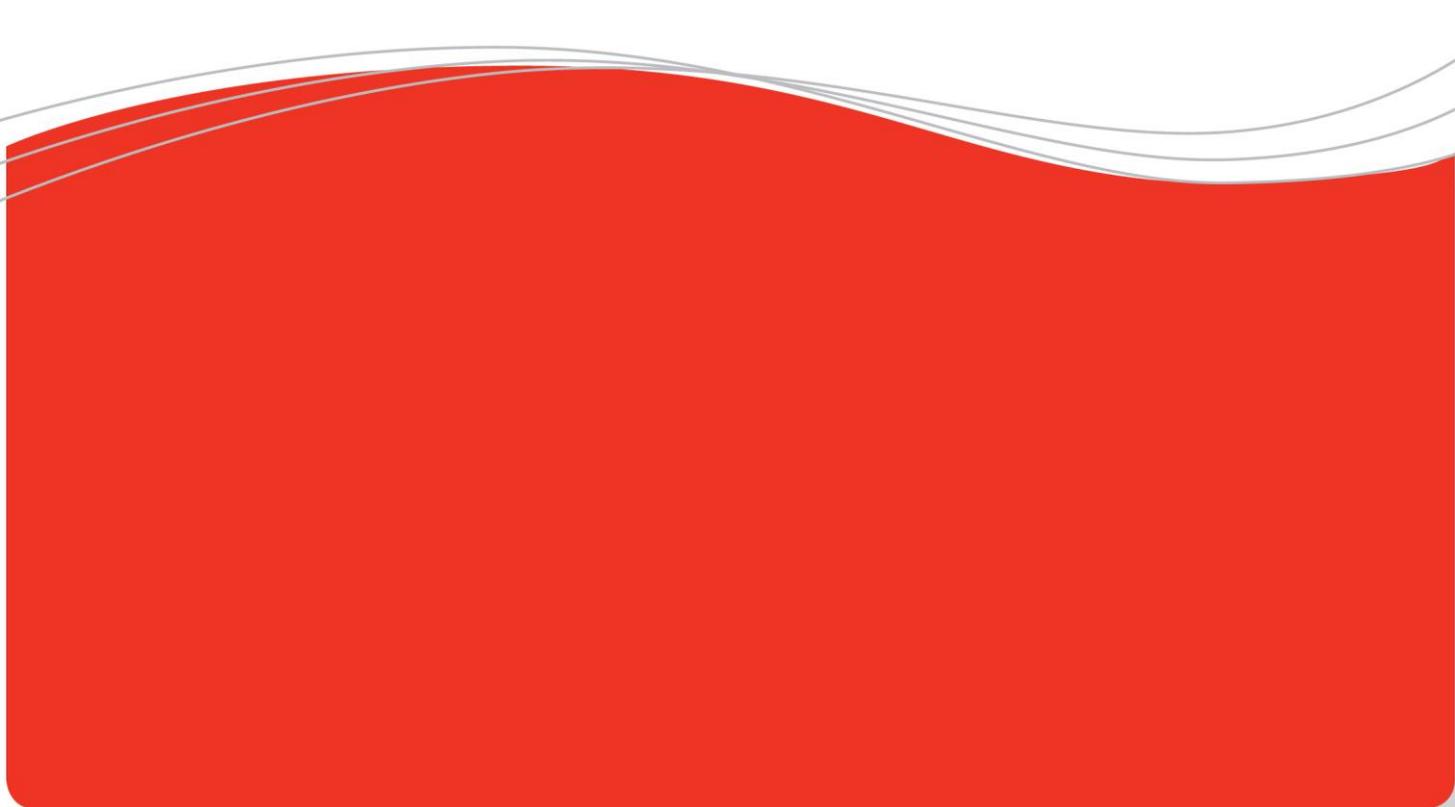




The Cost of Quality



By David Todd





The Cost of Quality

This article aims to provide an overview into the Cost of Quality and to discuss ways to control the Cost of Quality. Let's start with a definition.

Strangely, the Cost of Quality isn't the cost of the product or service you offer. It's also not the cost of buying machinery or equipment for the quality department and it's not the total cost of running the quality department - although there are obvious costs associated with these.

Briefly, the Cost of Quality can be defined as the cost of not creating a quality product or service and the associated costs of not doing so. For example, costs which include a decrease in product lifecycle, an increase in scrap, an increase in returns and an increase in the repair process. All of which will increase your quality costs.

At DataLyzer, we work with quality professionals from all industry sectors and one of the key areas where quality professionals are focussed is on monitoring and controlling any variation in the products and services which they provide from the perspective of quality. The reason for this? To reduce rework and to ensure that defects don't reach the market and end user. This is done in various ways, including visual inspection and the application of real-time SPC tools.

Why do this? Because if defects do reach the market, there is always a cost and, in some cases, a very high cost!

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Costs include scrapped products, material costs, rework, losing the competitive edge in the market, brand damage, liable costs and in the most extreme cases, the loss of life because of a faulty product or failed service.

All of this means your quality costs will increase for not making your products or services dependable in the design and process engineering phase.

For example, in 2017 the automotive sector saw recall numbers of 28,146,661 for a variety of defects. That's not a small number but a long way from 2016 that saw a total of 52,985,779 mainly due to the Takata Airbag campaign that ultimately saw the company go bankrupt.

In 2017 the Food and Drinks Industry saw 440 FDA regulated products recalled totalling millions of units. Many of the recalls were due to mislabelling and harmful allergens in the products.

In 2016 there were recalls of chocolate bars from 55 countries costing one famous brand an estimated cost of 10 million Euros.

For the Medical Sector 2017 saw 3202 medical devices recalled equalling millions of units.



The below table breaks down the key cost element areas with examples.

