

QUALITY MANAGEMENT 444

PART 2: QUALITY MANAGEMENT

Prof Imke de Kock

imkedk@sun.ac.za





Module Material:									
[1] Jooste, JL, 2024. Quality Management 444 Lecture Notes: Reliability Engineering. Stellenbosch University									
[2] Defeo, JA. 2017. Juran's Quality Handbook: The Complete Guide to Performance Excellence , Seventh Edition. McGraw Hill									
Date (Mon - Fri)	Week	Lecture Date	Lecture number	Time from	Time to	Content	Reference	Lecture / Assignment / Test / Tutorial	ECSA Knowledge Area Covered
21 – 25 July	1	24 July	1	11:00	13:00	Introduction to Quality Management, Reliability Engineering and -Methods	[1]	Lecture	Engineering Science
			2	14:00	17:00	Reliability Methods		Tutorial 1: Group Presentation & Quiz 1 (Week 1)	
28 July – 1 August	2	31 July	3	11:00	13:00	Reliability Modelling and Component Importance		Lecture	Engineering Science
			4	14:00	17:00	Reliability Methods, Modelling and Component Importance		Tutorial 2: Group Presentation & Quiz 2 (Week 2)	
4 – 8 August	3	7 August	5	11:00	13:00	Data Analysis Modelling Approach and Non-Repairable Systems		Lecture	Engineering Science
			6	14:00	17:00	Analysing Non-Repairable Systems		Tutorial 3: Model Development	
11 - 15 August	4	14 August	7	11:00	13:00	Repairable Systems Analysis, Availability and Maintainability		Lecture	Engineering Science
			8	14:00	17:00	Analysing Repairable Systems		Tutorial 4: Model Development & Quiz 3 (Week 4)	
18 – 22 August	5	21 August	9	11:00	13:00	Introduction to Quality Management Chapter 1 & 25	[2]	Lecture	Complementary Studies
			10	14:00	17:00	Introduction to Quality Management Chapter 1 & 25		Tutorial 5 (Week 5)	
25 - 29 August	6	28 August	11	11:00	13:00	Chapter 5, 15 & 16		Lecture	Engineering Science
			12	14:00	17:00	Chapter 5, 15 & 16		Tutorial 6 (Week 6)	
30 August – 5 September	TEST WEEK								
6 - 14 September	RECESS								



QM 444 Weeks 5 - 12



General arrangements:

- ⦿ Textbook
- ⦿ Lectures & tuts

QUALITY MANAGEMENT 444

WEEK 5 LECTURE 9

Introduction & Chapter 1 – Universal principles of Quality Management

Prof Imke de Kock

imkedk@sun.ac.za





Why should we care about quality management?



Why should we care about quality management?



Customer Expectations

People expect reliability, safety, and sustainability. Poor quality = instant social media backlash.



Reputation & Trust

One failure can damage a brand globally (e.g., McDonald's ice cream machines).



Cost of Poor Quality

Fixing defects later is expensive. Quality reduces waste and rework.



Global Supply Chains

One weak link can disrupt entire industries. Quality ensures smooth collaboration.



Innovation & Technology

AI, software, and digital systems need reliability too (e.g., Tesla recalls).



Sustainability & Responsibility

Quality now includes social and environmental responsibility.

Why should we care about quality management?



You Expect Quality Every Day

When food, apps, or phones fail, you get frustrated. Quality = things that work as promised.



Bad Quality Spreads Fast

One bad review or TikTok can damage a company's reputation instantly.



Mistakes Cost Money

Recalls, repairs, or failures cost companies billions. Fixing later is expensive.



The World is Connected

Global supply chains mean one weak link affects everyone.



The Future Depends on It

Safety, sustainability, and innovation all require strong quality systems.



Your Role as Engineers

You'll design systems. Quality tools ensure they deliver value in the real world.

Why should we care about quality management?



Why should we care about quality management?





Why should we care about quality management?



is the mcdonald's
ice cream
machine broken?



