



# Competitive Benchmarking and Case Studies

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Fundamentals of Benchmarking

Competitive Benchmarking in Practice

Case Studies from the Automotive Industry

Tools and Conclusion

# Fundamentals of Benchmarking

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# What is Benchmarking?

## Formal Definition


Benchmarking is the continuous process of measuring products, services, and practices against the toughest competitors or those companies recognized as industry leaders.

## In Simple Terms for Engineers

It's about understanding **how the best do it**, learning from them, and using that knowledge to **make our own products and processes better**.



- ✘ It is NOT just copying.
- ✔ It is a structured process for performance improvement.

# Why is it Critical in the Automotive Sector?

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-  **Demanding Customers:** Customers expect more features, better fuel economy, and higher quality at a lower price.

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# Types of Benchmarking

## Internal

Comparing processes or performance between different teams, plants, or divisions within the **same organization**. *Example: Comparing the production output of Tata's Pune plant vs. its Sanand plant.*

## Functional

Comparing similar functions or processes with non-competitors from **different industries**. *Example: Tata Motors studying Amazon's logistics and supply chain management.*

## Competitive

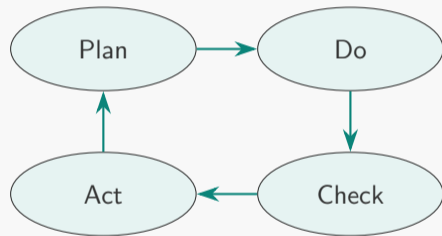
**Our Focus Today.** Direct product-to-product comparison against **direct competitors**. *Example: Anand Automotive tearing down a competitor's filter system.*

## Generic

Examines fundamental business processes that are the same across industries. *Example: Studying the HR onboarding process of a leading IT company.*

# The Benchmarking Process (PDCA Cycle)

1. **PLAN:** What to benchmark? Who are the best-in-class competitors? What data to collect?

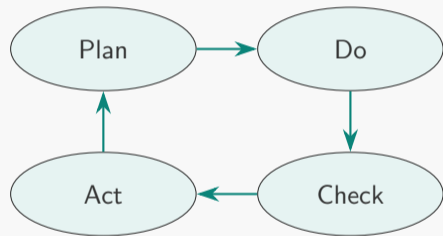


## Key Principle

This is a **continuous loop**, not a one-time project.  
The market is always evolving.

# The Benchmarking Process (PDCA Cycle)

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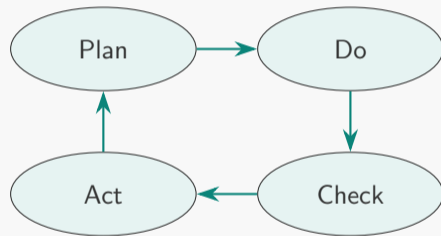


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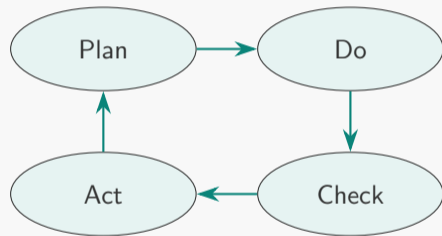
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4. **ACT (IMPLEMENT):** Develop and implement action plans to close the gap. Set new performance targets.

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# Competitive Benchmarking in Practice

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# Key Metrics for Automotive Engineers






What do we measure when we benchmark? A structured approach is key.

Category	Key Metrics	Example Components
 <b>Performance</b>	Power, Torque, BSFC, Emissions, Damping	Engine, Suspension, Brakes
 <b>Cost / Weight</b>	BOM Cost, Mfg. Cost, Kerb Weight	Chassis, BIW, Interior Trims
 <b>Quality</b>	NVH Levels, PPM Defect Rate, Warranty Claims	All components, especially mounts
 <b>Manufacturing</b>	Cycle Time, Degree of Automation	Assembly lines, Stamping

## Holistic View

No single metric tells the whole story. A winning product optimizes the trade-offs between these categories.

# Data Collection: The Engineer's Toolkit

-  **Product Teardown (Reverse Engineering):** The most common and effective method. Disassemble a competitor's product to its base components.
-  **Performance Testing:** Using labs and test tracks to measure objective performance data (e.g., using a dynamometer for engines).
-  **Literature & Patent Search:** Reviewing SAE papers and patent databases to understand a competitor's technology.
-  **Supplier & Customer Feedback:** Suppliers have insights into competitor components. Customer surveys reveal perceived quality.
-  **Trade Shows & Conferences:** A great way to see the latest innovations and talk to competitor engineers.

# **Case Studies from the Automotive Industry**

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# Case Study 1: Tata Nano - A Lesson in Perception

## A Masterclass in Cost Benchmarking

**Objective:** Create a safe, affordable car for the masses, benchmarking the cost of a scooter.

### Engineering Innovations:

- Rear-mounted 2-cylinder MPFI engine with single balance shaft.
- Lean manufacturing and minimalist design (e.g., 3-lug nuts, single wiper).

