

Vehicle Rubber Tire Manufacturing Industry



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Definition & Scope

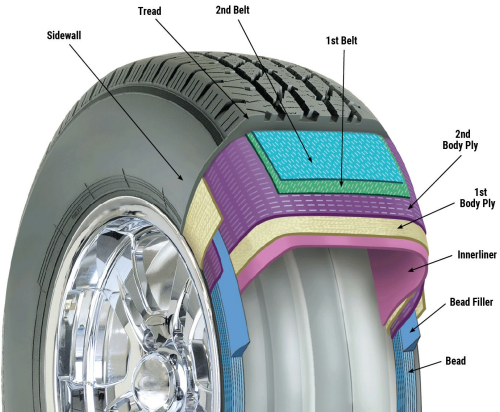
Product: Rubber tires for vehicles (passenger cars, other industrial vehicles and etc.)

Suppliers: Suppliers of raw materials such as rubber (natural- from Hevea Brasiliensis plant, synthetic), steel, carbon black, oil, anti zonants, fillers, fabric etc.

Buyers: OEM (automotive firms), aftermarket/replacement market

Note: Different types of tires (varying in composition, size, strength etc.) exist for each different types of vehicles: cars, trucks, tractors, buses, etc.

PRODUCT



SUPPLIERS

The Materials of Construction	Approximate Weight Percent %
Rubber hydrocarbon composition (RHC)	48
Carbon black and silica	22
Metal reinforcements	15
Oil, antidegradants, wax, stearic acid, etc.	8
Fabric	5
Zinc oxide (ZnO)	1
Curing agents	1
Total	100

**One example of one type of rubber tire*

BUYERS



Overview: Market Size and Key Players

Global Rubber Tire Market Size

USD 143.12 Bn. in 2021

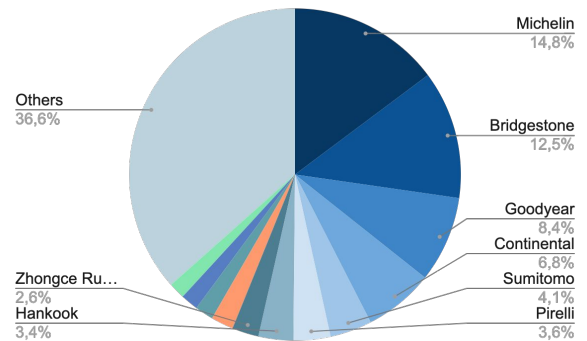
USD 149.41 Bn. in 2022

Revenue CAGR forecast

3.8 %
(2023 to 2029)

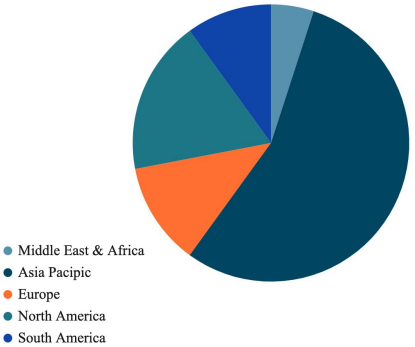
Current Industry Stage: **Maturity**

The top players based on global market share in FY 21

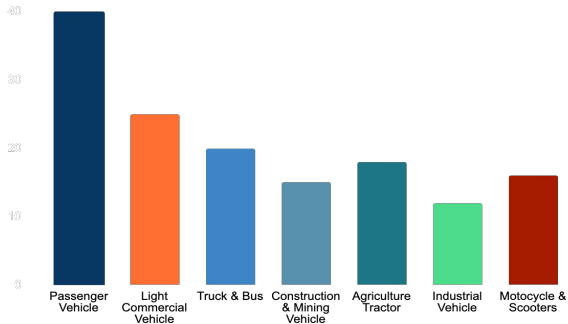


The Market is **FRAGMENTED** with several key players occupying the market share

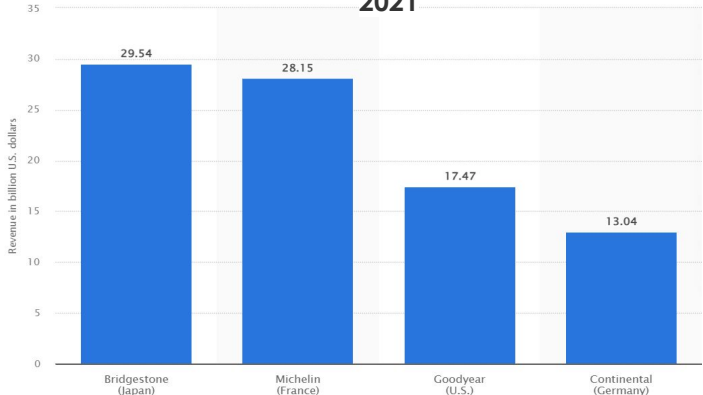
APAC region: The Top Market Share in terms of geographies

