



Measuring the True Cost of Quality

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Introduction



Introduction

Cost Analysis

Quality Leaders

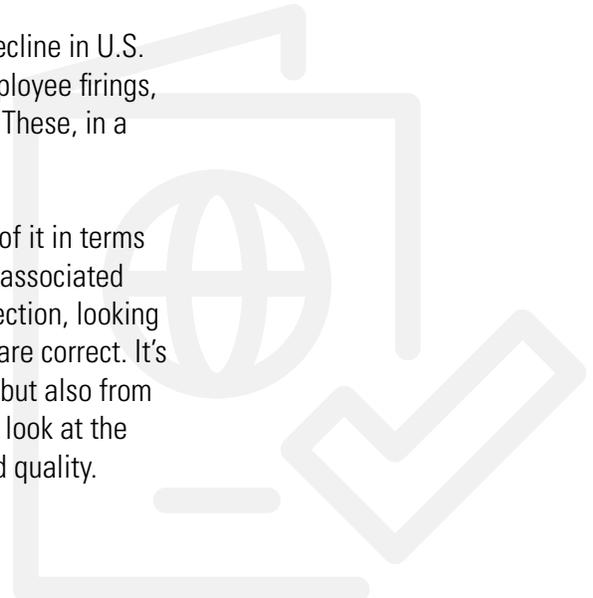
Summary



Imagine you are an executive at Johnson & Johnson, and you start receiving reports about your products having an unpleasant odor. As the number of complaints continues to rise, you hear that a few people have also experienced nausea, vomiting, and stomach pain. After a full investigation, you determine that the odor has been linked to the presence of trace amounts of a chemical byproduct from shipping materials.

What follows is a full recall of Tylenol, over \$650 million in lost revenue, a 31% decline in U.S. sales for Johnson & Johnson's over-the-counter brands, the closing of a plant, employee firings, loss of market share to competitors, and an immeasurable hit to the brand image. These, in a nutshell, are the costs of poor quality.

The term "quality costs" has a different meaning for different people. Some think of it in terms of the Johnson & Johnson example, focusing on the costs of poor quality that are associated with finding and fixing damaged products. Others come at it from the opposite direction, looking at the costs it takes to prevent problems and ensure high quality. Both definitions are correct. It's important to understand that quality costs result not only from correcting defects, but also from ensuring that good products are made in the first place. This paper takes a deeper look at the many costs associated with quality and highlights best practices for ensuring good quality.



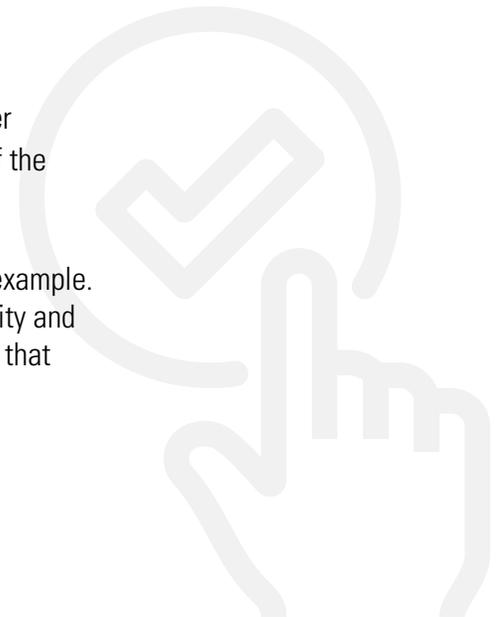


Why is Quality Important

Before jumping into all of the costs of quality, it's important to know all the different reasons why quality is so important. Higher quality – better and more consistent products – helps a company grow its profits because:

- Retailers are more likely to stock the product.
- Customers make repeat purchases and recommend the product or service to others.
- Perceptions of quality allow for more premium pricing.
- Fewer returns and replacements lead to reduced costs.
- A reputation for quality helps attract and retain good staff.
- The brand will be bolstered by the quality halo, further reinforcing all the above (consider the success of the Apple iPod, which led to the subsequent development and success of the iPhone, iPad and Apple Watch, as well as the growth of Apple computers).

