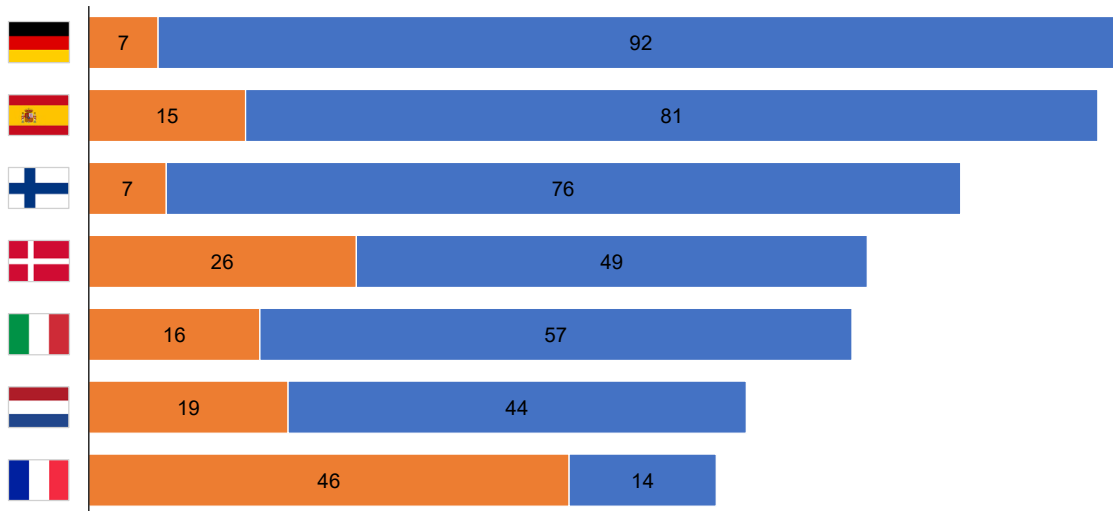
Exhibit 3

Price is currently still the most important (or only) award criterion

Distribution of tenders in the rail sector according to price weighting in the evaluation¹

Price weighting, percent

50 - 99 100



¹ The analysis was conducted using a proprietary analytics tool and is based on 23,000 EU-wide tenders in the rail sector from 2013 to Q3 2020

Source: Tenders Electronic Daily

MEAT tenders make better use of the innovative power of the rail industry

In the following, we focus on the four MEAT criteria that so far have been given too little weight in public tenders in Germany: I. Life cycle costs and sustainability; II. Quality in implementation and operation; III. Functionality of the tender and degree of technology support; and IV. Design and accessibility. To this end, we explain the most important approaches for the redesign of tenders. We also use profiles of successful tenders that are focused on MEAT criteria (hereinafter: “MEAT tenders”) to show the extent to which the consideration or greater weighting of one of the MEAT criteria in each case has had a positive effect (see text box “On the selection and assignment of the success stories”). We then provide a brief overview of the overarching success factors for MEAT tenders.

Text box: On the selection and assignment of the success stories

Our analyses of success stories for MEAT tenders in the rail sector have shown that no single path can be classified as the ultimate “best practice.” This is because the clients, including transport operators or infrastructure managers, have tendered a wide range of products and services with very different scopes of use. However, all examples show positive impacts on involved stakeholders along one or more of the MEAT criteria.

Eight tenders for rolling stock and infrastructure projects from several EU countries were selected as success stories (see “Overview of MEAT tenders” below) to provide a broad view of MEAT tenders in the rail sector. Each tender focuses on one of the four MEAT criteria, while at the same time taking the other (MEAT) criteria into account. For reasons of clarity, the examples have each been assigned to the criterion that is central to them.

Overview of MEAT tenders

MEAT criterion I: Life cycle costs and sustainability

Case study 1: Streetcars for the city of Augsburg 7

Case study 2: Regional trains for the Rhine-Ruhr Express (RRX) 7

MEAT criterion II: Quality in implementation and operation

Case study 3: Rail technology for the Gotthard Base Tunnel 8

Case study 4: Countrywide rollout of the ERTMS/ETCS signaling system in Norway 9

MEAT criterion III: Functionality of the tender and degree of technology support

Case study 5: Hydrogen-powered passenger trains for local transport in the Rhine-Main region 10

Case study 6: Innovative maintenance vehicles for rail infrastructure in Norway 10

MEAT criterion IV: Design und accessibility

Case study 7: New vehicles for the Bern–Solothurn regional light rail 11

Case study 8: The Giruno high-speed trains 13

Key aspects of the MEAT criteria for the redesign of tenders – including fact sheets on success stories of MEAT tenders

By considering one or more of the MEAT criteria, a tender can be designed to evaluate not only the purchase price but also the total costs, benefits, and sustainability of bids. In this context, the following aspects are of particular importance in each of the four MEAT criteria:

Criterion I: Life cycle costs and sustainability

If maintenance work is integrated into the bidding process for new vehicles, contractors will be moved to optimize the design and development of the vehicles in such a way that maintenance and acquisition costs are equally minimized over the entire service life and the greatest possible transparency is created for variable costs. High energy, resource, and cost efficiency always means more climate protection.