312 State St
Conneaut



3630 Belmont Rd
Youngstown



22 Boardman Canfield R...
Boardman



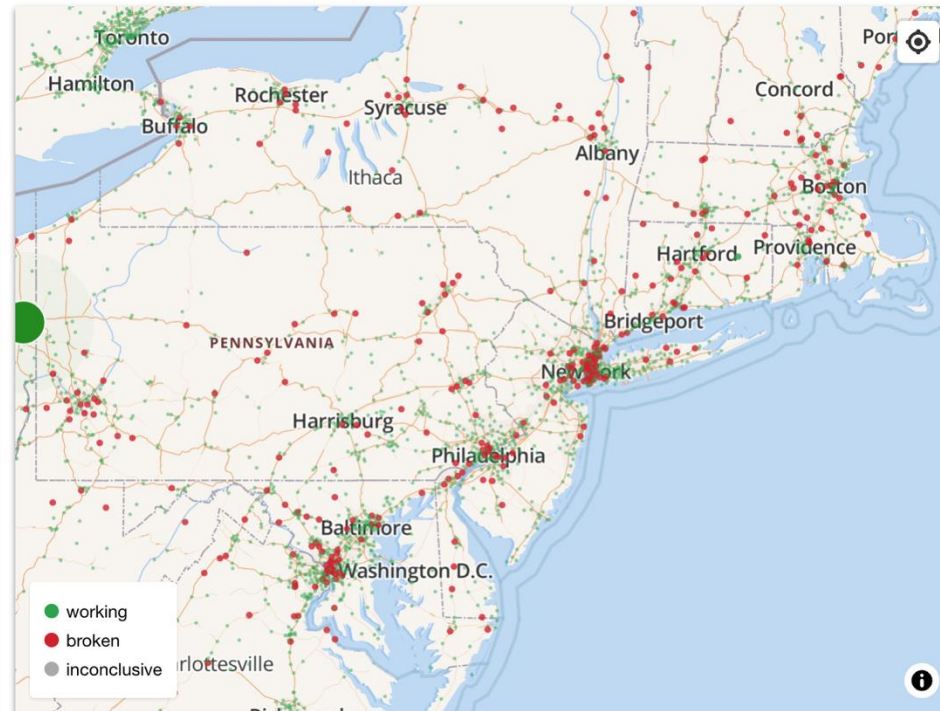
570 5th Ave
Youngstown



601 Midlothian Rd
Youngstown



900 Western Reserve Rd
Boardman



10.46%
Currently Broken

45.45%
in Riverside, CA

41.67%
in Washington, DC

38.24%
in Oklahoma City, OK

36.36%
in Tempe, AZ

35.42%
in Brooklyn, NY

33.33%

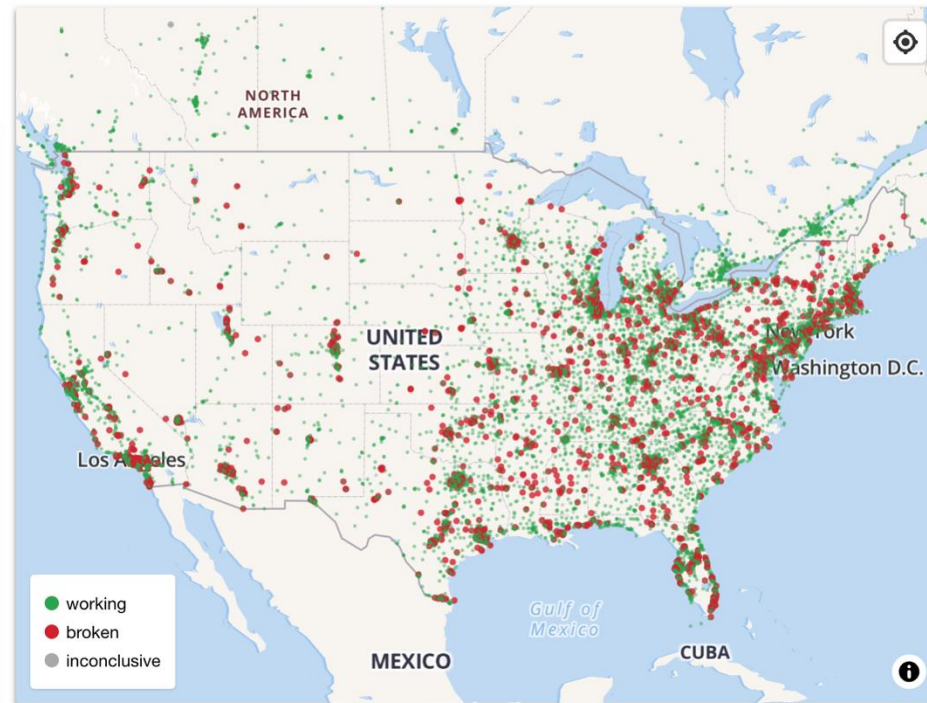


Why should we care about quality management?



is the mcdonald's
ice cream
machine broken?

- 410 S Greeley Hwy
Cheyenne
- 1201 Gaarder Rd
Holmen
- 11002 22nd Ave E
Tacoma
- 140 4th Ave N, Suite 130
Seattle
- 400 Vista Grande Way
Grandview
- 29360 Sr 410 E
Buckley



10.46%
Currently Broken

45.45%
in Riverside, CA

41.67%
in Washington, DC

38.24%
in Oklahoma City, OK

36.36%
in Tempe, AZ

35.42%
in Brooklyn, NY

33.33%



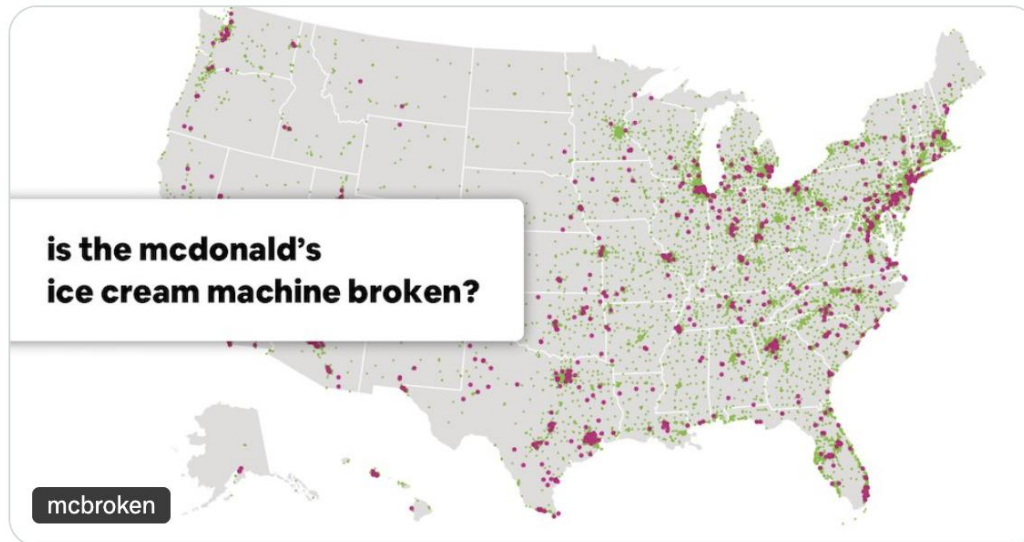
Why should we care about quality management?



← Post



I reverse engineered mcdonald's internal api and I'm currently placing an order worth \$18,752 every minute at every mcdonald's in the US to figure out which locations have a broken ice cream machine



From mcbroken.com

8:33 pm · 22 Oct 2020



Why should we care about quality management?