Each of the points above can help build corporate value. The U.S. auto industry is a quick example. Ford and Chevrolet were the two most awarded brands by the J.D. Power automotive quality and reliability ratings in 2019. They were also two of the three top selling car brands in the US that same year.





Cost of Poor Quality

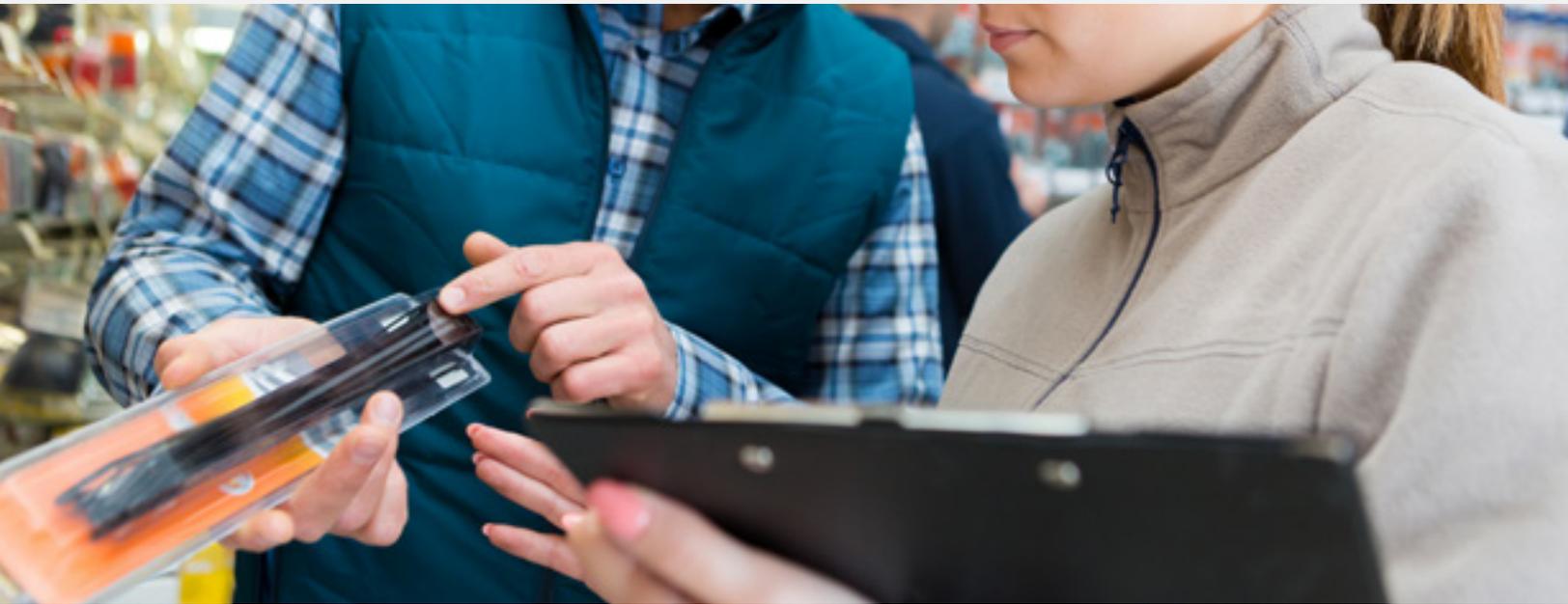
Unfortunately, what is hard to build is often easy to break. Companies spend years creating, maintaining and improving their reputation for quality, but that brand image can easily be damaged by product defects. The cost of poor quality includes both internal and external failure costs.



Internal Failure Costs

Internal failure costs result from defects that are found before they reach external customers. These are caused by products or services not meeting requirements or customer/user needs. Effective quality control and appraisal activities help companies to catch problems in-house, increasing these internal failure costs. (We'll talk more about appraisal costs later in the paper.) Internal failure costs are caused both by errors in products and by inefficiencies in processes. These costs include:

- Scrap: The labor and material that created the defective product.
- Rework: Correcting the defect.
- Re-testing: Retesting products after rework or other revisions.
- Downtime: The loss of effective capacity caused by the quality problems.
- Failure Analysis: The cost of analyzing problematic goods or services to determine root causes.
- Changing Processes: Modifying the manufacturing or service processes to correct the deficiencies.
- Downgrading: The cost difference between the normal selling price and the reduced price due to quality reasons.
- Backorders: Loss of revenue from unfulfilled current orders and future backorder.