Outsourcing of inventories for spare parts and special tools as well as the external provision of training and education for the customer's own maintenance personnel reduce the customer's capital and investment costs for the maintenance of the new vehicle classes and significantly lower the economic risk.

In addition, there is the option to completely outsource the general operating and maintenance costs to the contractor and to agree on a contractual availability commitment. This makes it possible to set the variable costs for the contractor at a fixed price per kilometer (or similar indicators) and to provide a fully operational vehicle fleet throughout. For passengers, this means more punctuality and greater reliability in rail transport.

Examples of such an award are the procurement of streetcars for the city of Augsburg and of new vehicles in regional transport for the Rhine-Ruhr Express:

Case study 1: Streetcars for the city of Augsburg

What is the scope?	11 streetcars, including a maintenance contract for 16 years with a two-time option to extend the contract by 8 years each time and guaranteed technical fleet availability
What is the type of contract?	Focus on availability and reliability
Why is it best practice?	One of the first agreements in public transport in Germany in which the OEM is responsible for maintenance and cooperates with the transport operators in doing so
Facts and figures	Main contract partners: Stadtwerke Augsburg (SWA), Stadler Contract volume: EUR 57 million Year of contract award: 2019

The key findings from this case study are as follows:

- In this modern maintenance model, the OEM contracted SWA as the transport operator to perform vehicle maintenance. SWA employees can carry out the maintenance work in the local workshops, while at the same time reducing risks and uncertainty for SWA.
- Because life cycle costs, including maintenance costs, were considered in the bid evaluation, SWA was able to forecast operating costs over the entire life cycle and then select the most economically advantageous bid.
- The integration of design criteria in the tender created the conditions for a vehicle design that is adapted to local requirements and provides the desired customer experience, including a high level of comfort for passengers.

Case study 2: Regional trains for the Rhine-Ruhr Express (RRX)

What is the scope?	84 multiple units, including a maintenance contract over a period of 32 years and guaranteed availability of the fleet
What is the type of contract?	Focus on availability and reliability
Why is it best practice?	One of the first agreements in the German public transport market where the manufacturer bears full maintenance responsibility over the entire life cycle
Facts and figures	Main contract partners: Transport authorities (led by VRR plus NVR, NWL, SPNV-Nord, and NVV), the state of NRW, Siemens Contract volume: EUR 1.7 billion Year of contract award: 2015

The key findings from this case study are as follows:

- Due to the life cycle approach in the tender, the manufacturer was able to optimize total costs through a design-to-maintain approach – which simplifies maintenance – and by optimizing operating costs. With this approach, energy consumption per seat is expected to fall by up to 50%.
- The RFP also evaluated passenger flow based on the manufacturer's train design. This led to the development of an innovative vehicle platform that improves passenger flow and enhances customer satisfaction.
- In this operating model, the manufacturer must always provide a certain number of operational trains and fix any defects. This creates clear responsibilities and makes operating costs predictable for the transit authority over the entire life cycle.

Criterion II: Quality in implementation and operation

Tenders with high quality, depth of detail, and defined milestones for the contractor (method for specifying and evidencing reliability, availability, maintainability, and safety (RAMS) on the one hand, and close monitoring on the client side on the other) can significantly increase quality and the probability of meeting time targets by linking them to bonuses.

Pilot projects and multistage bidding procedures considerably improve quality in the execution of large procurement transactions. A prerequisite for this is that the tendering procedures include negotiations and discussions on technology and project management with the OEMs, while allowing the client to better adapt the tender to the cooperation with the contractor and its own goals.

