



**ARE YOU USING
THE WRONG
QUALITY METRICS?**




**UNCOVERING THE
TRUTH ABOUT THE
COST OF QUALITY**



AUTOMOTIVE AND AEROSPACE MANUFACTURERS

today face a growing range of risks around supply chain complexity and quality control. Many companies turn to operational excellence to address these challenges and reduce costs, but they often fall short due to one critical error: failing to accurately define and measure the full cost of quality.



COMPLEX SUPPLY CHAINS FUEL GREATER RISK – WITH LITTLE ROOM FOR ERROR



Tight competition and accelerating change has led to highly complex global supply chains, with manufacturers under pressure to deliver higher quality products at lower cost.

Automotive OEMs are increasingly focused on innovation and design, outsourcing components and assembly production to suppliers. Today, third parties produce more than 82% of automotive parts, compared to just 56% in 1985.¹

**53.2 MILLION
VEHICLES
RECALLED
IN 2016.**



While supply chain strategies are central to viability in an industry with slim profit margins, they also create huge risks for OEMs and suppliers. The 53.2 million vehicles recalled in 2016 are a prime example.² It was a record high in a string of record-breaking years, driven largely by the massive recall of defective airbags. Not only has the crisis cost many lives and billion-dollar losses for OEMs, it's also led to criminal charges and bankruptcy for the supplier.

And it's not just the automotive industry at risk.

Aerospace, too, has struggled with challenges around extended supply chains.



More Suppliers = More Risk

Fierce competition and strong demand mean companies must work with growing numbers of suppliers. Today, the average aerospace OEM might work with more than 10,000 individual suppliers.

These relationships are a double-edged sword, both essential to the business model and one of its greatest sources of quality issues.

For both industries, this supply chain complexity combined with faster rates of production create more opportunities for errors— and rising risks around cost of quality.






CALCULATING THE TRUE COST OF QUALITY: A COMPLEX EQUATION

Most manufacturers recognize that extended supply chains, skills shortages and changing requirements and standards increase quality costs.

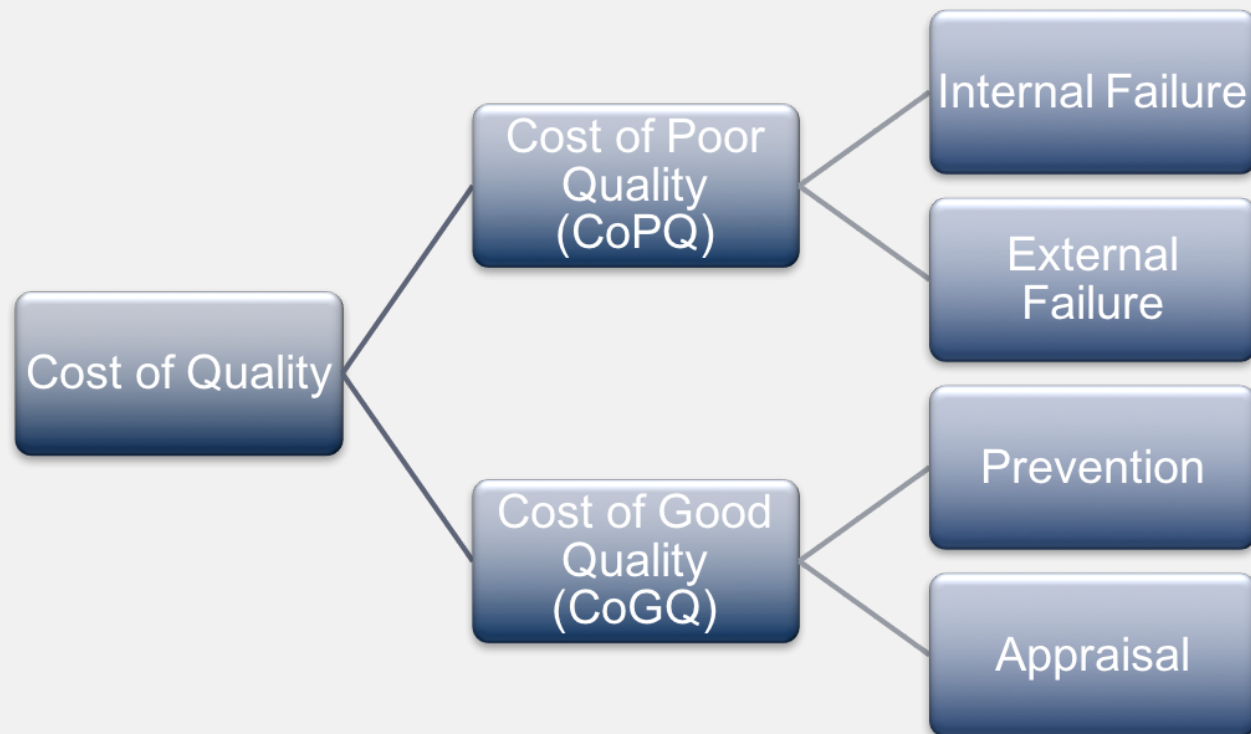
Despite this fact, 2 in 3 companies **do not track quality costs.**³ Even among those who do, few understand the full extent of their risk due to the numerous factors impacting cost of quality.



