

# The Pareto Principle

Kwaku Ofosu

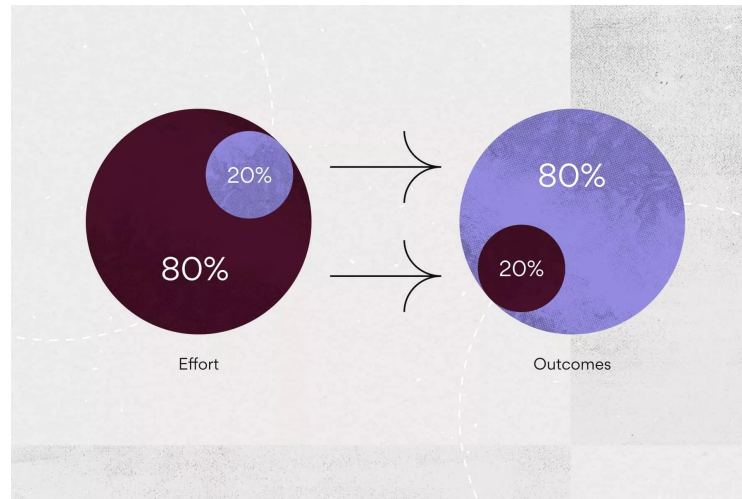


WILLIAM & MARY

CHARTERED 1693

# Overview

The Pareto Principle is an observed phenomenon which states that 80% of effects result from 20% of causes



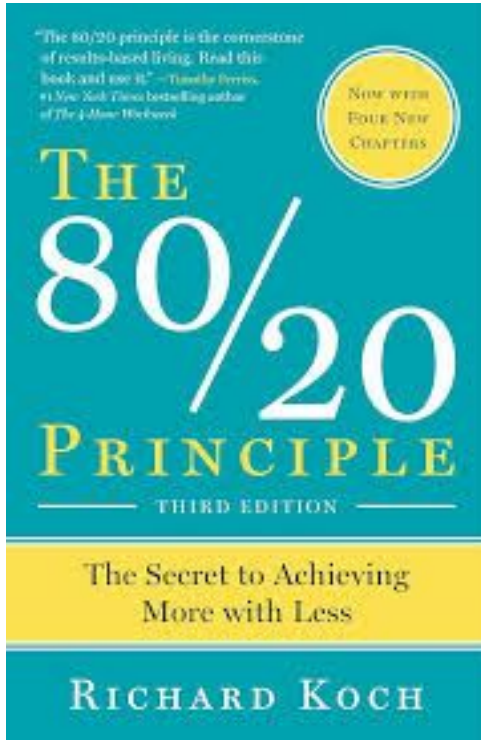
Visual taken from [Asana](#)

# Overview

This principle is also known as

- The Pareto Principle/Law
- 80/20 rule
- Law of the Vital Few
- Principle of Factor Sparsity
- Principle of Least Effort
- Principle of Imbalance

# The 80/20 Principle: The Secret of Achieving More with Less

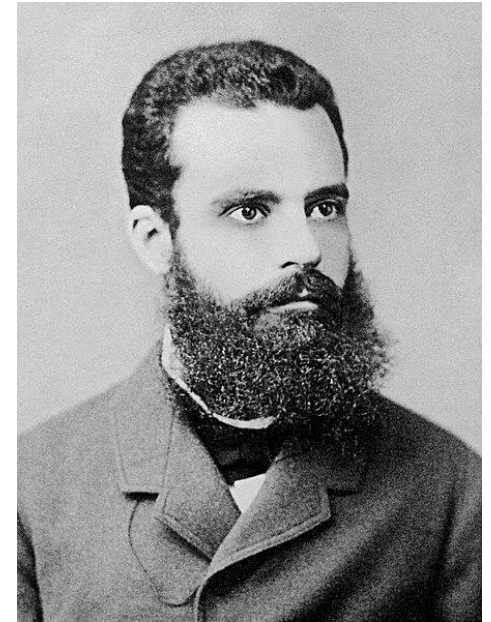


- Book by *Richard Koch*
- British management consultant, investor, entrepreneur
- Writes on how to apply the Pareto Principle to all walks of life

# Vilfredo Pareto (1848–1923)

Italian economist who first observed and discovered the principle while studying wealth and income in Europe

- Noted that 80% of wealth in Italy is owned by 20% of the population
- Later realized that this pattern was consistent across different time periods and across different countries



# George K. Zipf

American linguist and philologist

Discovered the *Principle of Least Effort*, which in reality was a rediscovery and elaboration of the Pareto Principle

