A clearer picture of poor quality

Francisco Dominguez CQP MCQI, is Director of Quality at CMP Products, as well as an IRCA Lead Auditor, CQI and IOSH Mentor. In this article, he describes how the Cost of Poor Quality is traditionally measured by small, medium and large companies, and asks what hidden costs – direct and indirect – should be calculated to provide a truer cost estimate. Remember, he says, that what you initially see when you assess those costs, might only be the tip of the iceberg

The Cost of Poor Quality (CoPQ), or Poor Quality Costs (PQC), can be defined as the costs that would disappear if systems, processes and products were all perfect. Activities and processes that do not meet agreed performance and/or expected outcomes could be calculated with the equation: **CoPQ = actual cost – minimum cost**.

In the equation, actual and minimum cost are defined as:

Actual cost = the total costs generated by poor quality activities and processes.

Minimum cost = the costs that can't be removed even if all activities and processes were perfect.

Most of the companies I've visited or worked with use different criteria to calculate the CoPQ. Many use the traditional CoPQ; when quality costs are initially determined, the categories included are the visible ones as depicted by the iceberg (right, top).

The costs listed in the visible side of the iceberg are easily captured and reported, and they don't require much involvement from departments other than finance.

Obviously, as an organisation gains a broader definition of poor quality, the hidden portion of the iceberg becomes apparent (right, bottom).

When we see the full iceberg, we realise we are missing many costs from our CoPQ calculations. Most companies don't benefit from calculating them all, but, in this article, I will identify which ones would be the preferred areas to report on.