In fact, manufacturers typically estimate their cost of quality at roughly 10% of annual revenue, when the **true cost** may total anywhere from 15% to 40%.⁴ **Even on the low end, these costs could easily erase a company's profit margin.**

When calculating these costs, organizations tend to focus on failure costs such as scrap, rework and customer returns.

In reality, these non-conformance costs are only part of the equation. A full accounting of quality costs must also look at the cost of keeping products in conformance, a number rarely measured and often misunderstood.



COST OF POOR QUALITY: THE REACTIVE COSTS

Non-conformance costs or cost of poor quality (CoPQ) are comprised of internal and external failure costs.

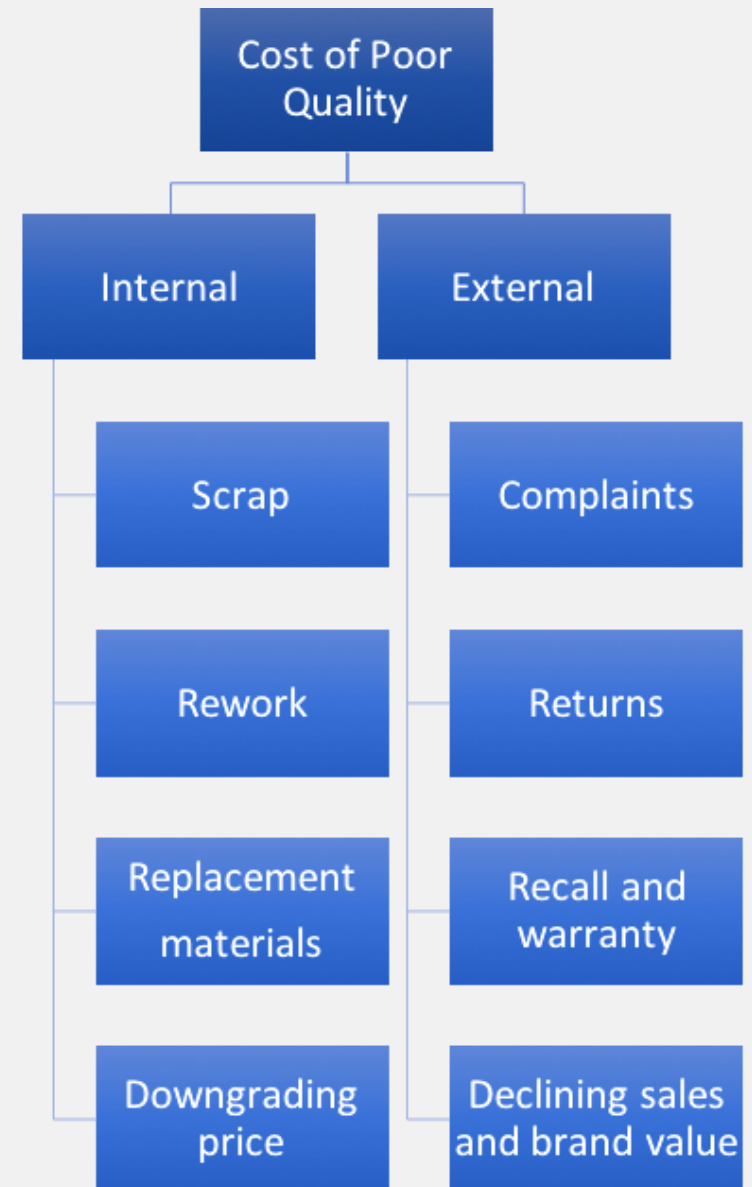
Internal failure costs are those arising from defects discovered before product is in the customer's hands, including:

- Scrap
- Rework
- Material costs
- Downgrading price



External failure costs are those discovered on the customer side. Some examples are:

- Systems and resources for managing customer complaints
- Replacing or repairing defective product returned by customers
- Recall and warranty costs
- Declining sales and loss of brand value
- Shipping costs and materials for returned and replacement goods



Failure costs go beyond these obvious, easily measured items.

Companies also face hidden opportunity costs as a result of quality failures, such as:

- Production and shipping delays when having to replace or rework product
- Equipment downtime due to process disruption, which research shows costs automotive manufacturers well over \$1 million per hour ⁵
- Resources needed for failure analysis, corrective action, and redesigning products and processes
- Slow or ineffective fixes that allow problems to continue due to inefficient corrective action processes
- Material shortages, as well as related delays and downtime
- Time spent following up on problems and overdue corrective actions when leaders could be pursuing more strategic goals



COST OF GOOD QUALITY: THE PROACTIVE COSTS

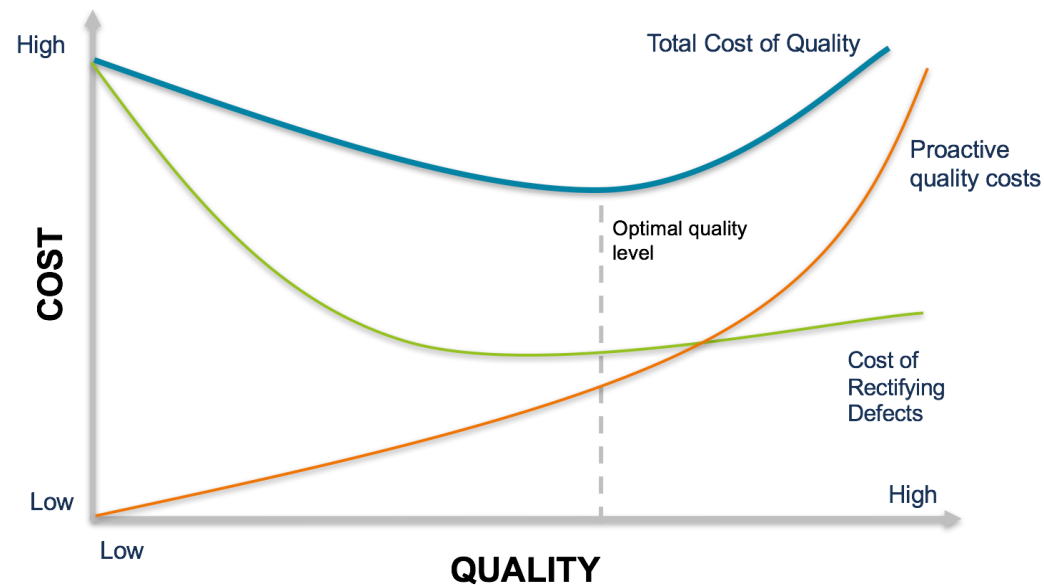
Costs associated with keeping products in conformance—the cost of good quality (CoGQ)—include both prevention and appraisal costs.

