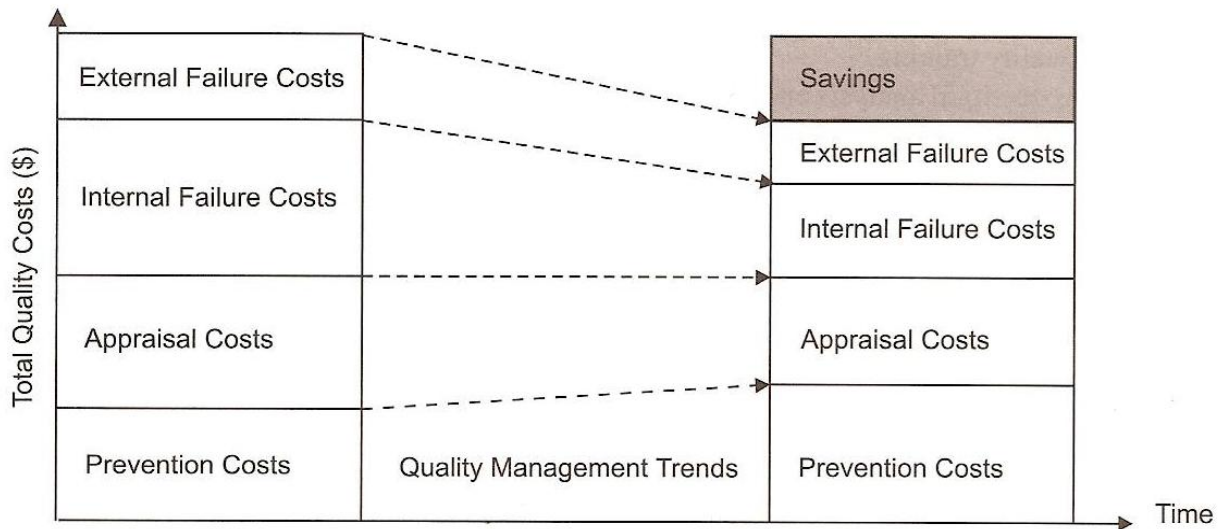# The Cost of Quality

Cost of Quality

Framework for identifying quality components that are related to producing both high quality products and low quality components, with the goal of minimizing the total cost of quality.

Costs of poor quality:

- Prevention costs
- Detection/appraisal costs
- Internal failure costs
- External failure costs

Category	Definition	Example
Prevention	Costs associated with preventing defects.	Training, early reviews, quality planning, tools, process improvement initiatives.
Appraisal	Costs associated with analyzing and testing the product to ensure it conforms to specifications.	Inspections, testing, audits, quality control.
Internal Failure	Costs associated with fixing defects found prior to release.	Repair, retesting, updating documentation.
External Failure	Costs associated with fixing defects found after release.	Technical support, defect reporting and tracking, field updates, loss of future sales.

Quality Cost Management shows how increased Prevention Costs reduce the Total Quality Costs.

The equation "Cost of Quality" (COQ) allows to quantify the impact of POOR quality. It is used as a monitoring tool to track costs for inspection, internal errors, external errors, and prevention. As the prevention efforts are increased, the costs for inspection, internal failures and external failures drop.

$$COQ = \frac{\sum(E + I + A + P)}{S} \times 100\%$$

E: External Failure Costs
I: Internal Failure Costs
A: Appraisal Costs
P: Prevention Costs
S: Sales

Typical Quality Cost Ratios

Category	Feigenbaum	Juran and Gryna
Prevention costs	5%–10%	0.5%–5%
Detection/appraisal costs	20%–25%	10%–50%
Failure costs	65%–70%	Internal: 25%–40%
		External: 20%–40%
Total cost of quality	100%	100%