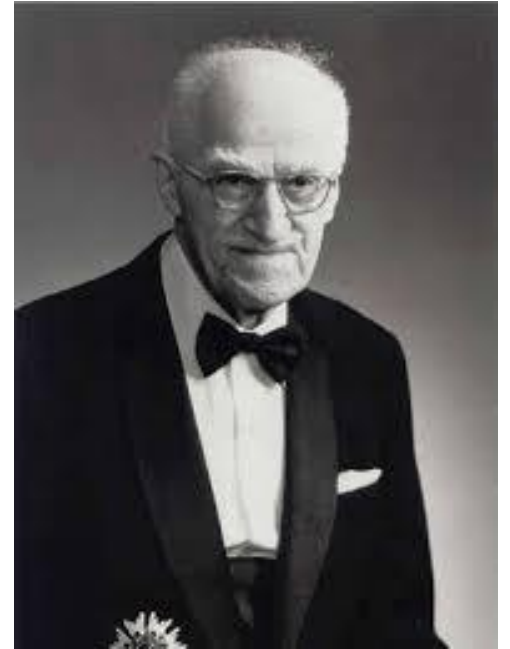


Specifically stated that resources tend to arrange themselves in a way such that 20–30% of any resource resulted in 70–80% of the activity related to that resource.

# Joseph Moses Juran

Romanian-American engineer behind the quality revolution of the 1950s-90s

- Officially coined the term “Pareto Principle”, also calling it the “Rule of the Vital Few”
- Used the Pareto Principle to root out quality faults and improve the reliability and value of industrial and consumer goods.



# Chaos Theory

*Chaos Theory*: The scientific study of random, non-linear, and unpredictable events

Phenomenon derived from / related to Chaos Theory:

- The Butterfly Effect
- Mixing
- Fractals
- and... **The Pareto Principle**





# Pareto Principle & Chaos Theory

Koch describes Chaos theory as *"a self-organizing logic lurking behind the disorder, a predictable non-linearity"*.

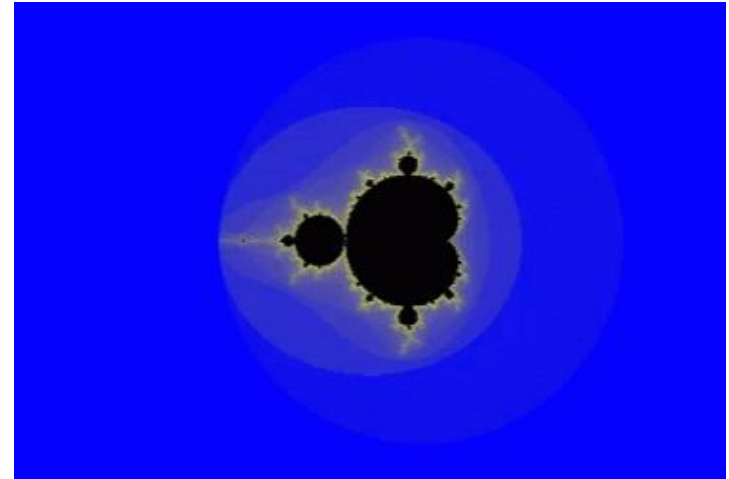
Similarities between these two aspects include

- Principle of Imbalance
- The universe is non-linear
- Feedback loops distort and disturb balance
- The tipping point
- First come, first served

# Pareto Principle & Fractals

*Perry Marshall*, American business consultant, expands on this topic in an article on *Harvard Business Review Italia*, with an additional claim of the Pareto Principle itself being a fractal

*Fractals* are patterns that repeat within itself. The patterns inside fractals repeat indefinitely, recursively



# Pareto Principle & Fractals

In the article, *Perry Marshall* argues that the Pareto Principle itself behaves recursively like a fractal.

For events where 20% of effort causes 80% of the effect, 20% of the 20% causes 80% of the 80%. In other words:

- 4% of effort also causes 64% of the effect.
- 0.8% of effort causes 52% of the effect

...and so on.