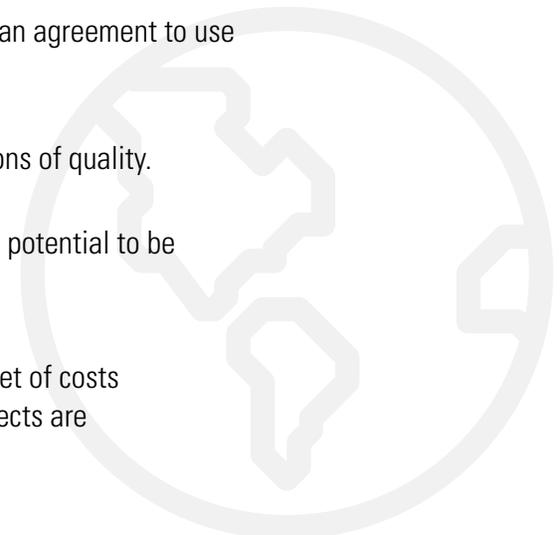


External Failure Costs

External failure costs are incurred when a defective product or service makes it to the customer. This happens either because the defect was not caught before shipping (which would have resulted in an internal failure costs), because a decision was made to ship knowing about the defect, or because the company did not adequately test its goods prior to shipping. Typically, the cost to fix an external failure is five times more than an internal failure. These costs include:

- Complaints: Investigating and adjusting for legitimate complaints from the defective product.
- Warranties: Replacing or making repairs to products that are still within the warranty period.
- Repairing Returns: Receiving, repairing, and replacing the defective product.
- Allowances: The costs of concessions made to customers in exchange for an agreement to use a substandard product “as is.”
- Penalties: The costs involved with violations in service level agreements.
- Lost Opportunities: Future profits lost due to customers switching for reasons of quality. This includes canceled contracts and loss of prospective customers.
- Company’s Brand and Image: While this cost is hard to measure, it has the potential to be the most damaging.

While there are many costs involved when something goes wrong, there is another set of costs involved with making sure things go right. These costs of preventing failures and defects are called the costs of good quality.





Cost of Good Quality

Costs of good quality include both prevention and appraisal costs. Companies that invest time and resources on these important measures can encounter significantly fewer quality issues.



Prevention Costs - Generally the most effective way to manage quality costs is to avoid having defects in the first place. It is much less expensive to prevent problems than to correct them after they happen. The funds spent to prevent product quality issues are called prevention costs. Successful companies that strive for operational excellence purposely allocate time and resources to track these costs. They typically spend more on prevention methods than the other aspects of quality cost. Some examples of prevention costs include:

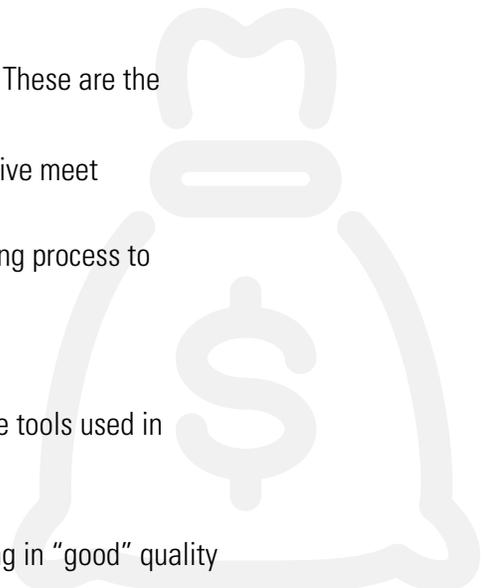
- **Quality Planning:** All the activities that create the overall quality plan and individual specialized plans, plus the full communication of these plans to all parties involved.
- **Process Planning:** Process capability studies, inspection planning, and other activities associated with the manufacturing and service processes.
- **Quality Audits:** Evaluating the execution of the quality plan.
- **Supplier Quality Evaluation:** Evaluating supplier quality activities prior to supplier selection, as well as auditing their activities.
- **Education and Training:** Preparing and conducting quality-related employee training programs on company procedures, specification, and inspection activities.
- **New Products Review:** Including design review, reliability engineering, risk assessment, Failure Mode and Effects Analysis (FMEA), Design of Experiments, and other quality-related activities associated with the launching of new products or designs.