	What happened?	Quality Issue?	So what?
Tesla Autopilot Recall (2023)	2M cars recalled due to Autopilot not preventing misuse (drivers sleeping, distracted). Fixed with a software update.	System design & safety — didn't account for real human behavior.	Quality today is about more than parts; it's about safe, reliable systems that work in the real world.
McDonald's Ice Cream Machines	Machines often "broken," became a global meme, even tracked by McBroken.com.	Process reliability — machines too complex to clean/maintain, hurting consistency.	Quality isn't always dramatic. Even small, recurring issues can damage brand trust.



Stats don't lie.



52%



Fortune 500



What is a Fortune 500 company?

The Fortune 500 is an annual list of 500 of the largest US

companies

from sources across the web

fiscal







magazine







prestige






quality

Fortune 500 list

From sources across the web

	Walmart CEO: Doug McMillon (01 Fe...	▼
	CVS Health CEO: Karen S. Lynch (01 Fe...	▼
	Chevron CEO: Mike Wirth (01 Feb 20...	▼
	Microsoft CEO: Satya Nadella (04 Feb...	▼
	Marathon Petroleum CEO: Michael J. Hennigan (...)	▼
	Ford Motor CEO: Jim Farley (01 Oct 202...	▼

	Amazon CEO: Andy Jassy (05 Jul 20...	▼
	Berkshire Hathaway CEO: Warren Buffett (1970-)	▼
	AmerisourceBergen CEO: Steven H. Collis (01 J...	▼
	McKesson CEO: Brian S. Tyler (01 Apr ...)	▼
	Phillips 66 CEO: Mark Lashier (01 Jul 2...	▼
	Home Depot CEO: Edward Decker (01 M...	▼

	Apple CEO: Tim Cook (24 Aug 201...	▼
	Alphabet CEO: Sundar Pichai (03 Dec...	▼
	Costco Wholesale CEO: Ron Vachris (01 Jan 2...	▼
	Cigna CEO: David Cordani (2009-)	▼
	Valero Energy CEO: R. Lane Riggs (30 Jun...	▼



Stats don't lie.



86%



Stats don't lie.



12%



Stats don't lie.



1958 – 61 years
2013 – 18 years



”

**CHANGE BEFORE
YOU HAVE TO.**

Jack Welch (CEO General Electric)



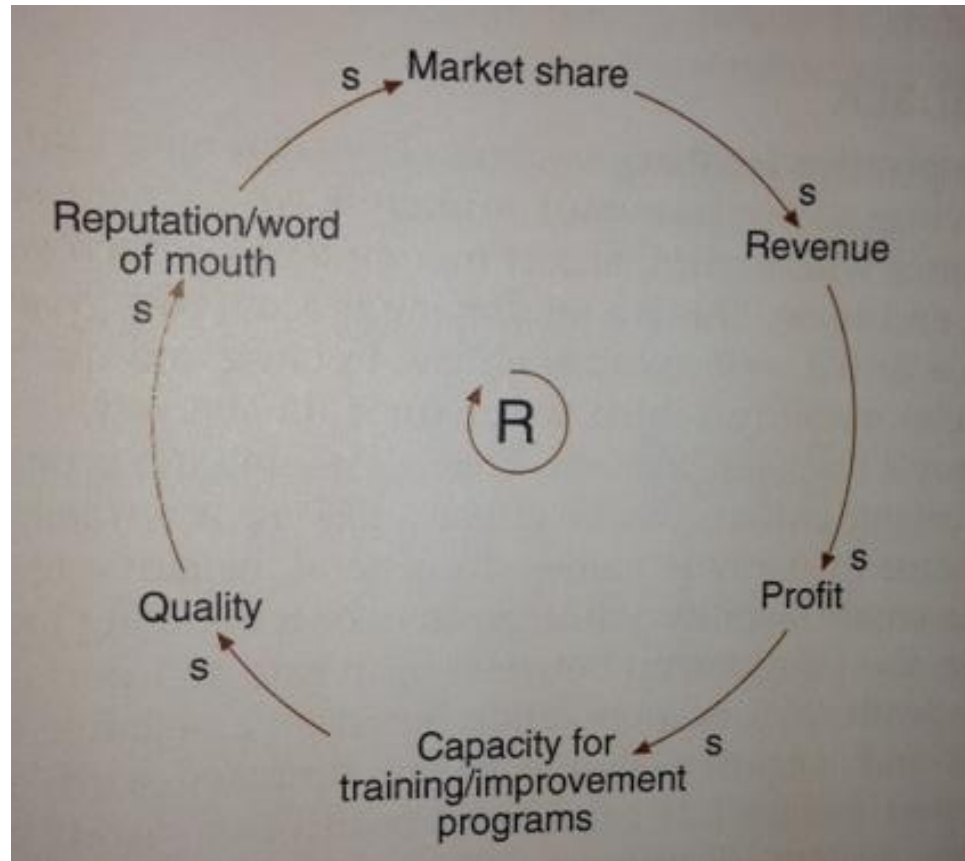
Importance of quality



S = Δ in same direction

O = Δ in opposite direction

R = Reinforcing loop





What is quality management?





What is quality management?



Quality management is the act of overseeing all activities and tasks needed to maintain a **desired level of excellence**.

This includes the determination of a **quality policy**, creating and implementing **quality planning and assurance**, and **quality control and quality improvement**.

In general, **quality management focuses on long-term goals** through the **implementation of short-term initiatives**.



Why Quality Management?



- ⦿ **The only constant is 'change'**
 - ⦿ **Push and pull drivers**



Why Quality Management?



⦿ The only constant is 'change'

⦿ Push and pull drivers

EXTERNAL TRIGGERS





Why Quality Management?



◎ The only constant is 'change'

◎ Push and pull drivers

INTERNAL TRIGGERS

Size changes

HR problems and prospects

Demographic and social influences

New management concepts



Inefficient processes / unproductive activities

Growth in size and scope of activities

Reformulation of the corporate strategy

Organizational development



Why Quality Management?



- ⊙ **The only constant is 'change'**
 - ⊙ **Push and pull drivers**
 - ⊙ **Major forces that affected had / have a profound impact on quality**
 - ⊙ **Rate and pace of change**



Stats don't lie.