Cost element		Examples	
Direct quality costs	Controllable quality cost	Prevention cost	<ul style="list-style-type: none"> • Quality Planning (for tests, inspection, audits and process control) • Education and training • Performing capability analysis • Conducting design reviews
		Appraisal cost	<ul style="list-style-type: none"> • Test and Inspection • Supplier acceptance sampling • Audit processes
	Resultant poor-quality cost	Internal error cost	<ul style="list-style-type: none"> • In-process scrap and rework • Trouble shooting and repairing • Design changes • Additional inventory required to support poor process yields and rejected batches • Reinspection and re testing of reworked items • Downgrading
		External error cost	<ul style="list-style-type: none"> • Sales returns and allowances • Service level agreement penalties • Complaint handling • Field service labour and parts costs incurred due to warranty obligations
	Equipment Quality cost	Gages, CMM, test equipment (but not equipment used to make the product)	
Indirect poor-quality costs	Customer-incurred cost	<ul style="list-style-type: none"> • Loss or productivity due to product or service downtime • Travel cost and time spent to return defective product • Repair costs after warranty period • Back-up product or service to cover failure period 	
	Customer dissatisfaction cost	Dissatisfaction shared by word of mouth	
	Loss-of-reputation cost	Customer perception of firm	

Harrington, J, 1987.



When looking at cost the Rule of Ten has been used by quality experts for decades as follows:

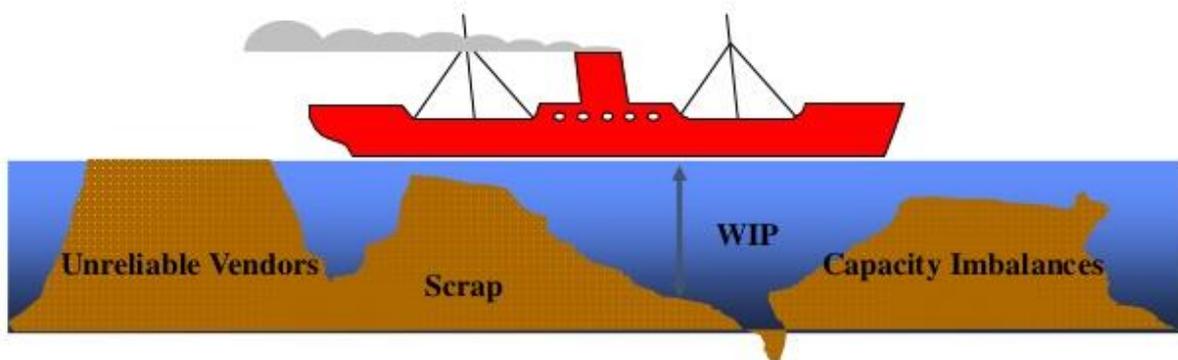
- If the issue costs £100 when it is discovered in the field, then...
- It may cost £10 if discovered during the final test...
- But it may cost £1 if discovered during an incoming inspection.
- Even better, it may cost £0.10 if discovered during the design or process engineering phase.

Another interesting way of viewing and interpreting the Cost of Quality is through the river analogy.

Visualise the river as being high Inventory and below the surface are numerous rocks which represent problems such as scrap, rework, unreliable suppliers and capacity imbalances along with other rocks (problems) such as machine downtime. All of which can increase your quality costs.

One of the biggest rocks is machine downtime which is costing industry in the U.K alone 180

Reducing inventory reveals problems so they can be solved.



Manufacturing Technology

36

Billion a year. <https://www.theengineer.co.uk/faulty-machinery-machine-manufacturers/>

A solution often mentioned is to simply reduce work in process or inventory and problems will become visible. That will hardly ever work because when these problems happen and you don't have a system in place to solve the issues immediately the quickest solution to get out of trouble is to increase the inventory again. So what you need to do is solve problems first and



then you can lower the water without too many problems. Solving the issues means starting with quality issues and then solve machine issues.

HOW DO WE PREVENT THESE ISSUES FROM OCCURRING IN THE FIRST PLACE?

A proven way of getting your products and services dependable in the design and process engineering phase is to use Failure Modes Effects Analysis (FMEA).

FMEA helps to identify, assess, mitigate and prevent the risk of failures through the application of the Process Flow diagram, Process Failure Mode and Effects Analysis (PFMEA) and Plan throughout the life cycle of the product or service.

This means that you can list all the potential failures of a product or service, assign a Risk Priority Number (RPN) or Action Priority (AP) to assess how the risk might affect the product or service in the market and then mitigate for that risk by recommending actions to eliminate and/or to reduce the risk in the design and process phase.

Then we can apply SPC to detect issues in an early stage. SPC can be applied on products but certainly also on process characteristics or even downtime data. These methods in combination with a relentless improvement culture will reduce the number of issues significantly.

One of the most famous quality experts, Dr. W. Edwards Deming said: *“If you improve the dependability of the product and improve its quality, your costs go down.”*

If you are not focused on ensuring failures are found in the design and engineering phase and have a system in place to detect and solve issues the moment they are found then be assured, you are going to increase your quality costs, you are going to lose your competitive edge and you are certainly risking damage to your brand and company reputation.



ABOUT DATAlyZER INTERNATIONAL

With 38 years in the business, partners in Continuous Improvement, Datalyzer is the only provider of manufacturing intelligence solutions globally offering integrated tools for FMEA/Process Flow/Balloonning/Control Plan, real-time SPC and OEE with Gage Management for Calibration and MSA Studies, CoA and CAPA.

This suite of integrated tools helps our customers to enhance their risk management capability, standardise processes to improve quality, (i.e., to deliver on-time and on-quality), whilst promoting efficiencies, reducing the cost to do so and not least to enhance customer satisfaction!

Website - <https://www.datalyzer.com/>