Appraisal Costs - Appraisal costs are also sometimes called inspection costs. These are the costs related to evaluating quality in all stages of production. These include:

- **Inbound Goods and Services Evaluation:** Making sure that the materials you receive meet your requirements.
- **In-Process and Outbound Inspection:** Testing product throughout the manufacturing process to ensure that it meets specifications prior to being released.
- **Field Testing:** Pulling product after it enters the market place and evaluating it.
- **Process and System Audits:** Formal evaluation your infrastructure.
- **Calibration of Measurement and Test Equipment:** Maintaining the accuracy of the tools used in the product testing process.

It is important to consider the tradeoffs between accepting “bad” quality costs and investing in “good” quality costs. Smart companies see the latter as the better choice.





Quality Leaders



Starbucks - Starbucks is known for focusing on the details, big and small, to create exceptional consumer experiences. Starbucks takes innovation and quality seriously, and they combine them to provide world-class products and services. Over \$1B of Starbucks' revenue comes from their packaged coffee beans sold outside their stores in supermarkets and other retailers. This is a large piece of business that is important to the brand. Starbucks demonstrated its approach to quality when they made a change to the one pound bag sold at retail.

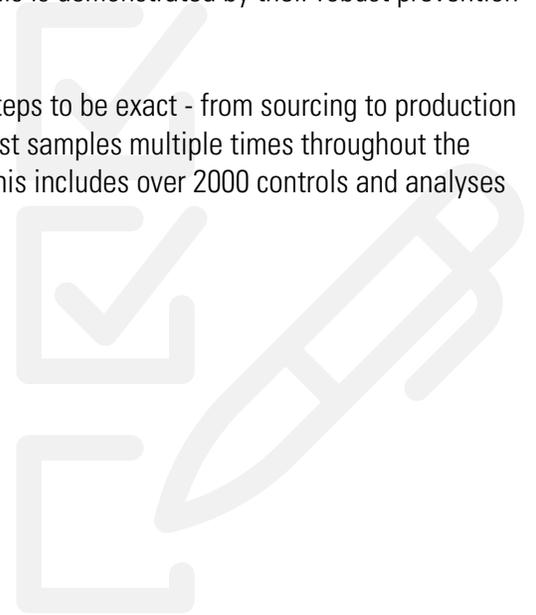
Starbucks utilized voice-of-the-customer (VOC) feedback to identify a need for improved packaging. Updates were required to ensure the bags were both properly sealed as well as easy to open. Starbucks appreciated that an investment in prevention would yield benefits in consumer behavior.

Starbucks incorporated several complex experimental designs to find the right combination of criteria to achieve the best results. These new process parameters were tested for reproducibility and reliability. The new parameters were then rolled out to production where both process and output (sealed bags) were carefully monitored. Subsequent customer feedback showed that packaging-related defects were reduced by 90%. By incorporating proven quality techniques throughout the organization, Starbucks was able to improve efficiency, reduce loss, and improve the customer experience.



Nestlé Waters - Nestlé Waters is the number one bottled water company worldwide, and they got there in part by placing a focus on quality. This is demonstrated by their robust prevention and appraisal processes.

Nestlé tests their water every step of the way – 12 steps to be exact - from sourcing to production to bottling. They have trained, dedicated staff who test samples multiple times throughout the production process. For their Nestlé PureLife brand, this includes over 2000 controls and analyses from sourcing through to packaging





Summary

Quality is a make-or-break issue for most businesses. It makes sense that companies with higher and more consistent quality do better over time. But this level of performance also comes at a cost. While we often hear about the “cost of poor quality,” this only reflects a portion of the total quality costs. There are also costs of good quality. This paper lays out four major categories of quality costs and introduces methods to ensure high quality.