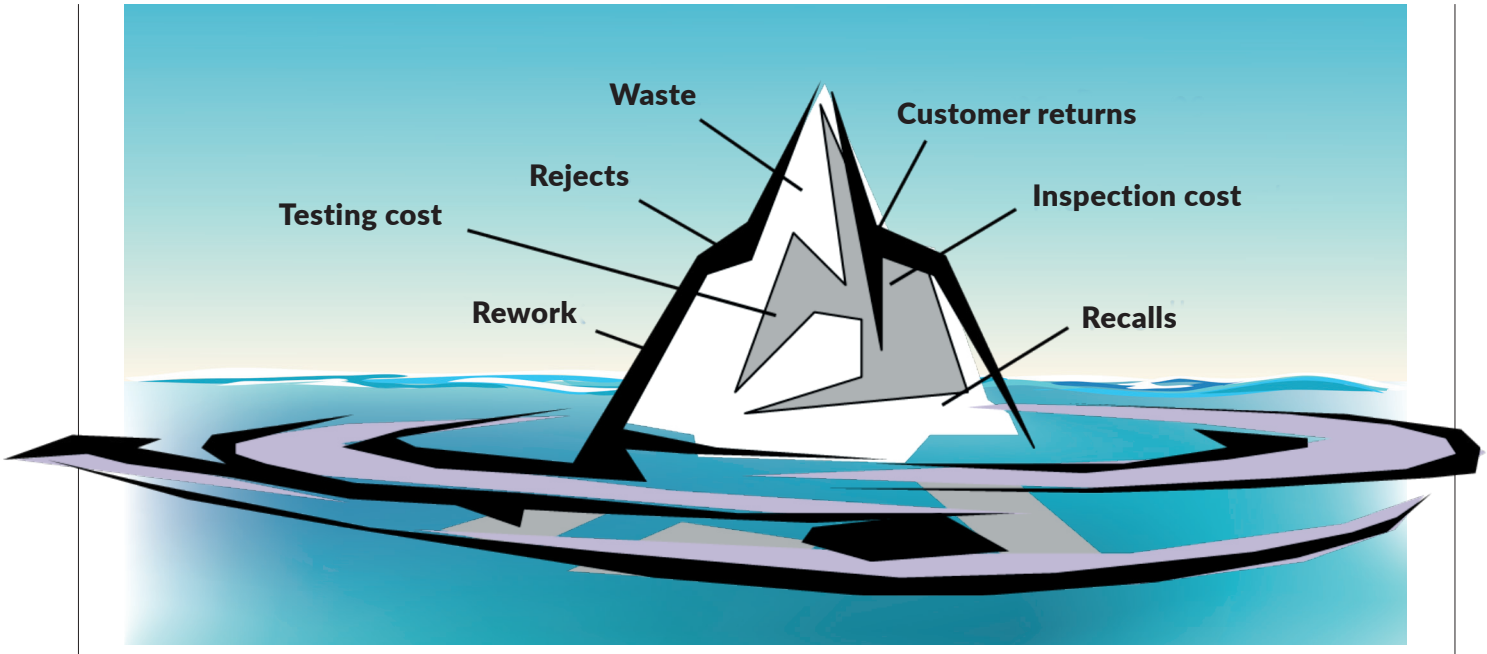
Direct and indirect costs

At the company in which I currently work, I started defining the types of CoPQ and split them into two categories: direct and indirect costs.

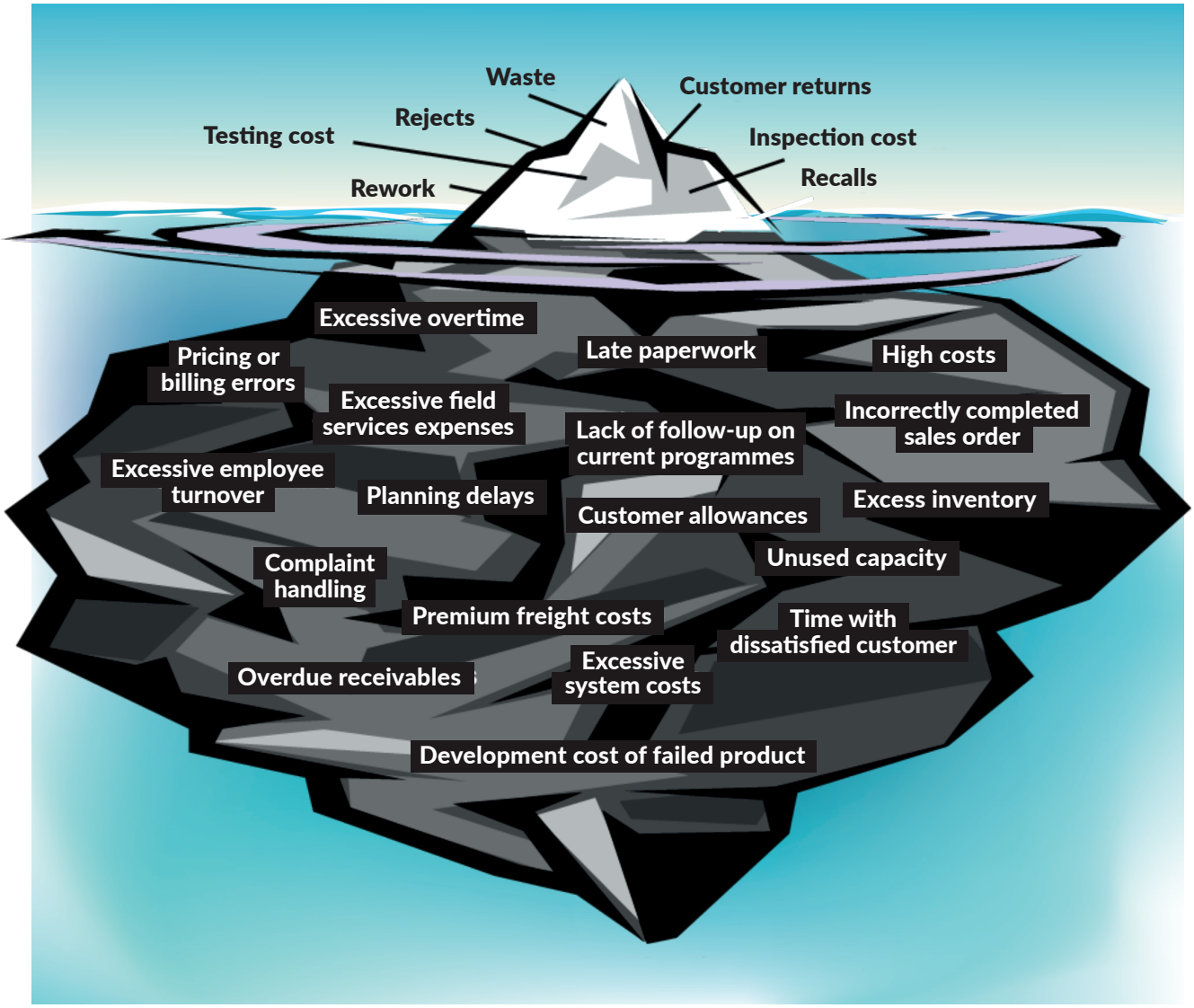
Direct CoPQ can be derived from entries in the company ledger. They are easy to calculate (this is the top of the iceberg) and consist of:

- **Controllable cost of poor quality**
  Costs are directly controlled, and are what the customer is willing to pay for, so the company can ensure that only acceptable products and services reach them. These include prevention costs (that is, quality planning for test, inspection, audits, process control; education and training; performing capability analysis; and/or conducting design reviews) and appraisal costs (test and inspection, supplier acceptance sampling, auditing processes).
- **Resultant cost of poor quality**
  The costs incurred because unacceptable products and services were delivered to the customer, resulting from earlier decisions about how much to invest in controllable CoPQ. These are internal and external error costs (test and inspection, supplier acceptance sampling and auditing processes).
- **Equipment cost of poor quality**
  The costs to invest in equipment to measure, accept or control a product or service. It is treated separately from controllable costs to accommodate the effects of depreciation. For example, this would include micrometers, voltmeters, automated test equipment (but not equipment used to make the product).

Indirect CoPQ is difficult to measure because it is a delayed result of time, effort, and financial costs incurred by ▶



The costs listed in the visible part of the iceberg are easily captured and reported.



As a broader definition of poor quality is gained, the hidden portion of the iceberg becomes apparent.

the customer. These customer costs add up to lost sales and, therefore, do not appear in the company's ledger.

- **Customer-incurred costs**
  Loss of productivity because of product or service downtime, travel costs and time spent to return defective product, repair costs after warranty period, backup product or service to cover failure periods.
- **Customer-dissatisfaction cost**
  Dissatisfaction shared by word of mouth.
- **Loss-of-reputation cost**
  Customer perception of firm.

I would like to keep it simple. My recommendation would be to focus on the resultant CoPQ as direct costs, and in customer incurred costs as part of the indirect CoPQ. The reasons for this are that a customer will pay for the direct, controllable CoPQ, as well as for the equipment required to measure the product or service.

When it comes to the indirect CoPQ, however, customer dissatisfaction and loss of reputation are longer-term considerations that can't be calculated during a financial year, only over a period of years. As they might only be reviewed every five years, perhaps linked to a five-year company strategy, they lose importance to customers in the short term.

Calculating costs

The formula used to calculate these costs is the sum of all direct and indirect costs in a month, divided by the total net sales for the month.

$$\text{CoPQ (\%)} = \frac{\text{Total poor quality costs (£)}}{\text{Total net sales (£) x 100}}$$

Then, you should be able to calculate the 12 months' average, to create a trend and understand how the CoPQ is evolving.

After calculating this, you'll need to generate a mixed table, where you can show the cost (£) in the left-hand Y axis and CoPQ (%) in the right-hand Y axis.