1958 – 61 years
2013 – 18 years



Why Quality Management?



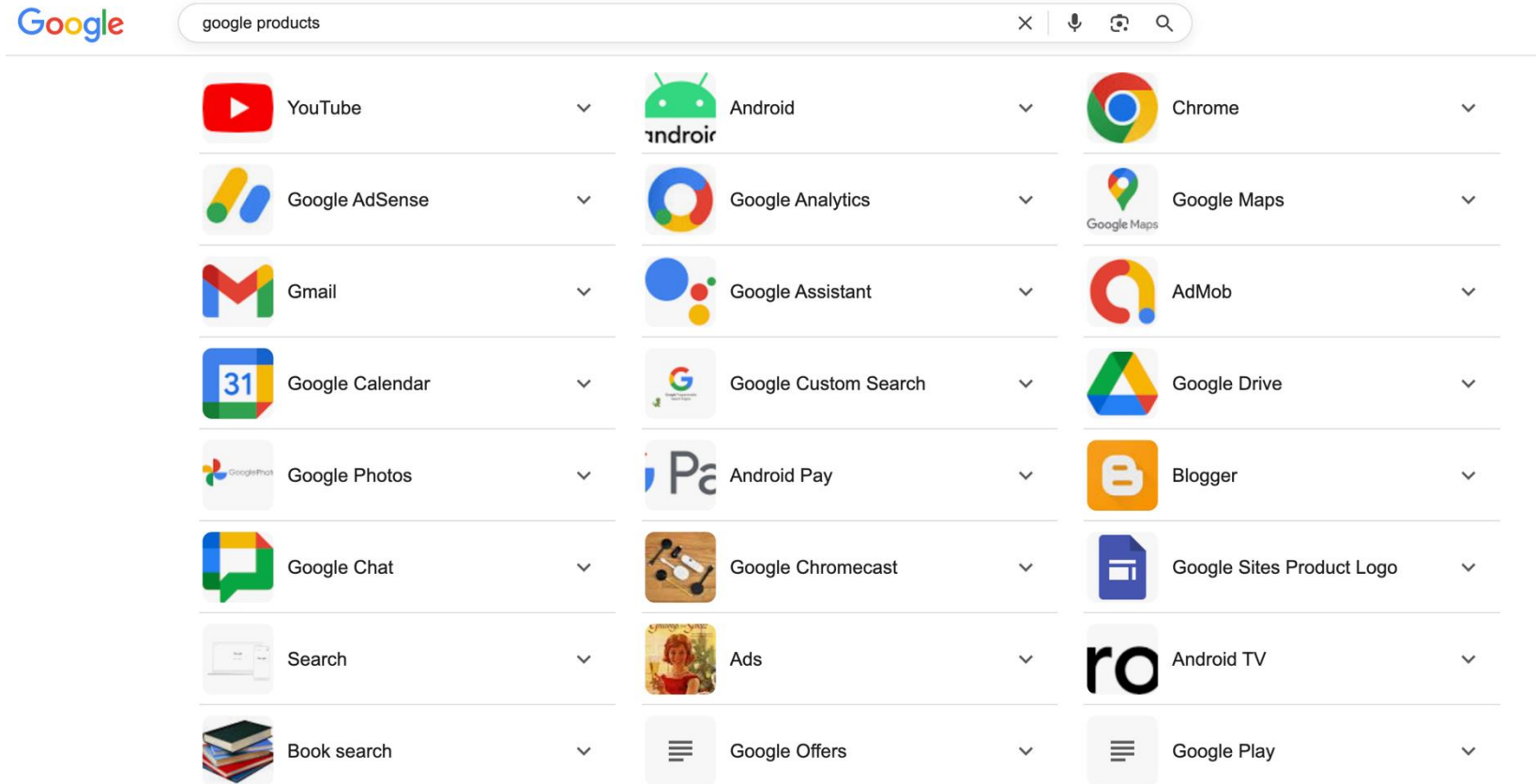
- ⦿ **The only constant is 'change'**
- ⦿ **Then and now? Changing business conditions**



Competition



Google



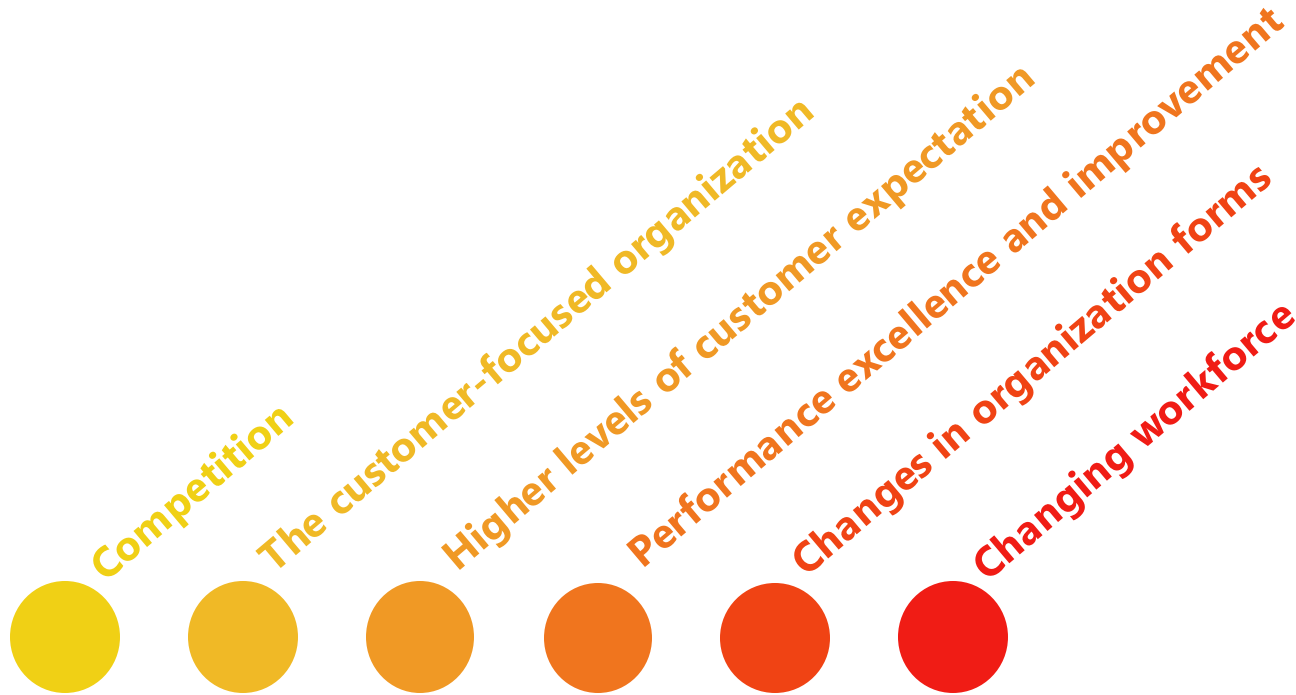
...what will Google do next?



