# Reasoning/Overview

* The project "**Decoding Apple's Green Journey**" is a brief analysis focusing on Apple's remarkable strides toward sustainability and its commitment to achieving net-zero emissions. It aims to shed light on Apple's progress, assess the organisation's current carbon footprint across its entire value chain and evaluate the challenges faced by Apple in its journey.

# Codes

* Refer GitHub Repository

# Challenges

* Manual extraction of data
* Projection calculation

# Project Workflow/Plan

* Not Applicable

# Methodology

* Exploratory and Predictive Analytics

# Tools in Play

* POWER BI
* Python
* MS Excel

# Project Objectives

* **Explore and analyse the CO2 emissions by Apple.**
* **Visualize their progress towards becoming carbon neutral in 2030**.

# Data Sources

* Maven Challenges
* Apple Official Reports

# Data Process, Storage and Management

A diagram of a software development

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# Data and Business Understanding

## Greenhouse

### What is GH effect?

The greenhouse effect is the process through which heat is trapped near Earth's surface by substances known as 'greenhouse gases.'

When sunlight strikes the earth’s surface, some of it radiates back toward space as infrared radiation (heat). Greenhouse gases absorb this infrared radiation and trap its heat in the atmosphere, creating a greenhouse effect that results in global warming and climate change.

Many gases exhibit these greenhouse properties. Some gases occur naturally and are also produced by human activities. Some, such as industrial gases, are exclusively human made.

A diagram of a greenhouse effect

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Imagine these gases as a cozy blanket enveloping our planet, helping to maintain a warmer temperature than it would have otherwise.

During the day, the sun shines through the atmosphere, warming the earth’s surface. At night the earth's surface cools, releasing heat back into the air. But some of the heat is trapped by the greenhouse gases in the atmosphere. That's what keeps the earth’s temperature at an average 14˚C (57˚F).

### What are GHG ?

Greenhouse gases (also known as GHGs) are gases in the earth’s atmosphere that trap heat.

Some of the greenhouse gases are:

* Carbon dioxide (CO2)
* Methane (CH4)
* Nitrous oxide (N2O)
* Industrial gases(chlorofluorocarbons):
  + Hydrofluorocarbons (HFCs)
  + Perfluorocarbons (PFCs)
  + Sulfur hexafluoride (SF6)
  + Nitrogen trifluoride (NF3)
* Ozone
* Water Vapour

Water vapor is the most abundant greenhouse gas, but most scientists believe that water vapor produced directly by human activity contributes very little to the amount of water vapor in the atmosphere.

[Ozone](https://www.eia.gov/tools/glossary/index.php?id=O#ozone) is technically a greenhouse gas, but ozone is helpful or harmful depending on where it is found in the earth's atmosphere. Ozone occurs naturally at higher elevations in the atmosphere (the [stratosphere](https://www.eia.gov/tools/glossary/index.php?id=Stratosphere)) where it blocks ultraviolet (UV) light that is harmful to plant and animal life from reaching the earth’s surface.

The protective benefits of stratospheric ozone outweigh its contribution to the greenhouse effect.

### Why GH effect is a major concern?

Greenhouse gases are part of Earth's atmosphere.

Earth is often called the 'Goldilocks' planet – its conditions are just right, not too hot or too cold, allowing life to thrive.

Part of what makes Earth so amenable is its natural greenhouse effect, which maintains an average temperature of 15 **°**C (59 **°**F).

Scientists have determined that carbon dioxide plays a crucial role in maintaining the stability of Earth's atmosphere.

If carbon dioxide were removed, the terrestrial greenhouse effect would collapse, and Earth's surface temperature would drop significantly, by approximately 33°C (59°F).

However, in the last century, human activities, primarily from burning fossil fuels that have led to the release of carbon dioxide and other greenhouse gases into the atmosphere, have disrupted Earth's energy balance.

This has led to an increase in carbon dioxide in the atmosphere and ocean.

The level of carbon dioxide in Earth’s atmosphere has been rising consistently for decades and traps extra heat near Earth's surface, causing temperatures to rise.

Greenhouse gas emissions and atmospheric concentrations have increased over the past 150 years.