Prevention costs for avoiding quality failures include:

- Quality planning
- Quality management systems
- Employee training
- Error-proofing

Appraisal costs for evaluating compliance include:

- Supplier selection and management
- Inspections, testing and calibration
- Process audits
- Risk management



Total cost of quality is lowest with modest investments in proactive quality measures



Measuring cost of quality is valuable for monitoring progress, identifying weaknesses and gauging the impact of quality initiatives—but only when you measure it holistically.

Common mistakes in measuring quality costs include:

- Not accounting for CoGQ as a quality cost, leading to underestimation of the organization's total cost of quality
- Treating prevention and appraisal activities as fixed costs, resulting in missed opportunities to reduce total cost of quality
- Inaccurately measuring CoPQ due to poor supplier quality management
- Inefficient corrective action processes that make it difficult to identify and address the true root cause of failures
- Failing to consider cost variations over time for external failures, which can take months or years to surface

This last mistake can be especially costly for manufacturers, as a large proportion of recalls often result from failures that occurred several years prior. If there's anything we can learn from previous recalls, it's that focusing on cost-cutting measures in the short term comes with a hefty price tag over the long term.



THE 1-10-100 RULE

The cost of resolving non-conformances increases exponentially as products move downstream from planning to manufacturing to distribution.

The Total Quality Management approach describes this relationship with the 1-10-100 Rule, which says that **every \$1 spent on prevention saves \$10 dollars in appraisal costs and \$100 in failure costs.**



COPQ VS. COGQ

MEASURING THE VALUE TRADEOFFS

Effective decision-making and performance improvement require comprehensive measurement and benchmarking of the four cost of quality variables:

CoPQ	CoGQ
Internal Failure	Prevention
External Failure	Appraisal

When companies compare CoPQ and CoGQ to each other and total cost of quality, they typically find modest investments in CoGQ can deliver surprisingly large reductions in CoPQ.



One example is investing in an automated layered process audit (LPA) system. LPAs are a structured method for frequently checking high-risk processes, helping manufacturers:

- Standardize processes to reduce variation
- Engage all layers of the organization in quality
- Prevent process errors before they occur
- Initiate timely corrective action to resolve problems quickly and reduce future costs
- Streamline compliance with standards and customer requirements
- Sharply reduce internal defects in a short amount of time, in some cases by 50% or more



The opportunity cost of investing in CoGQ is also important to consider. In the example above, not implementing an LPA system would mean higher quality costs as well as fewer dollars in the budget for other strategic initiatives. Without effective corrective action processes, it would also take longer to address failures whose costs are continually increasing over time.

COST OF QUALITY AND REVENUE GROWTH: A FUNDAMENTAL ERROR IN THINKING

Reductions in cost of quality directly correlate with revenue growth. It may seem like a no-brainer, but many manufacturers don't make this connection when it comes to setting priorities.

A survey by LNS Research asked more than 500 manufacturing executives to identify their most important financial and quality management objectives. Across the board, growing revenue was the top financial objective, while reducing cost of quality was the top quality management objective.



The most surprising insight?

Relatively few executives selected both quality cost reduction and revenue growth as their most important goals. That is, those who prioritize revenue growth typically place other quality management objectives over cost of quality, and vice versa.

In reality, every dollar saved in reactive quality costs adds directly to the company's bottom line.

Accurately capturing and analyzing the true cost of quality is the first step towards improving operational efficiency, business performance, and ultimately revenue growth.





About **beacon** QUALITY

Founded in 1986, Ease is the leading provider of cloud-based and on-premise layered process audit (LPA) software for the automotive and aerospace industries.


We have decades of experience helping companies improve visibility and control at every stage of production, with tools that promote company-wide engagement and operational excellence. Our mission: empowering businesses to deliver higher quality products better, faster and at lower cost.

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