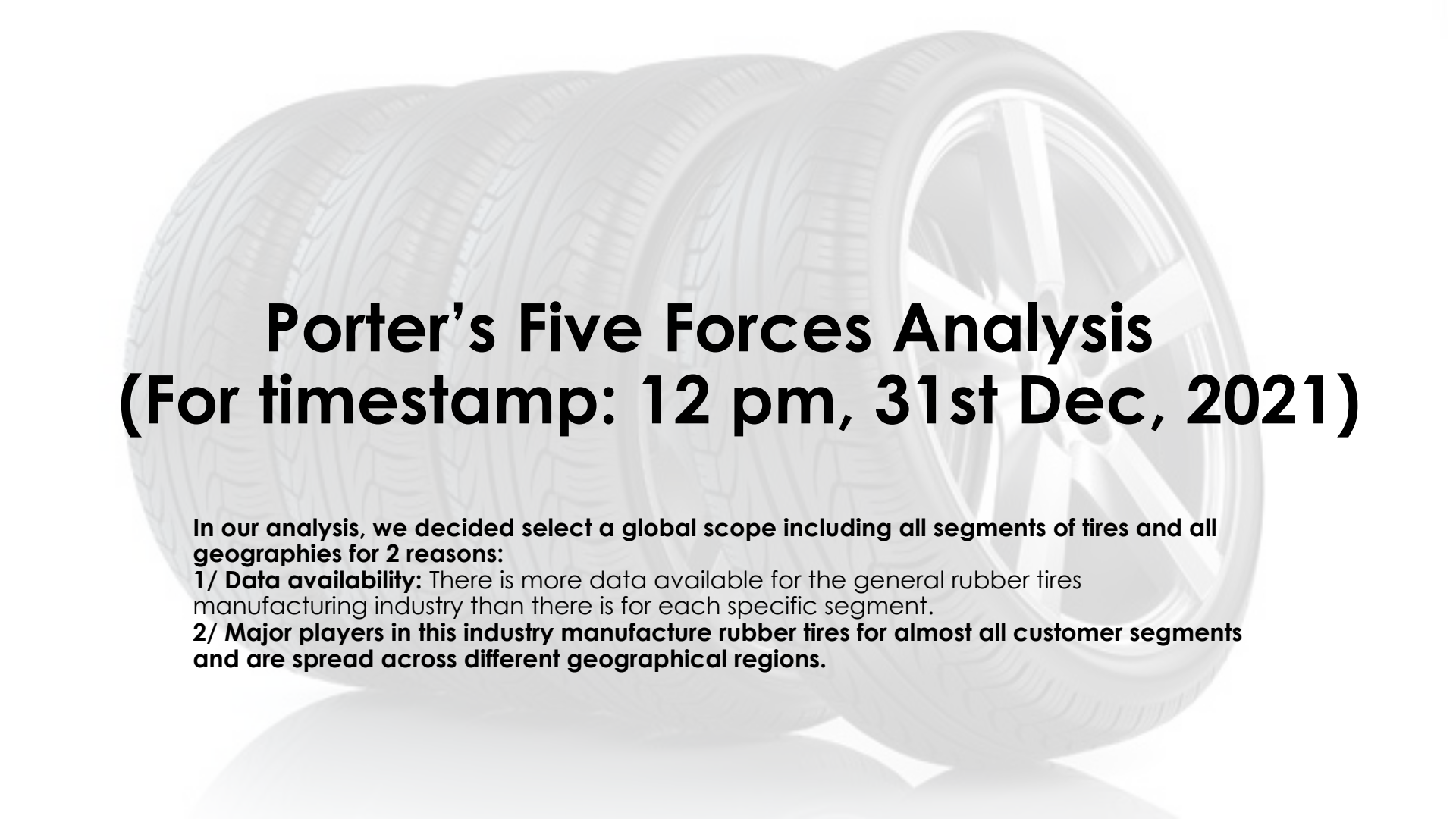


Passenger Vehicle: The Top Vehicle Type Segment in terms of market share



The top 4 players based on revenue in FY 2021





Porter's Five Forces Analysis (For timestamp: 12 pm, 31st Dec, 2021)

In our analysis, we decided select a global scope including all segments of tires and all geographies for 2 reasons:

1/ Data availability: There is more data available for the general rubber tires manufacturing industry than there is for each specific segment.