Concentrations of CO**2** in the atmosphere are naturally regulated by many processes that are part of the global carbon cycle. The flux, or movement, of carbon between the atmosphere and the earth's land and oceans is dominated by natural processes like plant photosynthesis. Although these natural processes can absorb some of the anthropogenic CO**2** emissions produced each year, starting in about 1950, CO**2** emissions began exceeding the capacity of these processes to absorb carbon.

A diagram of a carbon cycle

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This imbalance between greenhouse gas emissions and the ability for natural processes to absorb those emissions has resulted in a continued increase in atmospheric concentrations of greenhouse gases.

However, human activities, primarily the burning of fossil fuels and deforestation, have significantly increased the concentration of greenhouse gases in the atmosphere. This enhanced greenhouse effect has led to several notable consequences:

1. Global Warming: The increase in greenhouse gases, such as carbon dioxide and methane, has led to an overall rise in global temperatures. This is often referred to as global warming. Warmer temperatures can have a wide range of impacts, including more frequent and severe heatwaves.
2. Climate Change: Global warming has caused shifts in weather patterns, leading to changes in climate conditions. This includes altered precipitation patterns, more frequent and severe storms, and rising sea levels, all of which can have far-reaching effects on ecosystems and human societies.
3. Melting Ice and Rising Sea Levels: Higher global temperatures have caused glaciers and polar ice caps to melt at an accelerated rate. This melting contributes to rising sea levels, which can lead to coastal erosion, increased flooding in low-lying areas, and the displacement of communities.
4. Ocean Acidification: Increased levels of carbon dioxide in the atmosphere are absorbed by the world's oceans, leading to ocean acidification. This can harm marine life, especially organisms with calcium carbonate shells or skeletons, such as coral reefs and some shellfish.
5. Biodiversity Loss: Climate change disrupts ecosystems and can threaten the survival of many plant and animal species. Species that cannot adapt or move to more suitable habitats may face extinction.
6. Extreme Weather Events: The altered climate conditions associated with the enhanced greenhouse effect have been linked to more frequent and severe weather events, including hurricanes, droughts, and wildfires.
7. Health Impacts: Climate change and the associated increase in temperatures can have direct and indirect health effects, including heat-related illnesses, the spread of infectious diseases, and air pollution-related respiratory issues.
8. Food and Water Security: Changes in precipitation patterns and increased temperatures can affect crop yields, water availability, and the stability of food and water supplies, leading to potential food and water shortages.

### Addressing the Greenhouse Effect Issue

The first significant international agreement on climate change was the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC was adopted during the Earth Summit in Rio de Janeiro, Brazil, in June 1992 and entered into force on March 21, 1994. It represented a major step in acknowledging the importance of addressing climate change on a global scale.

The UNFCCC set the framework for subsequent climate change agreements and actions. Its ultimate objective, as stated in Article 2, is to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." The Convention established the Conference of the Parties (COP) to oversee its implementation.

One of the most notable outcomes of the UNFCCC was the negotiation and adoption of the Kyoto Protocol in 1997. The Kyoto Protocol set legally binding emission reduction targets for developed countries. It was an important early step in the effort to combat climate change but was later replaced by the Paris Agreement.

The Paris Agreement, adopted in 2015, is the most recent and widely recognized international climate agreement. It builds upon the UNFCCC and represents a more comprehensive and ambitious global effort to address climate change. The Paris Agreement sets the framework for global cooperation on climate action and aims to limit global warming to well below 2 degrees Celsius above pre-industrial levels, with an aspiration to limit it to 1.5 degrees Celsius.

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The Paris Agreement's long-term temperature goal is to keep the rise in mean global temperature to well below 2 °C (3.6 °F) above pre-industrial levels, and preferably limit the increase to 1.5 °C (2.7 °F), recognizing that this would substantially reduce the [effects of climate change](https://en.wikipedia.org/wiki/Effects_of_climate_change). Emissions should be reduced as soon as possible and reach [net zero](https://en.wikipedia.org/wiki/Net-zero_emissions) by the middle of the 21st century.[[3]](https://en.wikipedia.org/wiki/Paris_Agreement#cite_note-3) To stay below 1.5 °C of global warming, emissions need to be cut by roughly 50% by 2030.

### Carbon Footprint and GWP

A carbon footprint is the total amount of greenhouse gases (including carbon dioxide and methane) that are generated by our actions.

The carbon footprint (or greenhouse gas footprint) serves as an indicator to compare the total amount of greenhouse gases emitted from an activity, product, company or country.