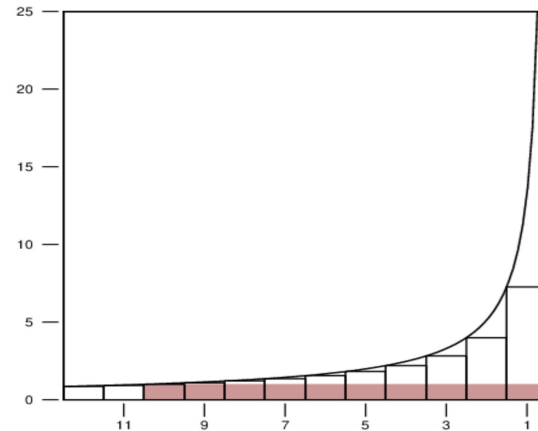
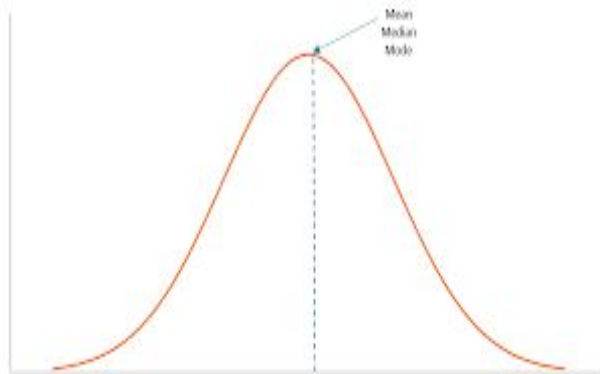
# Pareto Principle & Fractals

Perry Marshall highlights the following ideas in his article:

- 1) 80/20 is a fundamental aspect of nature
- 2) 80/20 is fractal
- 3) In business and life, it's more useful to think in exponential terms compared to thinking in terms of the bell curve and averages

# 80/20 Curve

With this notion in mind, Perry Marshall also developed the idea of the “80/20 Curve”. While a normal bell curve highlights averages, the 80/20 curve highlights outstanding performances.



Marshall, Perry. “L’80/20 è Una Legge Di Natura Frattale.” *Hbr Italia*, Hbr Italia, 4 June 2018, [www.hbritalia.it/giugno-2018/2018/06/04/news/l80-20-e-una-legge-di-natura-frattale-3513/](http://www.hbritalia.it/giugno-2018/2018/06/04/news/l80-20-e-una-legge-di-natura-frattale-3513/).

# 80/20 Curve

Perry Marshall defines the formula behind the recursiveness of the Pareto Principle. To develop an equation, we define the ratio  $R$  that is being used.

- For an 80/20 ratio, set  $R = 0.8$

From here, he defines the following:

$$q = \frac{\ln(R)}{\ln(1 - R)}$$

# 80/20 Curve

The 80/20 Curve calculates the output of members as the integral, where  $X$  represents the rank in percentile. The 80/20 distribution function is then defined as

$$f(x) = q(1 - x)^{q-1}$$
$$0 \leq x \leq 1$$

The two next formula can be used to find the total output of the left and right side of the curve respectively.

$$A_o(x) = 1 - \exp[q \cdot \ln(1 - x)]$$

$$A_1(x) = \exp[q \cdot \ln(1 - x)]$$

# Use Cases for the Pareto Principle

The Pareto Principle is versatile, showing success in a variety of business strategies. Koch notes the following successful applications of the Pareto Principle:

- 1) Strategy
- 2) Quality
- 3) Cost reduction and service improvement
- 4) Marketing
- 5) Selling
- 6) Information Technology
- 7) Decision Taking and Analysis
- 8) Inventory management
- 9) Project management
- 10) Negotiation



# Use Case: Technology

Koch notes two separate testimonies from two separate project directors: “80 percent of the benefits will be found in the simplest 20 percent of the system, and the final 20 percent of the benefits will come from the most complex 80 percent of the system.”

Another developer noted that customers follow the Pareto Principle when using software; customers use around 20% of the available services for a piece of software around 80% of the time.

# Use Case: Technology

The development of RISC Software uses the Pareto Principle

- Developers assumed that software spends 80 percent of its time executing only 20 percent of the available instructions.
- RISC processors were developed in order to optimize the performance of the hardware used by the majority of software cases
- Also reduced chip sizes and costs down by removing the other 80% of hardware

# Use Case: MONEY

- Incomes tend to be unequally distributed, with a minority gaining from aggregate income and a majority being gained from investing.
- It's more likely to accumulate wealth from investments rather than from employment income

# Use Case: MONEY

- When negotiating a pay raise, know that 80% of concessions will be made at the last 20% of negotiating time
- “If demands are presented early on, neither side may be willing to yield, and the entire transaction can fall apart”

*“The 80/20 Principle will always reassert itself, unless conscious, consistent and massive efforts are made and sustained to overcome it.”*

*“The 80/20 Principle asserts that when two sets of data, relating to causes and results, can be examined and analysed, the most likely result is that there will be a pattern of imbalance.”*

“Even if you start with goldfish almost exactly the same size, those that are slightly bigger become very much bigger, because, even with only slight initial advantages in stronger propulsion and larger mouths, they are able to capture and gobble up disproportionate amounts of food. ” (15)

