

10.1 Drivers of Quality and Types of Quality Types

The Need for Quality

- Design in vs. Inspect for quality (Deming and Juran – founding fathers of design)
- Nowadays, people acknowledge there is a difference between the design process and where the phone is manufactured. E.g. Apple iPhones designed in California but are manufactured in China. Previously, there was a belief that higher quality goods came from Germany & Japan
- External and internal forces pushing towards quality.

External Drivers (Outside Organisation):

1. *Customer requirements* e.g. do they want to buy a BMW
2. *Competition* – how entities differentiate themselves from their competitors.
3. *Supplier Requirements* – e.g. if you want to provide high quality goods then you need good quality inputs, but it could also flow the other way across the value chain.
4. *Legal Measures and/or Standards* e.g. Legally mandated standards for drugs.

Internal Drivers

- Recognition that Improvements in *Performance* and *Features* will:
 - Creates value → Better Financials
 - Cuts Defects → Reduces bottlenecks, reworks &/or replacements & warranty costs.

Perceptions of Quality management

- Two Views: Traditional and Quality view.

Traditional Quality View	Quality View
<ul style="list-style-type: none"> • Improving quality increases costs and time • Quality is inspected for afterwards • Quantity over quality (Cost accounting – minimise production costs through economies of scales by mass production) • Defects can happen and are acceptable, we set a benchmark 	<ul style="list-style-type: none"> • Improving quality can reduce costs and time • Quality should be built (less need for inspection) • Quality over quantity • Minimising defects is ideal. • Quality control is more important in service sector, as impressions matter.

Lecture Example: Live Sheep Export Industry

- Consider the value chain from the producers to the consumers
- There are *minimum standards* overseen by the Department of Agriculture and Water Resources, who enforce: Export Control Act & Australian Meat and Livestock Industry Act
- Are there consumer expectations and how may these differ?
 - Requirements from suppliers (Farmers) vs. Requirements on Suppliers (Shippers)
 - Producers → Quarantine → Shipping → Quarantine → Customer
 - Farmers will care more about the Sheep’s welfare than shipping companies
 - Perceptions of quality – e.g. is value affected if the consumers from Qatar don’t care.
- Other Stakeholders: NGOs, animal welfare groups, business lobbies.

First Impressions

- Customer ‘value’ in the service age as first impressions matter.
- Feedback as window into the nature of customer opinions: “I actually haven’t used it much...”
- Example of design quality e.g. I brought it and it was delivered on time.
- Customers are finicky, and there is no way to provide subsequent feedback after this.

What do we mean by Quality?

- A quality product service is one that (i) Meets customers’ needs and requirements, (ii) Conforms to design specifications, and is (iii) priced competitively.
- Two categories of quality:
 1. Design Quality: Do the characteristics of product/service satisfy the needs of the customer? Is there market demand for a product or service?
 2. Conformance Quality: Does the product/service satisfy its expectations? Post purchase expectations e.g. If a part breaks on a new car then it fails to satisfy conformance quality.

Lecture Example

- Pool in Vietnam is taken with a liberal angle to appear fancy, but when viewed from a different perspective the poor quality is more evident. This is an issue of design quality.
- People use social media, as a better proxy, for knowing the quality of the product or service than from the company's website.

10.2 Measuring and Analysing Costs of Quality**Quality and MAS**

- Concerned with identifying, measuring and controlling the costs of quality:
- What needs to be done to ensure quality throughout?;
- 'What needs to be done to correct quality breakdowns?'
- How do we measure the above two actions?'

Measuring Costs of Quality

Cost of Quality (CoQ) is the costs incurred to prevent, or the costs arising as a result of, the production of a low quality product. CoQ are classified into four categories:

1. Costs of Conformance Quality:*Costs of Conformance:*

- **Prevention** – costs incurred to preclude the production of products that don't conform to specifications (building in quality in the 1st place) e.g. design & process engineering, supplier evaluations, preventive equipment maintenance, quality training & testing new materials
- **Appraisal** – costs incurred to detect which of the individual units of products do not conform to specifications. E.g. Inspection, inspection of manufacturing process & Product Testing.
- If testing of component before production it is prevention, if afterwards it is appraisal.