Carbon footprints are usually reported in tons of emissions ([CO2-equivalent](https://en.wikipedia.org/wiki/CO2_equivalent)) per unit of comparison.

For a product, its carbon footprint includes the emissions for the entire [life cycle](https://en.wikipedia.org/wiki/Life-cycle_assessment) from the production along the [supply chain](https://en.wikipedia.org/wiki/Supply_chain) to its final consumption and disposal.

Similarly for an organization, its carbon footprint includes the direct as well as the indirect emissions caused by the organization called Scope 1, 2 and 3 in the [Greenhouse Gas Protocol](https://en.wikipedia.org/wiki/Greenhouse_gas_protocol) that is used for [carbon accounting](https://en.wikipedia.org/wiki/Carbon_accounting) of organizations.

Corporations and facilities use a variety of methods to track and report GHG emissions.

These include those from:

* Greenhouse Gas Protocol,
* the Task Force on Climate-Related Financial Disclosure,
* the Sustainability Accounting Standards Board,
* the Global Reporting Initiative,
* the Climate Disclosure Standards Board,
* the Climate Registry, as well as several industry specific organizations.

GHG Protocol is a group of standards that are the most common in GHG accounting.

* **Scope 1** covers all direct GHG emissions within a corporate boundary (owned or controlled by a company). It includes fuel combustion, company vehicles and [fugitive emissions](https://en.wikipedia.org/wiki/Fugitive_emission).

**Fugitive emissions** are leaks and other irregular releases of gases or [vapors](https://en.wikipedia.org/wiki/Vapor" \o "Vapor) from a pressurized containment – such as appliances, storage tanks, pipelines, wells, or other pieces of equipment – mostly from industrial activities.

* **Scope 2** covers indirect GHG emissions from consumption of purchased electricity, heat, cooling or steam.
* **Scope 3** emission sources include emissions from suppliers and product users (also known as the “value chain”). Transportation of goods, and other indirect emissions are also part of this scope. Scope 3 emissions often represent the largest source of corporate greenhouse gas emissions.

The carbon footprint of a product could help consumers decide which product to buy if they want to be climate aware.

“A carbon footprint is the total greenhouse gas (GHG) emissions caused directly and indirectly by an individual, organization, event or product. It is calculated by summing the emissions resulting from every stage of a product or service’s lifetime (material production, manufacturing, use, and end-of-life)

Throughout a product’s lifetime, or lifecycle, different GHGs may be emitted, such as carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O), each with a greater or lesser ability to trap heat in the atmosphere. These differences are accounted for by the global warming potential (GWP) of each gas, resulting in a carbon footprint in units of mass of carbon dioxide equivalents (CO2e).

Carbon footprints are usually reported in tons of emissions ([CO2-equivalent](https://en.wikipedia.org/wiki/CO2_equivalent)) per unit of comparison.

 The **carbon dioxide equivalent** (CO2e or CO2eq or CO2-e) is calculated from GWP.

**Global warming potential** (**GWP**) is a measure of how much infrared [thermal radiation](https://en.wikipedia.org/wiki/Thermal_radiation) a [greenhouse gas](https://en.wikipedia.org/wiki/Greenhouse_gas) added to the [atmosphere](https://en.wikipedia.org/wiki/Atmosphere) would absorb over a given time frame, as a multiple of the radiation that would be absorbed by the same [mass](https://en.wikipedia.org/wiki/Mass) of added [carbon dioxide](https://en.wikipedia.org/wiki/Carbon_dioxide) (CO2).

Carbon dioxide is the reference. It has a GWP of 1 regardless of the time period used.

CO2 emissions cause increases in atmospheric concentrations of CO2 that will last thousands of years.

GWP for any gas, is the mass of CO2 that would warm the earth as much as the mass of that gas. Thus it provides a common scale for measuring the [climate effects](https://en.wikipedia.org/wiki/Effects_of_climate_change) of different gases.

It is calculated as GWP times mass of the other gas.

[Methane](https://en.wikipedia.org/wiki/Methane_emissions) has GWP (over 20 years) of 81.2.

For example, a [leak](https://en.wikipedia.org/wiki/Fugitive_gas_emissions) of a tonne of methane is equivalent to emitting 81.2 tonnes of carbon dioxide.