Why Quality Management?



- ⦿ The only constant is 'change'
- ⦿ Then and now? Changing business conditions





Changing workforce



Statistically, generation-y accounts for 1.7 billion people, representing **25.5 percent** of the world's population. Millennials, who are already emerging as leaders in technology and other industries, will make up **75 percent** of the global workforce by 2025.

Understanding Y: Global Millennials – UYD Media

www.uydmedia.com/who-are-global-millennials/



About this result



Feedback

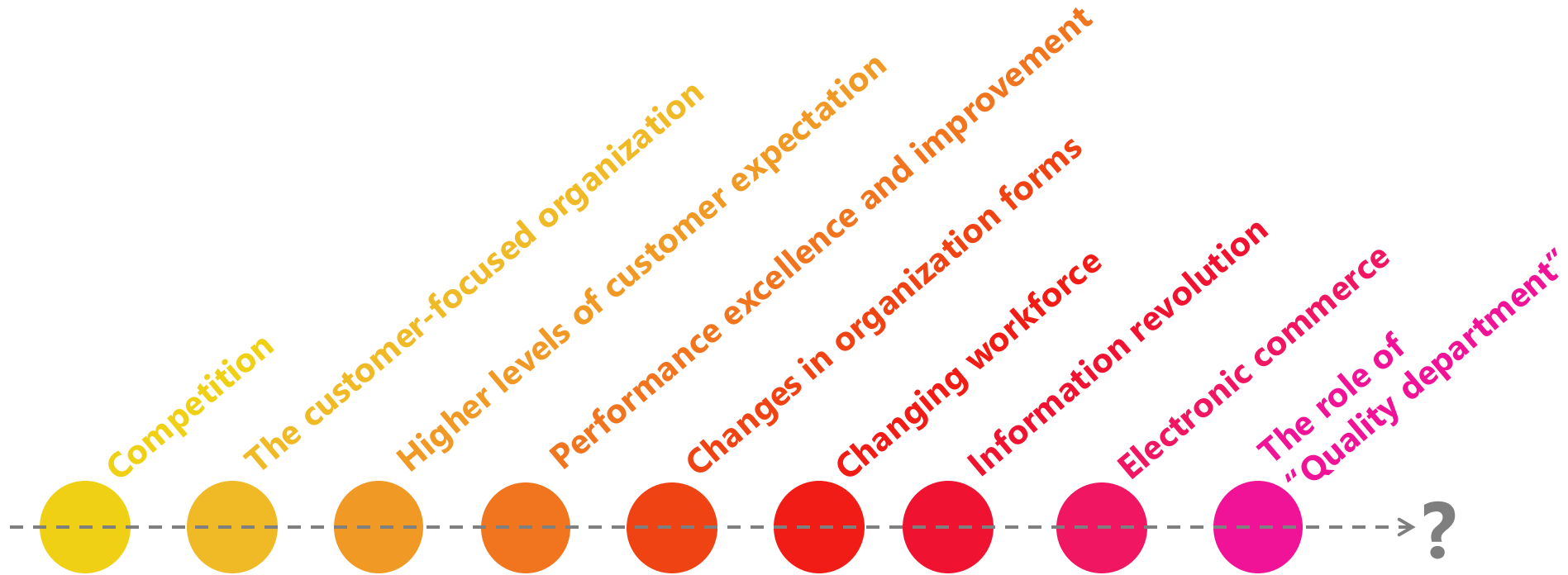
Their emphasis on work-life balance and continuous learning is prompting employers to offer more flexible work environments and professional development opportunities. Zurich Insurance reports that Gen Z currently makes up 30% of the world's population and is expected to account for **27% of the workforce by 2025**. 24 Jul 2024



Why Quality Management?



- ⦿ The only constant is 'change'
- ⦿ Then and now? Changing business conditions





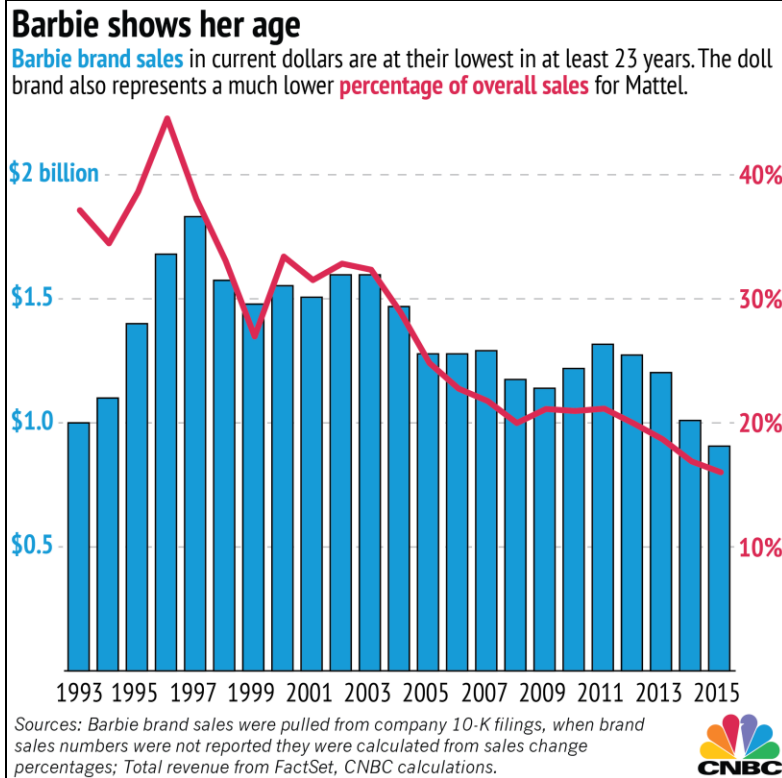
“But, we don’t need to change...”