Costs of Non Conformance (if Cost of conformance is not working)

- **Internal Failure** – costs incurred on defective products before they are shipped to customers e.g. Rework, scrapping, machine repairs, and spoilage.
- **External Failure** – costs incurred on defective products after they are shipped to customers. Someone outside the organisation identifies a problem resulting in reworks, warranties, and potential litigation, which require customer support.

2. Hidden Costs

- If a customer has a bad reputation of producing low quality products or performing low services, then they will distribute their opinions to social media and through reviews.
- Firms are not aware the extent to which these will limit future customers from coming to you.

Measuring Costs of Quality for Audi Car

Costs of Conformance	
Prevention	Appraisal
<ul style="list-style-type: none"> • Zero Tolerance engineers for failure or defects that inspect all aspects of the car. • 100 Years of experience and dedication to quality pursuit. • Materials – e.g. Australian Emu Feathers and quality and durable leather 	<ul style="list-style-type: none"> • 2.5 million test km / year • Stress tests for extreme road conditions and weather • 'Noise'/ Nose team
Costs of Non- Conformance	
Internal Failure	External Failure
<ul style="list-style-type: none"> • Replacing torn leather, reworking paint patches • Replacing fractured engine blocks, wheels that do no meet specs etc. • Fixing source of irritating noises, bad smells 	<ul style="list-style-type: none"> • Vehicle recalls due to defective components • Associated repairs/ replacements, costs Consumer confidence impact

10.3 Quality Control Lecture Examples

How to Approach Quality Category Questions

- Know the four categories and what each of these activities mean
- Understand the relationship(s) between the costs of conformance activities and the costs of non-conformance activities;
- Assess changes in each category before discussing how other relevant categories may have been affected; e.g. look at time zero and ascertain whether you have cost of quality issues e.g. External Failures. Need to explain why (not just how) have the costs of quality of changed over time.
- Assess how final expenditure in quality has changed, and its implications, has it improved and could it be improved further?

Example of Key Relationships

- Inverse Relationship between *Prevention activities* and other 3: If prevention activities work 100% then you don't need appraisal activities, and there are zero internal and external failures.
- Positive Relationship between *Appraisal* and *Internal Failures*: If appraisal activities work well then you will find more problems that need to be fixed, and costs more internally
- Assume inverse relationship between *Appraisal* and *external failures* i.e. if you find more of the problems then it is less likely to be found by external users.

Lecture Example 1

- BUMS on Seats (BoS) make a variety of home furniture and furnishings. BoS prepares monthly reports on quality costs.
- You have been tasked to assess recent changes in performance. With references to the cost of quality categories, assess the changes in BoS' quality performance?

Quality Cost Area	2016		2017	
Prevention cost	45	3.3%	107	12.4%
Appraisal cost	124	9.1%	132	15.2%
Internal failure cost	503	36.9%	368	42.5%
Total internal quality cost	6724	9.3%	607	70.1%
External failure cost	691	50.7%	259	29.9%
Total quality cost	1363	100%	866	100%

Analysis of Benchmark Year

- In 2016 the firm is spending 3 times as much on appraisal than prevention costs.
- However, the 9.1% spent on appraisal is identifying a lot of internal failures (36.9%)
- Suggest that firm is reactive – will spend a lot of money on R&D, logistics etc. creating products, but will only find the faults after production stage in Appraisal.
- Concern is that external failure accounts for 50% of quality costs, which are not being picked up from appraisal and fix in internal failures. Are there any hidden costs?

Summary Analysis

- Also need to compare total quality cost in absolute values with other measures too.
- *Prevention* has increased by 9.1% (12.4% – 3.3%), suggesting increased investment in quality inputs and processes.
- *Appraisal* has increased by 6.1% (15.2% – 9.1%), suggesting increased investment in supervision and inspection.
- *Internal Failure* has increased by 5.6% (42.5% - 36.9%) but dollar value has fallen from \$503 to \$368. Suggests one of two things:
 - Appraisal spending is inefficient → not finding as much internal failures. Or;
 - Increased prevention led to less defects → decreasing internal failures occurring.
- *External Value* has fallen by 20.8% (50.7% – 29.9%), and in dollar values too, by keeping costs in house there has been less spent on fixing failures identified externally. This suggests that the increased spending in prevention is worthwhile, doing things right the 1st time.
- *Total change in COQ* = sum of these four quality costs = has fallen 36% (needs to compare the total amount on COQ to profitability and sales revenue to see full effects)