### What is carbon neutrality and net zero emissions?

**Net zero emissions,** or simply **net zero,** is a state in which human-caused emissions are balanced by human-caused [carbon dioxide removals](https://en.wikipedia.org/wiki/Carbon_dioxide_removal) over a specified time period.

Achieving net zero targets requires actions to reduce emissions, such as by shifting from fossil fuel energy to [sustainable energy](https://en.wikipedia.org/wiki/Sustainable_energy) sources.

For residual emissions, organizations commonly [offset](https://en.wikipedia.org/wiki/Carbon_offsets_and_credits) them by buying carbon credits as a counterbalance.

Carbon neutrality means having a balance between emitting carbon and absorbing carbon from the atmosphere in carbon sinks.

The terms **net zero emissions**, **carbon neutrality***,* and **climate neutrality** are often used interchangeably. In some contexts, however, the terms are given different meanings from each other. For instance, some standards bodies allow more use of offsets for carbon neutral certification than for net zero certification.

In some contexts, "emissions" refers to emissions of all [greenhouse gases](https://en.wikipedia.org/wiki/Greenhouse_gas), and in other contexts it refers only to emissions of carbon dioxide (CO2).

Removing carbon oxide from the atmosphere and then storing it is known as **carbon sequestration**.

In order to achieve net zero emissions, all worldwide greenhouse gas (GHG) emissions will have to be counterbalanced by **carbon sequestration**.

Carbon sink is any system that absorbs more carbon than it emits. The main natural carbon sinks are soil, forests and oceans.

Businesses often speak about becoming carbon neutral. This means O2 (carbon dioxide) cloud formation in blue sky over green grass they’re taking steps to remove the equivalent amount of CO2 to what’s emitted through activities across their supply chains, by investing in ‘carbon sinks’ that absorb CO2.

Carbon sinks, such as forests or our oceans, absorb and store more carbon from the atmosphere than they emit. Investment into their health is called ‘offsetting’ and allows companies to operate in good conscience, knowing their emissions are balanced out.

Many companies begin this process by cutting down their CO2 emissions as much as possible first, before investing in highly-visible offset programmes.

‘**carbon neutral**’ being used when referring to businesses. In this case, it’s often referring to their ambition to limit any increase in future carbon emissions, while using offsets to neutralise existing emissions.

‘**Net zero’** on the other hand places much more focus on reducing carbon emissions as much as possible first, and only offsetting unavoidable, residual CO2 as a last resort.

**‘Gross zero’**, also known as ‘real zero’ refers to industry sectors (such as the energy sector) aiming to completely eliminate carbon emissions from their operations.

### Carbon Offset

A carbon offset is a reduction or removal of emissions of carbon dioxide or other greenhouse gases made in order to compensate for emissions made elsewhere.

Offsetting provides an excuse for avoiding real emission reductions and can create a dangerous mirage of 'climate neutrality' when emissions are actually rising.

### Credibility of net zero emissions

Despite an increasing prevalence of both nations and organizations (private and public sector) committing to net zero, the credibility of these claims remains low.[[12]](https://en.wikipedia.org/wiki/Net_zero_emissions#cite_note-apnews.com-12) Given the lack of any binding regulation mandating a transition to net zero, the overwhelming majority of net zero commitments have been made on a voluntary basis.[[60]](https://en.wikipedia.org/wiki/Net_zero_emissions#cite_note-60) The lack of an enforcement mechanism surrounding these claims means that many are dubious. In addition, in many sectors such as steel, cement, and chemical production, the pathway to achieving net zero remains technologically unclear.[[61]](https://en.wikipedia.org/wiki/Net_zero_emissions#cite_note-61) Further investment in research and innovation, as well as further regulation, will likely be necessary if net zero claims are to increase in credibility.

### The role of carbon credits

A primary reason for the low credibility of many net zero claims is the heavy reliance on carbon credits. Carbon credits are often used for offsetting, and are a reduction or removal of emissions of carbon dioxide or other [greenhouse gases](https://en.wikipedia.org/wiki/Greenhouse_gas) made in order to compensate for emissions made elsewhere.[[62]](https://en.wikipedia.org/wiki/Net_zero_emissions#cite_note-62)[[63]](https://en.wikipedia.org/wiki/Net_zero_emissions#cite_note-63) For example, many fossil fuel companies have made pledges to be net zero by 2050,[[64]](https://en.wikipedia.org/wiki/Net_zero_emissions#cite_note-64) while their extraction practices continue to increase greenhouse gas emissions.[[65]](https://en.wikipedia.org/wiki/Net_zero_emissions#cite_note-65) These claims are based on the fossil fuel companies assertions that they will use carbon credits and carbon capture technology in order to continue extracting and burning fossil fuels, and have been condemned by the UN as dangerous examples of greenwashing.