Examples of these awards include the rail technology for the Gotthard Base Tunnel in Switzerland and intelligent switch monitoring in Norway:

Case study 3: Rail technology for the Gotthard Base Tunnel

What is the scope?	Rail technology for the 57-kilometer-long Gotthard Base Tunnel
What is the type of contract?	Focus on meeting time and cost targets with an extended warranty period
Why is it best practice?	On-time completion of the highly complex project due to strict adherence to the RAMS model
Facts and figures	Main contract partners: AlpTransit Gotthard Ltd (ATG), Transtec Gotthard (consortium) Contract volume: CHF 1.7 billion Year of contract award: 2008

The key findings from this case study are as follows:

- The design of the tender and contract according to RAMS criteria laid the foundation for reliable execution and adherence to the schedule, among other things through the prescribed step-by-step procedure, in which all milestones are documented and handed over.
- The client took advantage of the high transparency of the detailed documentation to monitor progress. Among other things, he sent several technical consultants to monitor the project.
- The LCC values required in the RFP are a suitable compromise to account for life cycle costs without transferring life cycle maintenance to the contractor and thus potentially increasing complexity.

What is the scope?	Digitization of the Norwegian rail network through implementation of the ETCS Level 2 train control and signaling system, including a maintenance period of 25 years after completion
What is the type of contract?	Functional specification with a focus on quality and timely delivery
Why is it best practice?	High weighting of quality and reliability of execution, based on a sophisticated tendering and negotiation process
Facts and figures	Main contract partners: Bane NOR, Siemens Mobility Contract volume: EUR 800 million Year of contract award: 2018

The key findings from this case study are as follows:

- The implementation of a pilot project prior to the tender helped to clarify uncertainties regarding the large-scale project.
- The functional specification is based on proven European standards. Eliminating special requests enabled an interchangeable and interoperable solution that can be scaled quickly.
- Extensive negotiation rounds and repeated feedback to the OEMs meant that all offers were highly comparable in terms of quality and execution. This allowed for a transparent and comprehensive basis on which the decision could be made.

Criterion III: Functionality of the tender and degree of technology support

Technology-specific tenders in combination with an availability commitment and supply and maintenance obligations enable contracting authorities to promote and deploy new technologies without having to assume liability and risk for failures of this technology.

Innovation and the development of the best technological solution for the contracting authority can be launched through functional, open technology tenders with detailed requirements and a significant proportion of non-monetary decision criteria.

Examples of this are hydrogen-powered passenger trains for local transport in the Rhine-Main region and innovative maintenance vehicles for rail infrastructure in Norway.

Case study 5: Hydrogen-powered passenger trains for local transport in the Rhine-Main region

What is the scope?	Purchase of 27 hydrogen trains, including maintenance contract over a period of 25 years (hydrogen supply and provision of the necessary refueling infrastructure)
What is the type of contract?	Life cycle contract with focus on innovation
Why is it best practice?	Promotion of innovative drive technology
Facts and figures	Main contract partners: Rhein-Main-Verkehrsverbund (RMV) and Alstom Contract volume: over EUR 500 million Year of contract award: 2019

The key findings from this case study are as follows:

- The willingness of the transport authority to test a new and not yet fully established technology is a significant step towards a more widespread use of hydrogen trains and acts as a global beacon project for more sustainable train transport.
- By including hydrogen-supply and maintenance agreements in the contract, monetary risks for RMV are being limited. Alstom has succeeded in forming a consortium of partners that are suited to meet all the requirements of the contract.
- The operational model based on consortium partnerships over the entire life cycle ensures the allocation of clearly defined joint responsibilities with a focus on core competencies.

Case study 6: Innovative maintenance vehicles for rail infrastructure in Norway

What is the scope?	Tender from Bane NOR, the state-owned railroad infrastructure company in Norway, for 12 maintenance vehicles (awarded to WINDHOFF Bahn- und Anlagentechnik GmbH in 2020); delivery as of 4th quarter 2022).
What is the type of contract?	Functional contract with a focus on technical parameters
Why is it best practice?	Function at the center of the tender; non-monetary criteria decisive for the award (price only with a weighting of 40%)
Facts and figures	Main contractors: Bane NOR, WINDHOFF Bahn- und Anlagentechnik GmbH Year of contract award: 2020

The key findings from this case study are as follows:

- By opting for a functional tender process, Bane NOR was able to focus on technical parameters and give the tender participants the freedom to develop the vehicles best suited to Bane NOR's requirements.
- The tender included approximately 560 required vehicle specifications. This allowed Bane NOR to specify the exact technical standards for the desired vehicles.
- Since Bane NOR holds the manufacturer liable as soon as the life cycle costs exceed the contractually agreed limits, the company avoids unforeseeable costs once the vehicles are in service.

Criterion IV: Design and accessibility

Prioritizing design and functionality over price and involving users in developing the requirements for the new design creates, on the one hand, a clearly defined vision of the end product for the manufacturer even before the tendering process begins. On the other hand, this participatory tender process offers a public, media-effective marketing opportunity for the operator and client.