2/ Major players in this industry manufacture rubber tires for almost all customer segments and are spread across different geographical regions.

Force: Rivalry is **very high**

Factors Increasing rivalry

Low Concentration

The market concentration is low with a CR4 of merely 34.1% (according to FY 21 data)(see the pie chart)

As a result, the competition is not limited to non-price dimensions such as product innovation and differentiation, aggressive marketing and campaigning etc.

The competition often tends to enter into the price dimension, leading to price war, and hence reducing profitability. In other words, low concentration reduces the chances of collusion.

High Diversity of competitors

All leading firms belong to different continents, this implies that there is only limited parallelism when it comes to setting prices.

Low Product differentiation

Although different types of tyres exist, due to specific requirements of the automotive industry, the tires are rather standardized. In other words, they have been commoditized.

Excess capacity

The industry is prone to have excess tires, which leads to increased competition.

Exit barriers

They are high due to high fixed costs, industry specific assets, and legal contracts with the vehicle manufacturers.



Mature industry

The industry is in maturity stage, which means that companies try to take each other's market share to increase their profits as the demand has reached a saturation level.

Factors Decreasing rivalry



Almost none in this case

After analysing all these factors, we concluded that strength of the force Rivalry is very high

Force: Threat of entry is **moderately low**

Factors which make entry difficult



High Capital Requirements

In 2019, the capital requirements is approx. between \$3.05 million and \$22.05 million. ([Acc. to Finemodelslab blog](#))



Economies of scale

Since fixed costs are high, economies of scale are required to benefit from sales (lowering the average production cost is required as well), which deters new entrants.



Government and legal barriers

- Safety standards
- Environmental standard (beware of Hazardous raw materials)
- Labelling and Certification for size, load carrying-capacity, traction rating, speed rating



Product differentiation

Products are commoditized, which makes it difficult for new entrants to enter the industry.

Factors which make entry easy



Easy access to cheap raw materials

Raw materials are easily available and commoditized as well (more on this in supplier's side)



Governments provides subsidies to support new entrants

For instance in 2021:

- Chinese govt. provided subsidy of RMB 10 Mn
- Indian govt. provided subsidy of INR 100 bn
- Indonesian govt. provided IDR 10 trillion

After analysing all these factors, we concluded that strength of the force Threat of entry is moderately low

Force: Bargaining Power of Buyers is **high**

Factors which make the force high



Commoditized products, hence **switching costs** are low



OEMs are not influenced by **advertising or brand image** as they have deep knowledge of the tyres and are often in long term relationship with the manufacturers.



OEMs and aftermarket consumers have **easy access to information** about the products and prices, and the tire manufacturing process is not a secret recipe, hence it is easy for the buyers to estimate the cost of producing tires.



OEMs often **buy large volumes of tires**, hence tire manufacturing firms usually agree to their demands.



The tire manufacturing firms are often **locked up in legal agreements** with the large OEMs

Factors which make the force low



Buyers (OEM, replacement tires consumers) **can not vertically integrate** and produce tires themselves.



Buyers have **low price sensitivity** because the price of a tire is often a very small portion of their budget



Tires are **very critical for quality** and reliability of buyer's own product - that is vehicles

After analysing all these factors, we concluded that strength of the force bargaining power of buyers is high

Force: Bargaining Power of Suppliers is **low**

Raw materials required



Main **components**: Natural rubber, Synthetic rubber, Carbon black, Steel, Oil, Fabric etc.



Different tires (for passenger vehicles, trucks, other heavy vehicles) which have different compositions of these raw materials, allowing variation in load carrying capacity, tensile strength etc. **Example:** Passenger vehicles have on average 14% of natural rubber and 34% of synthetic rubber, while truck tires have the opposite proportions (natural rubber offers better resistance to wear and tear).

Factors which make the force high



Almost none in this case

Factors which make the force low



The **raw materials** used in rubber tire manufacturing are **easily available and commoditized**. The tire manufacturers thus have **multiple potential sources** for acquiring materials and have virtually no reliance on the suppliers. In other words, switching costs for manufacturer is quite low.



Suppliers **can't enter the manufacturing industry** and produce tires themselves due to high fixed costs involved in setting up tire manufacturing firms



According to various reports, The **rubber tire industry** is the **major consumer of rubber**. The suppliers of rubbers don't have many alternative industries to serve.

After analysing all these factors, we concluded that strength of the force bargaining power of suppliers is low.