### Baseline Emissions

An emissions baseline is the reference point against which a business or country’s greenhouse gas (GHG) emissions will be measured going forward. Baseline emissions are calculated by looking at a 'baseline emissions period', usually the past 1 - 5 years of an organisation’s activity. If no action is taken to reduce emissions, this is the level at which they can be expected to remain.

## Apple’s Emission Goals and Details

In 2020, after announcing their corporate operations were officially carbon neutral, Apple pledged to make their products carbon neutral by 2030.

To achieve this goal, they set their emissions for 2015 (38.4 million metric tons CO2e) as the baseline and will aim to reduce them by 75% by 2030.

The remaining 25% of gross emissions (9.6 million metric tons CO2e) will be removed using carbon offsets, bringing the net emissions to 0.

### Corporate Emissions:

**Scope 1** emissions - all direct GHG emissions

* Natural gas, diesel, propane
* Fleet vehicles
* Other emissions - Emissions from R&D processes and refrigerant leaks

**Scope 2** emissions\*\* – indirect GHG emissions

Market based.

* Electricity
* Steam, heating, cooling – [emissions from the purchase of district heating\*, chilled water, and steam]

\* District energy is an innovative energy solution that involves the production of thermal energy at a central facility and distribution to buildings via an underground piping network.

\*\* estimate the life cycle emissions associated with our use of renewable electricity for our corporate facilities to be about 60,000 metric tons CO2e. We do not currently account for these emissions in our carbon footprint, due to the poor quality of this data.

**Scope 3 -** emissions from product life cycle, suppliers, and product users – value and supply chain

Corporate

* Business travel
* Employee Commute
* Upstream fuel
* Work from home (Market Based)
* Transmission and distribution loss (market-based)
* Third-party cloud (market-based)

Product

* Manufacturing (purchased goods and services)
* Product transportation (upstream and downstream)
* Product use (use of sold products)
* End-of-life processing

Building emissions refers to emissions from natural gas and electricity at corporate offices, data centers, and retail stores

### Avoided Emissions

Scope 2 emissions avoided - Corporate facilities – Renewable electricity

### Carbon Offsets

Corporate carbon offsets

Product carbon offsets

### Product- wise carbon emissions

Estimated emissions are calculated in accordance with guidelines and requirements as specified by ISO 14040 and ISO 14044. Calculation includes emissions for the following life-cycle phases contributing to Global Warming Potential (GWP 100 years) in CO2 equivalency factors (CO2e):

Production

Transport

Product use

End-of-life processing

### Normalizing Factors

Normalizing factors in emissions refer to the factors or variables used to adjust or standardize emissions data to make meaningful comparisons between different entities, periods, or situations. Emissions data can vary significantly based on various factors like location, scale, and economic activities. Normalizing factors help in comparing emissions fairly, taking into account these variations.

Net sales can be used as a normalizing factor in certain contexts, particularly when you want to assess the efficiency or performance of a business or industry in relation to its sales revenue. Normalizing by net sales helps provide insights into the relationship between emissions and economic activity.

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Business Performance and Trend Analysis

# Preprocessing and Analysis

## Main points to show/discuss: (All the below data points should be explained with details/strategies and how effective these strategies are?)