## The Unforeseen Gap: Customer Aspiration

The engineering was brilliant, but the marketing as "The World's Cheapest Car" backfired.

- People desire an *affordable car*, not a *cheap car*.
- Early safety perception issues were difficult to



The Tata Nano: An engineering marvel of frugal design.

## Key Takeaway

The "best" engineered solution must also be the "right" solution for the customer's perception of value and safety.

# Case Study 2: Maruti Suzuki - King of Frugal Engineering

**How do they consistently dominate the market?**

**The Answer: A Deep Culture of Benchmarking & Optimization**

## **Design Philosophy**

Benchmark global Suzuki platforms and ruthlessly re-engineer them for Indian conditions and cost targets. Every gram and rupee is scrutinized.

## **Supplier Development**

They don't just buy parts; they build suppliers. They work closely with vendors to optimize manufacturing and reduce costs system-wide.

## **Lesson for Tata and Anand**

World-class cost control is achieved not just in the design phase, but by building a deeply integrated and efficient supply chain.

### Creating a Segment vs. Competing in One

**The Masterstroke:** Ford didn't benchmark a competitor; they benchmarked a **customer need**: the desire for an SUV with hatchback running costs.

#### How they did it:

- Used their global B-platform (from the Fiesta).
- Designed it under 4 meters for tax benefits.
- Introduced the revolutionary 1.0L EcoBoost engine.



### Key Takeaway

Sometimes, the most powerful strategy is to benchmark a customer need that no one else is serving.

### For Tata Motors Professionals

The Punch & Exter are fierce competitors. If you benchmarked the Exter's powertrain, what would be your top 3 metrics to investigate & why? *(Consider: Performance*

*feel, fuel efficiency, NVH, cost)*

### For Anand Automotive Professionals

EVs have unique NVH characteristics. How does this alter your benchmarking for suspension bushings, mounts, and bearings?

*(Consider: Material selection, damping properties, supplier targets)*

## **Tools and Conclusion**

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# Helpful Tools for Benchmarking

While teardowns and testing are key, these analytical tools help structure the findings:

- **SWOT Analysis:** Strengths, Weaknesses, Opportunities, Threats. Good for a high-level comparison.
- **Quality Function Deployment (QFD):** The "House of Quality". Translates customer requirements ("Voice of the Customer") into engineering specifications.
- **Value Analysis / Value Engineering (VAVE):** A systematic method to improve the "value" of goods by examining function.

## Core Formula

$$Value = \frac{Function}{Cost}$$

- **Gantt Charts & Project Management Software:** To plan and execute the complex process of a full benchmarking project.

# Tools Techniques for Automotive Benchmarking

Tool/Technique	Description	Application in Automotive Sector
<b>Product Teardown</b>	Physical disassembly of a competitor's product to understand its design, materials, and manufacturing processes.	Analyzing a rival's gearbox to study its efficiency, or a suspension system for its individual components and assembly.
<b>Performance Testing</b>	Objective measurement of product performance under controlled conditions using specialized equipment.	Using a dynamometer to map an engine's torque curve; testing brake fade on a certified test track.
<b>Value Analysis (VAVE)</b>	A systematic method to improve the value of a product by analyzing its functions and their associated costs.	Reducing the cost of an interior trim part without affecting its perceived quality, durability, or function.
<b>QFD (House of Quality)</b>	A matrix-based tool to translate customer requirements (Voice of the Customer) into detailed engineering specifications.	Ensuring a car's "sporty feel" (customer need) translates to specific steering ratios, suspension stiffness, and throttle response.
<b>SWOT Analysis</b>	A high-level strategic tool to identify a product's or company's Strengths, Weaknesses, Opportunities, and Threats against rivals.	Comparing Tata's extensive EV portfolio (Strength) against a competitor's limited charging infrastructure (Weakness).
<b>Patent Analysis</b>	Scrutinizing patents and technical papers to understand a competitor's underlying technology and future R&D focus.	Discovering a competitor's new proprietary alloy for engine blocks or a novel battery cooling technique before it hits the market.

## Summary: Key Takeaways

- Benchmarking is not a choice; it's a **necessity for survival and growth** in the automotive industry.
- It is a **structured, continuous process** (Plan-Do-Check-Act), not a one-off task.
- For engineers, it provides **concrete data and clear targets** to drive innovation in performance, cost, and quality.
- Case studies teach us that **technical excellence must be combined with a deep understanding of the customer and the market.**

# Thank You

## Questions & Discussion

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# Potential End-Term Exam Questions

## Sample Questions for Preparation

1. Explain the complete benchmarking process (PDCA cycle) and discuss why it is indispensable for an Indian automotive component manufacturer like Anand Automotive in the current market scenario.
2. Analyze the Tata Nano project as a case study. Discuss its successes from a frugal engineering perspective and its failures from a market perception standpoint. What are the key lessons for a product development engineer at Tata Motors?
3. Considering the shift towards Electric Vehicles (EVs), outline a competitive benchmarking plan for a Battery Thermal Management System. Specify the key performance, cost, and quality metrics you would measure, and name two potential 'best-in-class' competitor vehicles you would analyze.