At the same time, while the value of design and accessibility is difficult to quantify, as a criterion it will play an increasingly important role in the acceptance and attractiveness of rail as a means of transport in the future. In view of the rising expectations of local transport customers with regard to comfort and aesthetics (see text box “Shifts in customer expectations”), both aspects must be seen as critical to success. This is especially true regarding competition with new forms of mobility that can respond more flexibly to customer preferences.

Examples of these innovations include new vehicles for the Bern–Solothurn regional light rail and the Giruno high-speed trains:

Case study 7: New vehicles for the Bern–Solothurn regional light rail

What is the scope?	Purchase of 14 commuter trains for the S7 line in Bern, Switzerland; design with ideas from passengers solicited through a crowdsourcing process
What is the type of contract?	Focus on design and functions
Why is it best practice?	Involvement of local population; focus on functional award criteria; final award decision based on non-monetary criteria; acquisition price with 40% weighting
Facts and figures	Main contract partners: Regionalverkehr Bern–Solothurn (RBS), Stadler Contract volume: CHF 134 million Year of contract award: 2015

The key findings from this case study are as follows:





- Involving the local population in the design process was a completely new form of customer orientation in public transport.
- The consideration of functional design aspects such as more doors for faster boarding and exiting ensured high customer satisfaction and enabled punctuality targets to be met despite the expected increase in passenger numbers.
- Since the acquisition price did not play a central role in the award criteria, Stadler was able to concentrate on the demanding functional aspects and play to its strengths in terms of technology and service.

Text box: Shifts in customer expectations

Shifting traffic to rail is essential for reducing CO₂ emissions and achieving climate targets. In order to increase the share of rail in passenger transport, rail must be seen as an attractive alternative to private cars or airplanes in urban areas and on long routes (Exhibit 4).

Exhibit 4

Selected examples show that attractive and innovative offers in rail passenger transport can significantly increase its modal share

	Streetcar in Karlsruhe	High-speed train between Berlin and Munich	High-speed train between Paris and Brussels	Public transport in Vienna
Situation	 <p>Since 1970, trains on isolated regional lines in Karlsruhe have been integrated with inner-city streetcars and regional trains, allowing passengers to travel seamlessly from the city center to the suburbs</p>	 <p>With the high-speed Berlin-Munich connection built in 2017, the travel time is now only 2.5 hours</p>	 <p>The introduction of high-speed trains was successful thanks to investments in a state-of-the-art high-speed line and trains that meet customer needs</p>	 <p>The city of Vienna invested > EUR 400 million to offer inexpensive public transport tickets (EUR 365 for an annual ticket)</p>
Impact	<p>Passenger numbers increased by > 50% between 1996 and 2016</p> <p>With the integration of neglected regional lines into the streetcar system, the number of passengers increased by up to 800%</p>	<p>The modal share increased from 23% to 45%: Passengers are traveling by air less and less, which has already saved ~ 188,000 tons of CO₂</p>	<p>Rail operators doubled their share of traffic to > 50% of all trips between the 2 cities</p> <p>Air traffic almost came to a standstill on this route, and the share of passenger cars fell by > 20%</p>	<p>The modal share of public transport increased by ~ 10% in the last 25 years and is currently 38% for public local transport and only 29% for passenger cars</p>

Source: Bundesinstitut für Bau-, Stadt- und Raumforschung; System-Bahn; industr.com; Die Zeit; Der Spiegel

Rail should not be seen by customers as a “mode of last resort” or even as an occasional mobility solution. For rail to be a success, it should be seen, consistently, as the better alternative to private motorized transport in as many areas of their lives as possible. It is therefore crucial to understand and deliver on all of customers’ public-transportation preferences. But what are the most important decision-making criteria for customers when choosing a means of transportation? A McKinsey survey conducted in Germany investigated customer preferences in mass transit and what drives the decision making of frequent public transport users when it comes to which mode of transportation they choose (Exhibit 5):