<https://youtu.be/l1vnsqbnAkk?si=PCCX6eWC5lGefcp0>



“But, we don’t need to change...”



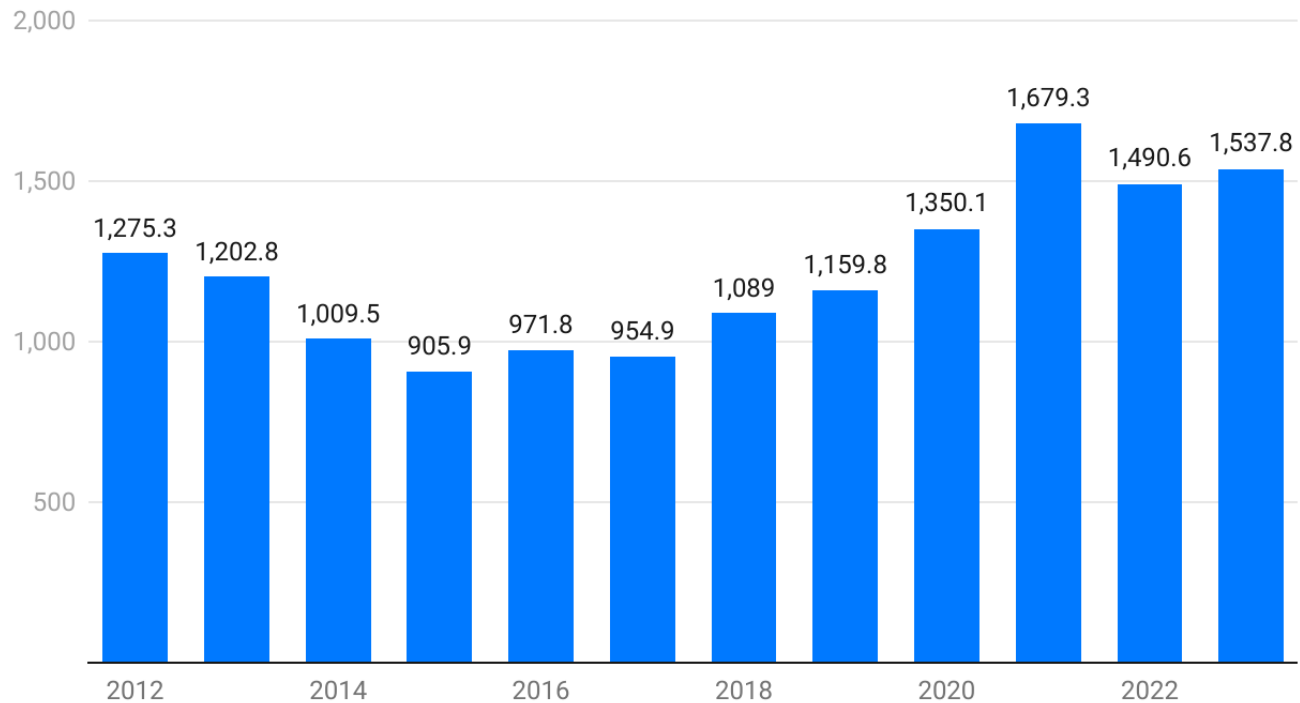


...need to change...



Gross Sales of Mattel's Barbie Brand Worldwide from 2012 to 2023

(in million U.S. dollars)



Source: Coolest Gadgets

COOLEST-GADGETS



...need to change...



WOMEN

Barbie's Surprising Comeback Has Everything To Do With Race

How diversity saved Mattel's iconic doll.

© 02/03/2017 11:02 SAST | Updated 03/03/2017 23:00 SAST

2.9 K





...some weren't that lucky



Blockbuster



Borders Group



Compaq



Enron



Kodak



General Motors



Polaroid



Sears Holdings Corp



Radio Shack



Why Quality Management?



- The only constant is 'change'
- Then and now? Changing business conditions
- Expect the unexpected
 - 'Sustainability' from a business perspective