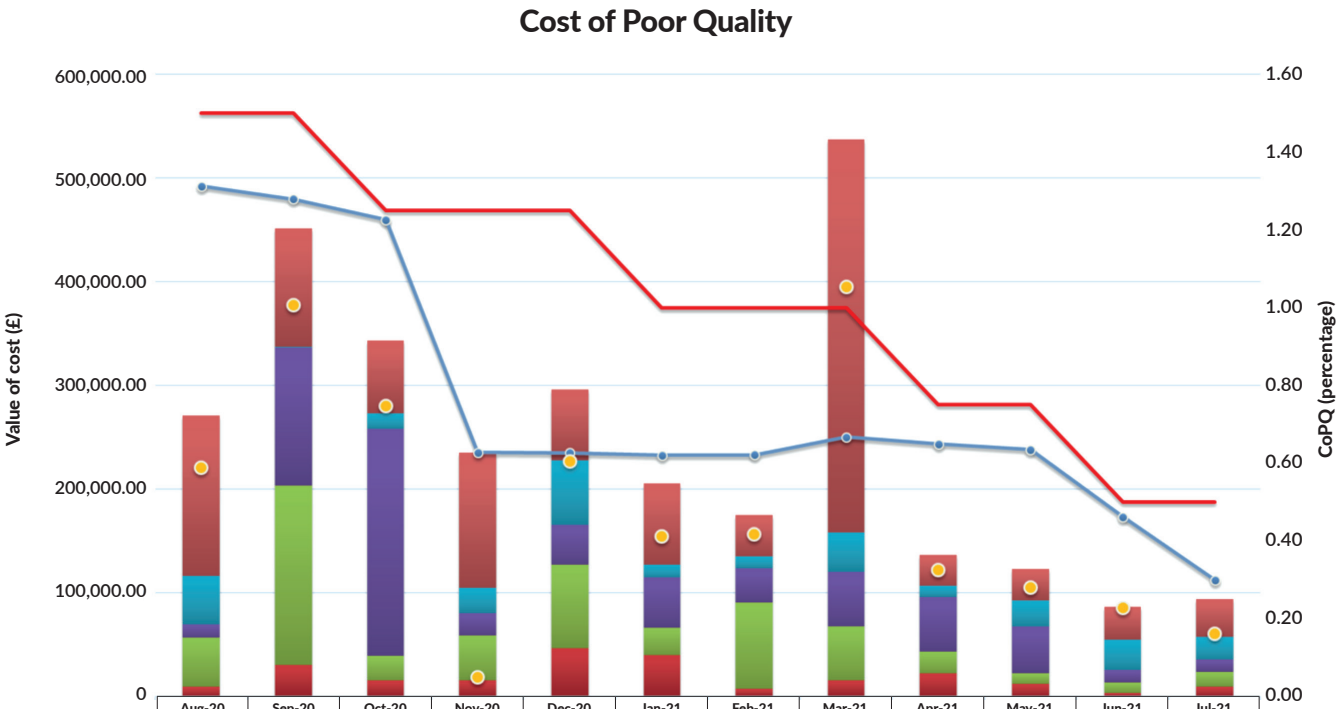
You can make the report as complicated as you want. For example, you could analyse it by quarter, including the CoPQ year-to-date (YTD), and so on. If the report is done correctly, it will help you drive further improvements.

An example of a CoPQ report can be seen below.

Clearer picture

The CoPQ report is a great tool to drive continuous improvement in any organisation. Companies need to ensure the information is clear, easy to obtain and, if possible, provided automatically, so no external intervention can affect the data.

A brainstorming session would be required to understand where the information comes from and how it is going to be presented. But when you have defined your costs of poor quality, then you will have a clearer picture of the direct and indirect costs associated with poor quality of process, service and systems, and where improvements can be made.



	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21
Scrap cost	154940.55	114175.90	69956.04	130870.65	68499.00	78309.20	3.9723.32	378882.31	29406.00	30449.88	31368.00	36598
Credit cost	46549.44	591.26	10588.00	24173.60	62116.60	12527.10	11286.60	38083.20	11192.55	25000.00	29350.00	21535
Replacacement cost	12593.70	133.98.00	218759.10	21339.50	38460.20	48720.84	33210.00	52812.60	52770.00	45000.00	12305.00	12035
Indirect cost	47631.15	172686.00	23446.65	43077.65	80499.65	26368.20	82968.71	51727.60	20999.80	10173.40	9958.00	14305
Standard cost	9345.00	30625.00	15700.00	16000.00	46500.00	39750.00	7700.00	15750.00	22250.00	12400.00	3568.00	9600
CoPQ as % of sales	0.59	1.01	0.75	0.05	0.60	0.41	0.42	1.05	0.32	0.28	0.23	0.16
12-month rolling	1.31	1.28	1.23	0.63	0.63	0.62	0.62	0.67	0.65	0.63	0.46	0.30
Target	1.50	1.50	1.25	1.25	1.25	1.00	1.00	1.00	0.75	0.75	0.50	0.50

An example of a CoPQ report, which is a great tool to drive continuous improvement in an organisation.