Force: Threat of substitutes is **very low**



Available substitutes of rubber tyres for passenger vehicles (such as cars):

- A. There are **very few substitutes available which are not made up of majority of rubber (traditional natural from Hevea Brasiliensis + synthetic)**. For instance, **run-flat tyres** used for cars in place of normal tyres are too made up of rubber, which allow one to drive even after puncture. But these are not preferred in cars in place of normal air filled rubber tyres as they do not offer the same level of performance as the latter provide.
- B. The idea of **airless tyres for cars** is gaining popularity. Airless tyres are tyres made up of majority of plastic and require no air (hence the name airless). They are most commonly used in golf carts, lawn mowers etc. where risk of tyre puncture is high. In 2019, Michelin proposed a prototype of airless tyre for car- (MICHELIN UPTIS).

NOTE: There has been little work on the substitutes for vehicle tire segments other than the passenger vehicles.

C. Rubber tire manufacturers have been making efforts on creating **new eco-friendly rubber tyres** to take into account the climate change issues.

- **Bridgestone** has created fully functioning passenger car tires with 100 percent natural rubber derived from **guayule plant** rather than using combination of synthetic and natural rubber from Hevea Brasiliensis plant, which is the traditional source of natural rubber.
- **Continental** has started producing tyres from **dandelion roots** for cars.
- These tires are relatively very new, they are not popular amongst the buyers and their market is very small. There is not much data available to compare their prices and performances to the traditional rubber tyres, that could indicate the propensity of the buyers towards this substitute.

Hence, we conclude that strength of the force Threat of substitutes is very low.

Impact of Compliments

1. Analysing the impact on passenger vehicle rubber tire segment(which is the largest segment of all vehicle tire segments):

Changes in demand of passenger vehicles widely affects the demand of passenger tyres as both are complement goods according to the microeconomic theory.



New government laws encourage **carpooling, ride sharing and better public transportation infrastructure in the country**, can severely reduce the demand of cars and passenger vehicles, which can in turn the reduce the demand of rubber tyres.



Changes in oil/fuel prices which lead to changes in demand for passenger vehicles also impacts the rubber tyre industry.



Changes in schemes by automotive industry, auto insurance companies and auto service centres, **increasing or decreasing the prices of passenger vehicles**, indirectly affect the rubber tyre industry.

2. We acknowledge that analysing the impact of compliments on other vehicle tire segments is quite complex.

Overall Conclusion from PFF analysis

In our opinion, the industry in 2021 is pretty **unattractive** because:

- **Force of rivalry is very high**
 - Bargaining power of buyers is high
- All these factors lead to **fierce competition**, reducing the profitability of the industry.

The force that **poses the biggest threat to profitability is "Rivalry"**, because the industry concentration is very low: $Cr4 = 34.1\%$. This leads to lack of collusion and price wars, which decrease the industry profitability.

Noteworthy Fact:

- In 2021, median ROE for this industry was around 7% according to S&P Global market intelligence report (which is low)

Expected evolution of forces in the future (dynamics which could impact the industry's profitability in future) :

- **Rivalry would/should increase:**
 - The industry is currently in maturity phase, this implies that in future rivalry would increase as the market has reached a saturation level and the way firms try to increase their individual profits is by trying to grab each other's market share.
- **Threat of Entry should/would decrease:**
 - New entrants would not prefer to enter an industry which is already in mature stage, decreasing the threat of new entrants in future.
- **Bargaining power of buyers should/would increase** due to saturation in demand the market as industry is in maturity phase.
- **Bargaining power of suppliers could increase:**
 - Scarcity of raw materials like oil (limited resource) and traditional natural rubber (there is a decrease in the growth rate of Hevea Brasiliensis rubber trees) could increase the supplier power.
- **Threat of substitutes could increase:**
 - Emergence of airless tyres for cars and R&D investment subsidized by governments for producing eco-friendly tires using raw materials other than the traditional ones having performance and price at par with the traditional tyres.
- **Impact of compliments:** As more and more countries are developing better and wider public transportation, demand of passenger vehicles should decrease, hence negatively affecting the passenger tyre segment of the industry.

Hence, in our opinion, the industry profitability will decrease in the future.

Our Experience of using LLMs

LLM models used

We used Chatgpt 3.5 and Google bard in our analysis.

How we used it

We asked the tool to provide an analysis of each force individually and also several "WHY?"s. We did get some context to get started with our analysis, but for the most part, our experience was unsatisfactory.