...A NEED TO CHANGE



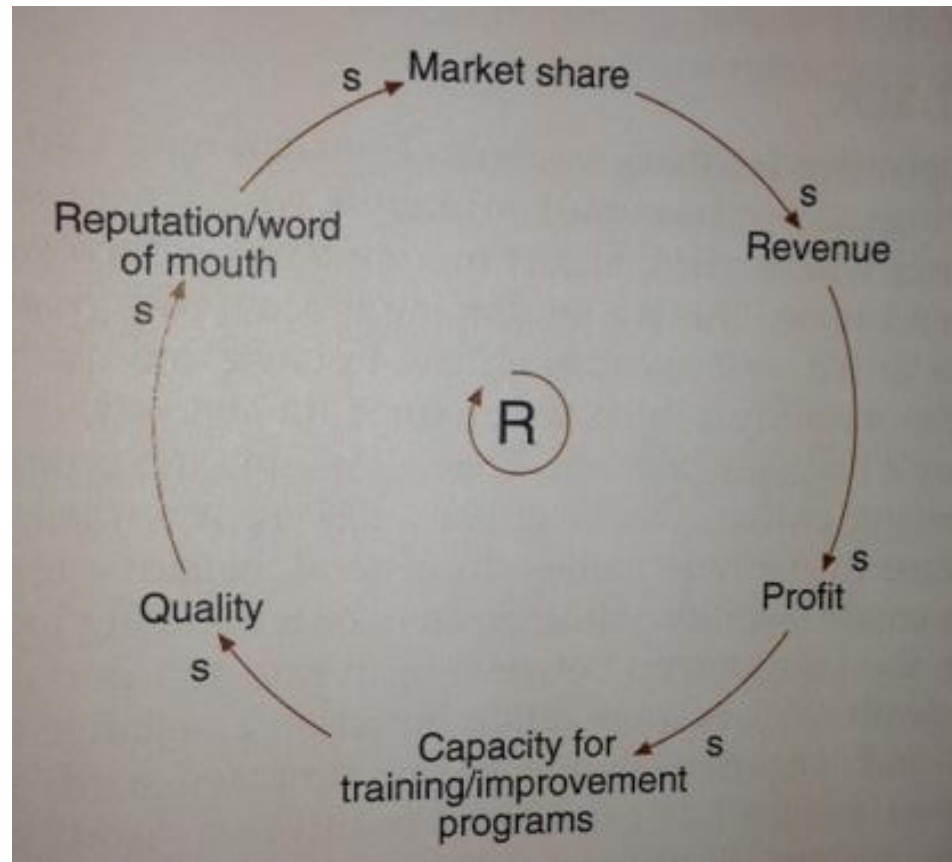
cutting through complexity

Global Sustainability Megaforces

Climate Change
Energy & Fuel
Material Resource Scarcity
Water Scarcity
Population Growth
Wealth
Urbanization
Food Security



Importance of quality





Dimensions of quality



Table 1.1 The Meaning of Quality

Features Which Meet Customer Needs	Freedom from Failures
<i>Higher quality enables organizations to</i>	<i>Higher quality enables organizations to</i>
Increase customer satisfaction	Reduce error rates
Meet societal needs	Reduce rework, waste
Make products and services salable	Reduce failures, warranty charges
Exceed competition	Reduce customer dissatisfaction
Increase market share	Reduce inspection, test, and audits
Provide salesrevenue	Shorten time to develop new products
Secure premium prices	Increase yields, capacity
	Improve delivery performance
<i>The major effect is on revenue</i>	<i>The major effect is on costs</i>
Usually higher quality costs more.	Usually higher quality costs less.
Source: Juran Institute, Inc., 2009.	



Does quality always come at a higher price?





Does quality always come at a higher price?



U B E R





Does quality always come at a higher price?



CAPITEC
BANK



Quality, cost & time – pick 2





Dimensions of quality



Table 1.1 The Meaning of Quality

Features Which Meet Customer Needs	Freedom from Failures
<i>Higher quality enables organizations to</i>	<i>Higher quality enables organizations to</i>
Increase customer satisfaction	Reduce error rates
Meet societal needs	Reduce rework, waste
Make products and services salable	Reduce failures, warranty charges
Exceed competition	Reduce customer dissatisfaction
Increase market share	Reduce inspection, test, and audits
Provide salesrevenue	Shorten time to develop new products
Secure premium prices	Increase yields, capacity
	Improve delivery performance
<i>The major effect is on revenue</i>	<i>The major effect is on costs</i>
Usually higher quality costs more.	Usually higher quality costs less.
Source: Juran Institute, Inc., 2009.	



Effect on revenue, income and cost



- Features effect on Revenue
- Failures effect on Income
- Failures effect on Cost



Universal principles for managing for quality: Juran's trilogy



Table 1.2 Managing for Quality

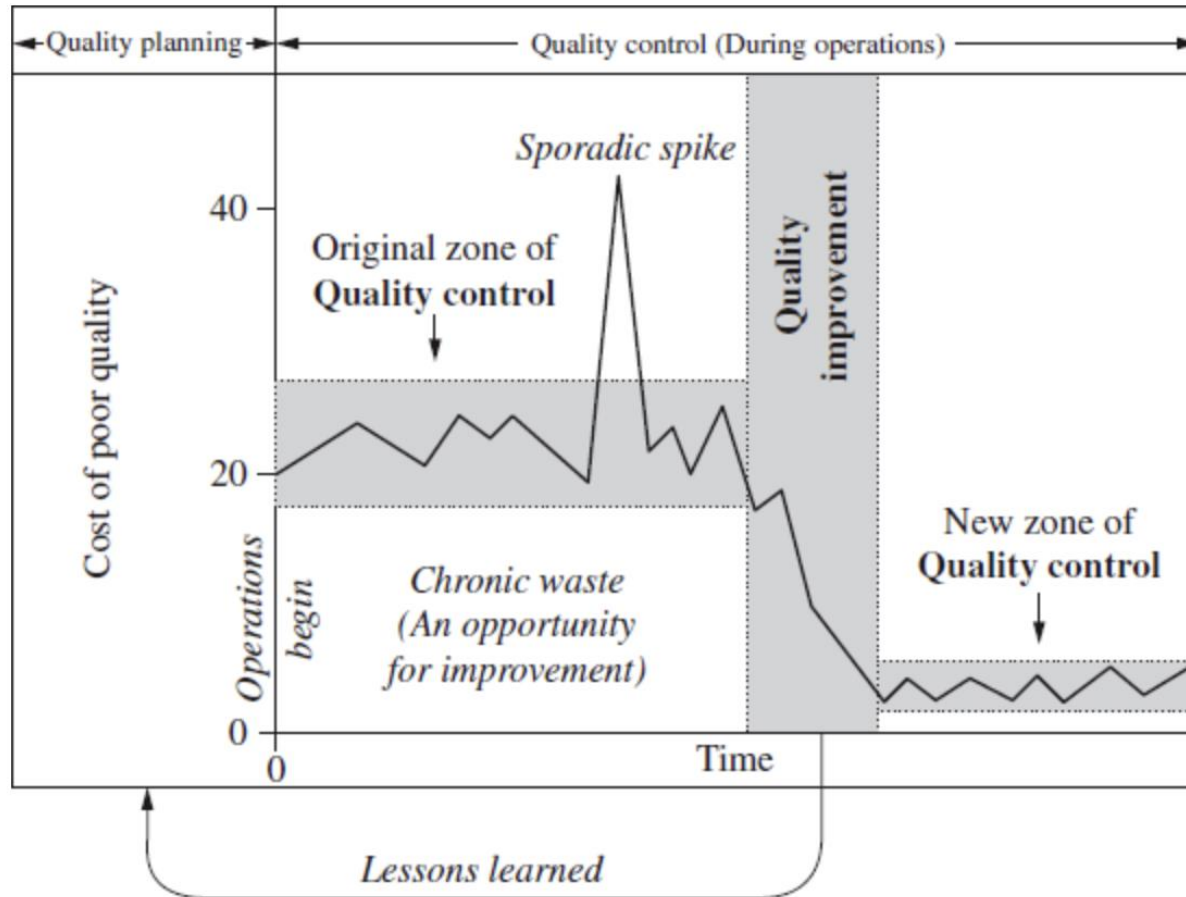
Quality Planning	Quality Control	Quality Improvement
Establish goals	Determine the control subjects	Prove the need with a business case
Identify who are the customers	Measure actual performance	Establish a project infrastructure
Determine the needs of the customers	Compare actual performance to the targets and goals	Identify the improvement projects
Develop features which respond to customers' needs		Establish project teams
Develop processes able to produce the products	Take action on the difference	Provide the teams with resources, training, and motivation to: Diagnose the causes Stimulate remedies
Establish process controls transfer the plans to the operating forces	Continue to measure and maintain performance	Establish controls to hold the gains