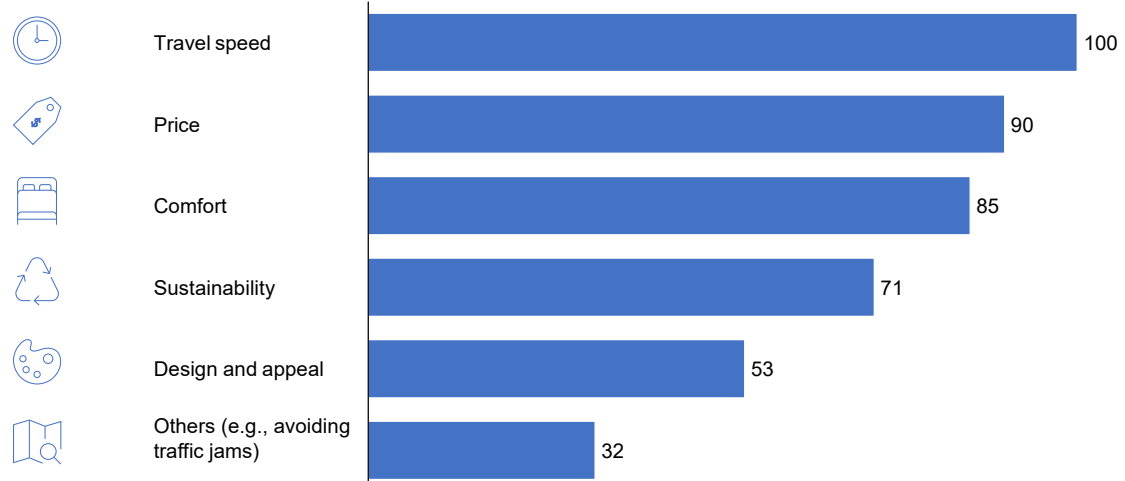
Exhibit 5

Consideration of customer preferences helps to increase the attractiveness of rail

Besides travel speed and price, there are other factors that are important to customers when choosing a means of transportation

Most important reasons for frequent public transport users’ choice of means of transport, percent¹

n = 1,647



1. Multiple answers possible, indexed

Source: McKinsey Future of Mobility

What is the scope?	29 high-speed multiple units for the Swiss north-south axis, including the connection to Italy as the world's first single-deck, low-floor, high-speed trains
What is the type of contract?	Functional tender
Why is it best practice?	Focus on customer-oriented innovations in a complex environment with international business activities (Switzerland, Italy, Germany)
Facts and figures	Main contract partners: SBB, Stadler Contract volume: CHF 970 million Year of contract award: 2014

The key findings from this case study are as follows:

- A functional tender with a clearly specified evaluation scheme and based on transparent subjective evaluations, where appropriate, can encourage innovation and help identify the most economically advantageous offer (MEAT criteria).
- Branch dialogues can prove helpful in discussing the feasibility of key requirements and tendering marketable solutions; after submission of bids, clean-up meetings allow both sides to align on technical details before the final contract is awarded.
- The inclusion of purchase options for different versions in the tender gives the tendering body the flexibility to expand the vehicle portfolio later according to the conditions.

Overarching success factors for MEAT tenders

In addition, five overarching success factors for convincing tenders can be derived from our analyses:

- 1. Predefinition of the participation processes.** This applies in particular to very large projects.
- 2. Long-term involvement of OEMs or contractors.** Ideally, this commitment is made at the beginning of the bidding process and applies to the entire life cycle of the products or services.
- 3. Avoiding superfluous specifications and fixed budgets.** To incentivize cost-effective innovation, MEAT tenders are increasingly moving away from providing excessively detailed specifications or providing fixed budgets.
- 4. Creating and providing additional requirements for investments.** These include detailed preparation of the RFP process, staffing the RFP team with experienced personnel, providing a functional specification with room for innovation, offering a high-quality design, and applying proven industry standards.
- 5. Efficient risk management.** Important components of the success of the overall project are fair and balanced contract terms and an allocation of contractual risks that is guided by the basic principle of better risk governance.



In MEAT tenders, decisions are not made primarily on the basis of the purchase price, but based on criteria such as life cycle costs and sustainability, quality of implementation and operation, functionality of the tender and degree of technology support, as well as design and accessibility. Applying MEAT to rail tenders means that subsidized low-cost bids alone are no longer a guarantee of winning a contract. Importantly, MEAT also ensures that taxpayers consistently receive the “best value” – not just the cheapest price – for their invested tax money. Tenders based on MEAT criteria make it possible to strengthen the entire rail and mass transit ecosystem. In turn, rail is better positioned to increase its share of the transport sector – both in passenger and freight – and an important contributor to Germany's ability to achieve its climate targets.

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Verband der Bahnindustrie in Deutschland (VDB) e.V.

Universitätsstraße 2
10117 Berlin
Telephone: +49 (0)30 - 206289-0
Fax: +49 (0)30 - 206289-50
E-mail: info@bahnindustrie.info
www.bahnindustrie.info

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Content contributions

Dr. Carsten Lotz, McKinsey & Company
Dr. Anselm Ott, McKinsey & Company
Moritz Motyka, McKinsey & Company
Steffen Köpke, McKinsey & Company

Production team

Editing: Jörg Hanebrink, McKinsey & Company
Layout: Frank Breuer, McKinsey & Company
Copy Editing: Lena Bolanz, McKinsey & Company
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