Reasons for disappointment

- Chatgpt 3.5 and Google Bard both **came up with different answers**. (See image A- next slide)
- **Fluff statements:** Chatgpt 3.5 output only fluff statements without much concrete statistics to support the theory. We had to find most of this information ourselves through google search and reading various articles and reports. (See image B- next slide)
- **Contradictory statements:** Initially Chatgpt3.5 said that supplier bargaining power was high, however upon further interrogation it said that its strength is low. (See image C- next slide)

Our learnings

Chatgpt3.5 and Google bard are **great at summarizing information** and at **giving broad context/ guidelines** for analyses, however they do **not** provide information which is **specific enough** and supported with **real time data**. Sometimes they also output **wrong and contradictory statements**. Hence, we felt like for now they should both be used as an aid to human Intelligence and they are still not fully reliable.

Image A: Note the difference in answers by Google Bard and Chatgpt 3.5

Please list the strength of porters forces for vehicle rubber tire manufacturing industry in 2021

Sure, here is a list of the strength of Porter's forces for the vehicle rubber tire manufacturing industry in 2021:

|Porter's Force|Strength|

|---|---|---|

|Supplier Power|Strong|

|Buyer Power|Weak|

|Threat of New Entrants|Low|

|Threat of Substitutes|Low|

|Competitive Rivalry|High|

Please list the strength of porters forces for vehicle rubber tire manufacturing industry in 2021

Certainly, here's an assessment of the strength of Porter's Five Forces for the vehicle rubber tire manufacturing industry in 2021:

- Threat of New Entrants: Low to Moderate
- Bargaining Power of Suppliers: Low to Moderate
- Bargaining Power of Buyers: Moderate to High
- Threat of Substitute Products: Low to Moderate
- Rivalry Among Competing Firms: High

Image B

Can you give me the analysis of rivalry force for rubber tire manufacturing industry in 2021 along with some statistics or concrete examples in order to support the reasoning

I apologize for any inconvenience, but I don't have access to specific market data or statistics for the rubber tire manufacturing industry in 2021. To provide an analysis of the rivalry force in the industry for that year, I would need access to up-to-date and industry-specific data, which I do not have.

Regenerate

Image C: Note how Chatgpt3.5 is unsure about its answer

Certainly, here are the strengths of Michael Porter's Five Forces for the rubber tire manufacturing industry in 2021 summarized in five bullet points:

- **Bargaining Power of Suppliers:** Moderate to High
- **Bargaining Power of Buyers:** Moderate
- **Threat of New Entrants:** Low
- **Threat of Substitutes:** Moderate
- **Rivalry Among Existing Competitors:** High

Isn't the bargaining power of suppliers low in this industry as numerous suppliers of raw materials are available?

You are correct; my previous response incorrectly characterized the bargaining power of suppliers in the rubber tire manufacturing industry. In reality, the bargaining power of suppliers in this industry is generally low due to the availability of numerous suppliers of raw materials. Tire manufacturers often have multiple sourcing options for raw materials like natural and synthetic rubber, steel, and chemicals. This abundance of suppliers can lead to competitive pricing and favorable terms for tire manufacturers, reducing the suppliers' overall bargaining power.

I appreciate your clarification, and I apologize for any confusion. Here is the corrected strength for the bargaining power of suppliers:

- **Bargaining Power of Suppliers:** Low

Regenerate

Challenges faced and References

Finding the specific data posed the greatest challenge for us. We wish to have found more data to support our analysis.

The references we used are as following:

<https://www.maximizemarketresearch.com/market-report/rubber-tire-market/128465/>

<https://www.fool.com/investing/stock-market/market-sectors/consumer-discretionary/automotive-stocks/tire-stocks/#:~:text=Consolidation%20has%20long%20been%20a, and%20the%20Goodyear%20FCooper%20deal.>

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<https://rerev.com/statistics/bridgestone/>

<https://www.statista.com/statistics/225677/revenue-of-the-leading-tire-producers-worldwide/>

[https://straitsresearch.com/report/automotive-tire-market#:~:text=Market%20Overview,period%20\(2022%20%E2%80%932023\).](https://straitsresearch.com/report/automotive-tire-market#:~:text=Market%20Overview,period%20(2022%20%E2%80%932023).)

<https://contec.tech/what-are-tires-made-of/>

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<https://www.kazmaier-translations.com/business-strategy/the-industry-lifecycle/>

<https://www.continental-tires.com/about/sustainability/activities-and-initiatives/material-sourcing/taraxagum/>

<https://autosphere.ca/tires/2021/10/06/exploring-alternatives-for-rubber-tires/>

Help from Chatgpt3.5, Google Bard, Class Notes and Grant book- Chapter-3