* ~~What and why of carbon emissions reduction~~
* ~~Apple’s goal with numbers to reduce carbon emissions.~~
* ~~Current total carbon emissions till 2022~~
* ~~Overview and projection of emission reductions toward end goal by year~~
* ~~Cumulative emissions by year~~
* ~~Carbon emissions by year, scope and category~~
* ~~Category wise breakup and analysis by year~~
* ~~Scope wise breakup and analysis by year~~
* Overview of carbon emissions, reductions, and carbon offsets total (2015 till 2022) by Scope and Category
* ~~Carbon emissions reduction rate by year – standard rate?~~
* ~~Reduction strategies vs Normalisation and vice versa analysis using different ratios~~
* ~~Using above ratios for predicting emissions.~~
* Carbon emissions by product, which product is efficient and leaves less carbon footprint?
  + Iphone
    - Total emissions
    - Emissions by model
    - Highest emission by model
* Conclusion – ask questions that people want to know and answer them - **visualize their progress towards becoming carbon neutral in 2030**
  + **Is apple keeping up with its promise to reduce carbon emissions?**
  + **Are the reduction rates effective enough ?**
  + **Are apple’s strategies affecting its business or is the business affecting its carbon emissions goal**
  + **Are their products contributing to their emission goals.**
  + **Will it reach its goal of becoming carbon neutral.**
* Renewable energy emissions?
* Apple’s approach to reduce carbon emissions with infographics.

## Switching to renewable energy has reduced emissions

* Apple has generated or sourced 100 percent renewable electricity forits corporate operations, since 2018
* swiftly progressing toward transitioning our entire manufacturing supply chain and product use to 100 percent clean electricity, too.
* **100 percent renewable electricity for Apple facilities**
  + **Direct ownership**
  + **Long-term renewable energy contracts**
  + **Equity investment**
* **Transitioning our suppliers to renewable electricity**
  + Supplier Clean Energy Program
* Clean Energy Charging, which became available in the United States in fall 2022 through iOS 16, enables customers to help decrease the carbon footprint of iPhone.

## Sales to market Capitalisation

The Sales-to-Market Capitalization (Sales/MC) ratio is a financial metric that measures the relationship between a company's total revenue or sales and its market capitalization. This ratio is calculated by dividing a company's total revenue by its market capitalization. The formula for calculating Sales/MC is as follows:

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Here's what you should know about the Sales/MC ratio:

1. **Interpretation**: The Sales/MC ratio quantifies how much of a company's total sales or revenue is represented by its market capitalization. It measures how efficiently the market values a company's sales in terms of its market value.
2. **Unit of Measurement**: The Sales/MC ratio is typically expressed as a fraction or percentage. It tells you how many times the company's total sales fit into its market capitalization. A higher Sales/MC ratio indicates that the market values the company's sales more favorably.
3. **Comparison**: This ratio can be used to compare a company's valuation efficiency with that of its peers or competitors within the same industry. It provides insights into whether the market is pricing the company's sales more or less aggressively relative to others in the same sector.
4. **Context Matters**: The interpretation of the Sales/MC ratio depends on the industry and market conditions. Some industries may naturally have higher Sales/MC ratios due to their growth potential and profit margins, while others may have lower ratios.
5. **Profitability Consideration**: The Sales/MC ratio focuses on sales and market capitalization but does not take into account a company's profitability. A company with a high Sales/MC ratio may still be unattractive if it has low profit margins.
6. **Use in Investment Analysis**: Investors may use the Sales/MC ratio as part of their investment analysis to identify companies that may be overvalued or undervalued based on their sales relative to their market capitalization. However, it should be used in conjunction with other financial metrics for a more comprehensive assessment.
7. **Limitations**: Like any financial ratio, the Sales/MC ratio has limitations. It provides a snapshot of a company's valuation efficiency at a specific point in time and may not capture all relevant factors influencing a stock's value.

In summary, the Sales-to-Market Capitalization (Sales/MC) ratio helps investors understand how efficiently the market values a company's sales in relation to its overall market value. It can be a valuable tool for assessing valuation relative to peers and identifying potential investment opportunities, but it should be used in conjunction with other financial metrics and a thorough analysis of a company's fundamentals

If both revenue and market capitalization have increased over time, but the Sales-to-Market Capitalization (Sales/MC) ratio has decreased, it can be an indication of changing market sentiment or expectations regarding the company. Here are some possible reasons for this scenario:

1. **Slower Revenue Growth Relative to Market Cap Growth**: While both revenue and market capitalization have increased, if revenue growth has not kept pace with the growth in market capitalization, the Sales/MC ratio can decrease. Investors may expect stronger revenue growth to justify the higher market valuation.
2. **Profitability Concerns**: Despite revenue growth, if the company's profitability has not improved or has declined, investors may become concerned about the company's ability to convert its sales into profits. This can lead to a lower Sales/MC ratio.
3. **Market Sentiment Shifts**: Changing market sentiment or macroeconomic factors can affect how investors value a company's sales. If there is increased uncertainty or concerns about the industry or economic conditions, it may lead to a lower Sales/MC ratio even as revenue and market capitalization grow.
4. **Competitive Pressures**: Intensified competition or market disruptions could result in investors being less willing to pay a premium for a company's sales, despite revenue growth.
5. **Dilution**: If the company has issued additional shares or engaged in dilutive actions, even if revenue and market capitalization grow, the increase in the number of outstanding shares can lead to a lower Sales/MC ratio.
6. **Changing Growth Expectations**: Investors may have initially had very high growth expectations for the company, which were reflected in a high Sales/MC ratio. As those expectations moderate over time, the ratio may decrease, even with continued revenue and market cap growth.
7. **Profit Margin Compression**: If the company's profit margins have declined, it can negatively impact the perception of its sales-to-earnings potential, which can contribute to a lower Sales/MC ratio.

To understand the specific reasons behind the decreasing Sales/MC ratio, it's essential to conduct a thorough analysis of the company's financials, competitive positioning, industry dynamics, and any changes in market sentiment. Additionally, comparing the company's valuation metrics to industry peers and considering the broader economic environment can provide valuable insights into the factors driving the ratio's decline.

If the Sales-to-Market Capitalization (Sales/MC) ratio decreases over time, it generally implies that the market is valuing a company's sales less favorably relative to its market capitalization compared to a previous period. Several factors could contribute to a decreasing Sales/MC ratio over time:

1. **Slower Revenue Growth**: If a company's revenue growth rate slows down or falls short of market expectations, the Sales/MC ratio may decrease. Investors may perceive the company as having reduced growth prospects.
2. **Market Sentiment Shifts**: Changes in market sentiment can play a significant role. Negative news, economic uncertainties, or shifts in investor sentiment towards a particular industry or sector can lead to a lower valuation for sales.
3. **Profitability Concerns**: A decrease in the Sales/MC ratio may also result from concerns about the company's profitability. If the market becomes skeptical about a company's ability to generate profits from its sales, it may reduce the valuation assigned to those sales.
4. **Competitive Pressure**: Increased competition within the industry or sector can erode a company's market share or pricing power, potentially leading to lower valuations for its sales.
5. **Dilution**: If a company issues additional shares or engages in dilutive actions (e.g., stock splits, convertible debt offerings), it can increase the number of outstanding shares, which in turn can lead to a lower Sales/MC ratio. This happens because market capitalization is divided among more shares.
6. **Changes in Industry Dynamics**: Shifts in industry dynamics, technological advancements, or regulatory changes can impact a company's sales growth and market perception.
7. **Market Conditions**: Broader economic conditions, such as economic downturns or recessions, can affect the valuations assigned to stocks in general, leading to changes in the Sales/MC ratio.

It's important to note that a decreasing Sales/MC ratio should prompt further analysis and not be considered in isolation. Investors should assess the overall health and performance of the company, including profitability, liquidity, debt levels, competitive positioning, and management's strategy. Additionally, comparing the company's Sales/MC ratio to industry peers and considering macroeconomic factors can provide additional context.

Investors may use this ratio as one of many tools to evaluate a company's valuation and growth prospects, but it should be considered alongside other financial metrics and qualitative factors when making investment decisions.

A decrease in the Sales-to-Market Capitalization (Sales/MC) ratio indicates that the market is valuing a company's sales less favorably compared to its market capitalization. In other words, for each dollar of sales, investors are willing to pay less for the company's stock, which could imply several things:

1. **Reduced Growth Expectations:** A decline in the Sales/MC ratio may suggest that investors have lowered their growth expectations for the company. This could be due to factors such as a slowdown in revenue growth, increased competition, or changes in market conditions.
2. **Market Sentiment:** A decreasing Sales/MC ratio might reflect a shift in market sentiment. Investors may become more cautious about the company's prospects, which can lead to a lower valuation relative to sales.
3. **Profitability Concerns:** While Sales/MC primarily focuses on sales and market capitalization, it doesn't account for profitability. A decreasing Sales/MC ratio could be a result of concerns about the company's profit margins or earnings quality.
4. **Competitive Pressures:** Increased competition within the industry or sector can lead to a reduced Sales/MC ratio. If a company faces challenges in maintaining or growing its market share, it may experience a decrease in the valuation assigned to its sales.
5. **Market-Wide Trends:** Changes in market conditions, economic factors, or investor sentiment can impact the valuation of all stocks in general. A decreasing Sales/MC ratio could be part of broader market trends affecting multiple companies.
6. **Dilution:** An increase in the number of outstanding shares through stock issuances or dilutive events can lead to a decrease in the Sales/MC ratio. More shares outstanding mean that the market capitalization is spread over a larger base, which can reduce the value assigned to each dollar of sales.