# Examples of The Pareto Principle



# Business

- 80% of sales come from 20% of customers
- 80% of customer complaints come from 20% of customers
- 80% of business productivity results from the work of 20% of employees
- 80% of firm profits are driven by 20% of corporation's staff
- 80% of pollution originates from 20% of all factories

# Economics

- In 2023, 66.6% of total wealth in the US was held by 10% of the population
- Globally, around 75% of total wealth is held by 10% of the population



# Technology

- 80% of software glitches are caused by 20% of bugs
- 80% of the public uses 20% of their computers' features.
- 80% of software functionality is caused by 20% of the software developers' efforts.
- 20% of your phone apps get 80% usage.
- 20% of computer bugs fixed will stop 80% of crashes.

# Entertainment

- 20% of professional athletes cause 80% of sports ticket sales

# Personal/Daily Life

- 80% of stress is caused by 20% of stressors.
- 80% of your knowledge is used 20% of the time.
- 80% of sleep quality occurs in 20% of sleep.
- 80% of projects get completed in the last 20% of the time before a deadline.
- 20% of your wardrobe is worn 80% of the time.
- 20% of words in a language account for 80% of usage.

# Bibliography

by WID.world, Written. "What's New about Wealth Inequality in the World? - Wid - World Inequality Database." *WID*, 22 Dec. 2023, [wid.world/news-article/whats-new-about-wealth-inequality-in-the-world/#:~:text=The%202023%20update%20of%20the,inequality%20data%20up%20to%202022.&text=The%20top%2010%25%20own%20nearly,almost%20entirely%20deprived%20of%20wealth.](https://wid.world/news-article/whats-new-about-wealth-inequality-in-the-world/#:~:text=The%202023%20update%20of%20the,inequality%20data%20up%20to%202022.&text=The%20top%2010%25%20own%20nearly,almost%20entirely%20deprived%20of%20wealth.)

Guy-Evans, Olivia. "Pareto Principle (the 80-20 Rule): Examples & More." *Simply Psychology*, 21 Sept. 2023, [www.simplypsychology.org/pareto-principle.html](https://www.simplypsychology.org/pareto-principle.html).

"Home - Richard Koch: Author, Investor, Speaker." *Home - Richard Koch | Author, Investor, Speaker*, richardkoch.net/. Accessed 11 Feb. 2024.

Koch, Richard. *The 80/20 Principle: The Secret of Achieving More with Less*. Currency, 2018.

Langel, Jesse. "100 Examples of the 80/20 Rule with 35 Key Insights." *New York City Debt Collection Defense Attorney*, 3 Apr. 2021, [www.thelangelfirm.com/debt-collection-defense-blog/2018/august/100-examples-of-the-80-20-rule/#:~:text=20%25%20of%20your%20work%20tasks,with%2080%25%20of%20the%20value.](https://www.thelangelfirm.com/debt-collection-defense-blog/2018/august/100-examples-of-the-80-20-rule/#:~:text=20%25%20of%20your%20work%20tasks,with%2080%25%20of%20the%20value.)

Marshall, Perry. "L'80/20 è Una Legge Di Natura Frattale." *Hbr Italia*, Hbr Italia, 4 June 2018, [www.hbritalia.it/giugno-2018/2018/06/04/news/l80-20-e-una-legge-di-natura-frattale-3513/](https://www.hbritalia.it/giugno-2018/2018/06/04/news/l80-20-e-una-legge-di-natura-frattale-3513/).

Published by Statista Research Department, and Dec 20. "Wealth Distribution U.S. 2023." *Statista*, 20 Dec. 2023, [www.statista.com/statistics/203961/wealth-distribution-for-the-us/#:~:text=In%20the%20third%20quarter%20of,percent%20of%20the%20total%20wealth.](https://www.statista.com/statistics/203961/wealth-distribution-for-the-us/#:~:text=In%20the%20third%20quarter%20of,percent%20of%20the%20total%20wealth.)

Veyrat, Pierre. "Pareto 80 20 Rule: 12 Examples, Tips and Ideas." *HEFLO BPM*, 25 Aug. 2018, [www.heflo.com/blog/business-management/pareto-80-20-rule-examples/](https://www.heflo.com/blog/business-management/pareto-80-20-rule-examples/).

"What Is Chaos Theory?" *Fractal Foundation*, [fractalfoundation.org/resources/what-is-chaos-theory/](https://fractalfoundation.org/resources/what-is-chaos-theory/). Accessed 9 Feb. 2024.