Universal principles for managing for quality: Juran's trilogy



Figure 1.1 Juran Trilogy.

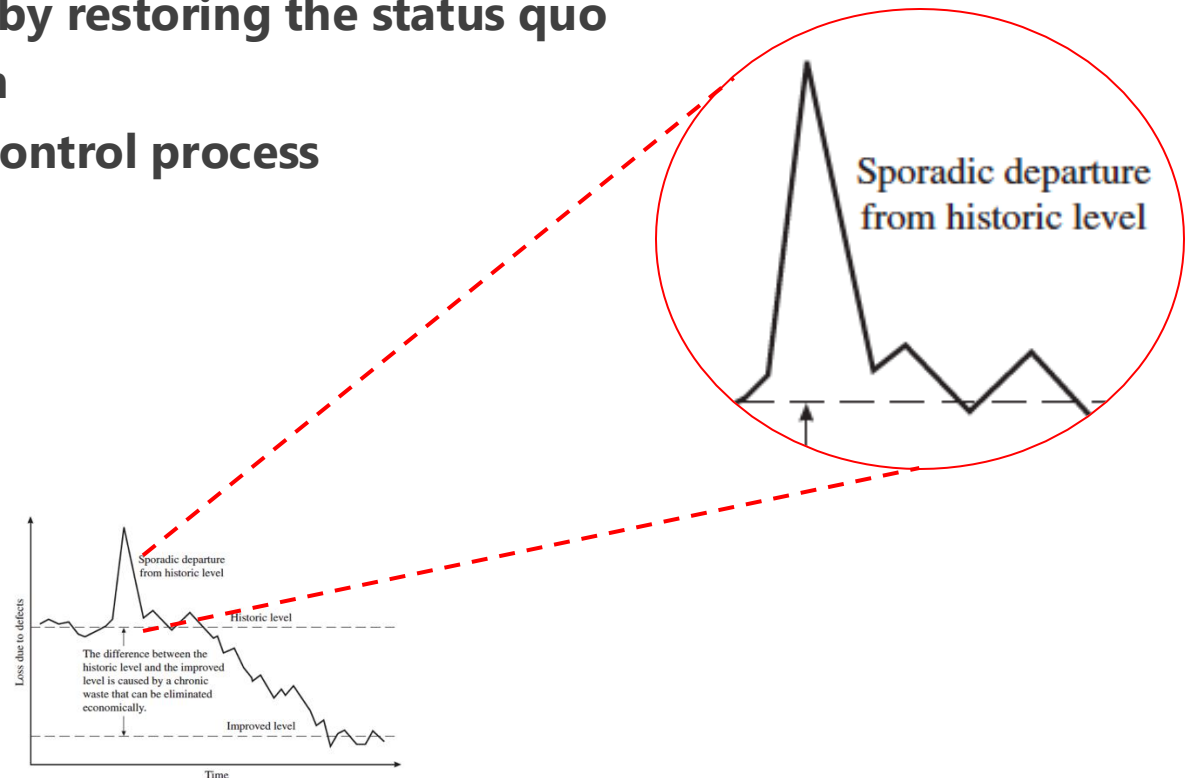




Sporadic quality problems



- **Sudden, adverse change in the status quo**
 - ⊙ **Dramatic**
 - ⊙ **Requires remedy by restoring the status quo**
 - ⊙ **Once-off problem**
 - ⊙ **Attacked by the control process**





Chronic quality problems



- **Long-standing adverse situation**
 - ⊙ Requires remedy by changing the status quo
 - ⊙ Difficult to solve, accepted as inevitable
 - ⊙ Chronic problems are accepted as inevitable
 - ⊙ Continuous improvement addresses chronic problems, involving the whole organisation
 - ⊙ Kaizen
 - ⊙ http://www.thetoyotasystem.com/lean_concepts/kaizen.php





Universal principles for managing for quality: Juran's trilogy



Figure 1.1 Juran Trilogy.