It's important to note that while a decreasing Sales/MC ratio may raise concerns about a company's valuation and growth prospects, it should be evaluated in conjunction with other financial metrics and a thorough analysis of the company's fundamentals. Investors should consider factors such as profitability, competitive positioning, financial health, and industry dynamics when making investment decisions. Additionally, market conditions and investor sentiment can change over time, influencing how stocks are valued relative to their sales and market capitalization.

## Price to sales ratio

A Price-to-Sales (P/S) ratio of 6 means that for every dollar of revenue or sales generated by the company, investors are willing to pay $6 for its stock. This ratio provides insight into the valuation of the company's stock relative to its sales. Here's what a P/S ratio of 6 might imply:

1. **Valuation**: A P/S ratio of 6 suggests that the market is valuing the company relatively high compared to its revenue. It may indicate that investors have positive expectations about the company's growth prospects, profitability, or other factors.
2. **Growth Expectations**: A P/S ratio of 6 may imply that investors expect the company to achieve significant revenue growth in the future. Companies with high P/S ratios are often expected to have strong sales growth potential.
3. **Industry Comparison**: To better understand the significance of a P/S ratio of 6, it's important to compare it to the average P/S ratios of other companies in the same industry or sector. Different industries have varying typical P/S ratios, so context is crucial. A P/S ratio of 6 might be considered high in some industries and low in others.
4. **Profitability**: The P/S ratio does not take into account a company's profitability. A company with a P/S ratio of 6 may still be a good investment if it has strong profit margins and the market expects those margins to improve.
5. **Risk**: While a high P/S ratio can indicate optimism, it also means that the stock may be more sensitive to changes in sales or revenue. Any disappointment in sales growth or revenue could lead to a significant drop in the stock price.

In summary, a P/S ratio of 6 suggests that the market is willing to pay a relatively high price for each dollar of the company's sales, which may indicate positive investor sentiment and growth expectations. However, it's crucial to consider this ratio in the context of the company's industry, financial health, and other relevant factors to make a well-informed investment decision.

## Revenue growth rate

The revenue growth rate, often simply referred to as the "growth rate," is a measure that shows the percentage increase or decrease in a company's revenue over a specified period of time. It is used to assess a company's ability to increase its sales or revenue and is a key indicator of its financial health and performance. The formula for calculating the revenue growth rate is as follows:



Here's how to interpret and understand the revenue growth rate:

1. **Positive Growth Rate**: If the revenue growth rate is positive, it indicates that the company's revenue increased compared to the previous period. Positive growth is generally considered a positive sign, as it suggests that the company is expanding its business and generating more sales.
2. **Negative Growth Rate**: A negative revenue growth rate indicates that the company's revenue decreased compared to the previous period. Negative growth may raise concerns about the company's performance and may be a red flag for investors and analysts.
3. **Magnitude of Growth**: The percentage value of the growth rate tells you how much the revenue increased or decreased. A higher growth rate indicates a more significant increase in revenue, while a lower growth rate suggests more modest growth.
4. **Trend Analysis**: It's important to analyze the revenue growth rate over multiple periods to identify trends. Consistently positive growth rates may indicate a healthy and growing business, while erratic or declining growth rates may signal issues.
5. **Comparisons**: Comparing a company's revenue growth rate to that of its competitors or industry peers can provide valuable insights. It helps assess how well the company is performing relative to others in the same sector.
6. **Forecasting**: The revenue growth rate is often used in financial projections and forecasting models to estimate future revenue. It's a key input when making financial projections and valuations.

Keep in mind that while a high revenue growth rate can be a positive sign, it's essential to consider other factors like profitability, operating expenses, and market conditions when evaluating a company's overall financial health and potential for future success. A company may have high revenue growth, but if it incurs significant expenses and fails to generate profits, it may not be a sustainable business model in the long run.

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