



A STUDY ON IMPACT OF CRUDE OIL ON INDIAN ECONOMY WITH REFERENCE TO AUTOMOBILE SECTOR

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ABSTRACT

Consumers' opinions and choices about the car sector are greatly affected by petrol prices, according to research on consumer behavior. Our analysis of production expenses and supply chain dynamics sheds light on the ways in which fluctuations in oil prices impact company operations. This study examines the multi-faceted relationship between crude oil prices and the Indian economy by way of the intricate dynamics of the automobile sector. Looking at elements like previous trends, macroeconomic indicators, consumer behavior, production costs, and policy considerations, this study employs a detailed research technique to evaluate the complicated implications of changes in crude oil prices on India's economy. Several major Indian automakers have shown financial resilience, according to a report from the stock market.

I – INTRODUCTION

The economic activity of refining petroleum into various chemical products is known as the petrochemical industry. These days, the typical citizen in a developed country consumes around 3.5 gallons of oil daily for petrochemical production. So, let's not forget about fuel oil; the typical individual in an industrialized country needs about 1,200 gallons of oil each year just for modern life.

Production of food

One of petroleum's most significant uses is as a nitrogen source in agricultural fertilizers, which is ammonia. The use of pesticides in farming is also crucial for maintaining consistent and healthy crop yields. The main ingredient in most insecticides is crude oil. Farm machinery and fertilizer factories are only two examples of the many ways in which agricultural activities depend on petroleum-based products.

Fabricated from polyethylene

Plastic is an essential component of modern life. Plastics like computer screens, nylon, and Styrofoam are essential to many produced items. Polystyrene is the main ingredient of Styrofoam and polyvinyl chloride (PVC), two industrial waste products that emerged after World War II. Nylon, the most ubiquitous petroleum-based material to date, finds use in everything from apparel to mechanical gears and car engines. Most plastics are derived from olefins, which include propylene and ethylene.

Mineral oil and petrolatum are petroleum by-products that are present in many topical lotions and treatments. Also derived from petroleum is tar, which is used topically to alleviate dandruff and psoriasis. The building blocks of most drugs, complex organic compounds, start as smaller, simpler chemical

molecules. Most of these precursors are petroleum by-products. Petroleum distillates, including benzene, toluene, xylene, and

others, are the primary components of dye, synthetic detergent, and fabric goods. Polyurethanes are derived from benzene and toluene; these chemicals are used to make surfactants, oils, and wood varnish. Even sulphuric acid originates from sulfur that is produced from petroleum.

Petroleum Chemistry

Petroleum chemistry involves a combination of many hydrocarbons. Carbon and hydrogen are the building blocks of hydrocarbons, an organic material. A large part of petroleum consists of hydrocarbons of different lengths. Even the tiniest hydrocarbons include hydrogen atoms and one carbon atom, like methane.

Contrarily, hydrocarbons may contain hundreds of thousands of atoms linked in a variety of complex structures, such as rings, chains, and more.

The majority of hydrocarbons in petroleum chemistry are alkanes, which are also known as branching or linear hydrocarbons. The remaining chemical component is mostly composed of aromatic hydrocarbons and cycloalkanes. There are a lot of more complex hydrocarbons in petroleum chemistry as well, including asphaltene.

Those Hydrocarbons

The primary classes of hydrocarbons studied in petroleum chemistry are alkanes, sometimes known as paraffins. The



proportion of these saturated hydrocarbons in crude oil might range from fifteen percent to sixty percent. They may be generally described as C_nH_{2n+2} . Alkanes are what make petroleum combustible, whereas paraffins are highly aromatic hydrocarbons made up of just carbon and hydrogen. The many alkanes found in raw petroleum chemistry determine its potential use. For fuel exclusively, you may use the following types of alkanes: Refined gasoline, kerosene, diesel, and fuel oil are all byproducts of this process. The refined products of this process are pentane, octane, hexadecane, nonane, and heating oil, respectively. An exception to this rule is natural petroleum gas, which is composed of molecules with less than five carbon atoms. These molecules may be burned off or captured and sold under pressure as LPG.

II – RESEARCH GAP

There are a number of potential directions to take research on the effect of crude oil price fluctuations on the Indian economy, especially as they pertain to the automotive industry. Examine how changes in the price of crude oil affect the price elasticity of demand for autos. Examine the ways in which customers react to changes in gasoline prices by modifying their buying habits, favouring more fuel-efficient automobiles, and altering their use patterns (such as mileage and vehicle size). Analyse how the unpredictable price of crude oil has affected the Indian automobile supply chain. Analysis of the automotive industry's cost structure, its use of petroleum-based materials (e.g., plastics, rubber, and lubricants), and the methods used to control input costs and minimize supply chain interruptions might be part of this.

III – OBJECTIVES OF THE STUDY

- To know about the economy growth of the country
- To identify the factors influencing the crude Oil Prices
- To analyze the impact of Crude Oil Prices on Consumer Buying Behavior

Research Methodology

The impact of rising crude oil prices on India's economy, and the automotive industry in particular, is examined using a methodical approach that combines quantitative and qualitative research methods.

Data is gathered from Primary Source and Secondary Source of Data

Primary Data: Data which is collected through the Structured Questionnaire and Observations

Research Design: Descriptive Research Design

Sampling Design: Convenience Sampling

Sampling Procedure: Systematic Sampling

Sample size: 147

Tool for analysis: Structured Questionnaire

Secondary Data: The Data is collected from the secondary source which is already available like Textbooks, Journals, Websites etc.

IV – LIMITATIONS OF THE STUDY

- The data is only available based on responses from participants in the survey.
- The study's analysis may not provide reliable findings for decision-making.
- The data obtained from participants might not be acquired at the optimal time for analysis.

V – LITERATURE REVIEW

A Study on Impact of Crude Oil Prices Fluctuation on Indian Economy by Mr. Kali Charan Mdak, Ms. Pallabi Mukherjee, (2013): Crude oil prices have a large impact on the growth of national GDP. Crude oil for India is imported to a large extent. Gross domestic product, coefficient of production, and wholesale price index are only a few of the many variables used in this essay. Using time series data from 2000–2014, this study examines the impact of fluctuating oil prices on India's economic growth. The data is analyzed using several linear regression models. India's dependence on imported crude oil is increasing at a rapid pace. Crude oil prices reached \$148/bbl, a massive rise. It was July 2008 on a worldwide scale. A barrel of crude oil cost \$84 in 2014, a record low. Imports of crude oil are increasing in price, contributing to a worsening trade deficit in India. The primary purpose of this article is to analyze the impact of crude oil price changes on India's GDP growth. This research examined the impact of oil prices on the Indian economy using time series data that extended from 2000–2001 to 2012–2013.... India is growing its reliance on imported oil. Imports account for 80% of our current revenue, and that number is only going to grow.

Impact of Crude Oil on Indian Economy by Firdoos Ahmad Wani, Mudasir Kirmani, Syed Mohsin Andrabi, (Nov 2015):

India relies on crude oil imports to fulfill its energy demands, which are increasing at a fast pace. The basic price of crude oil is quite inexpensive, but the typical customer pays more because of import tariffs. In response to a rise in the cost of gasoline and related items, the typical consumer's expenditure rises. This research has made an effort to explain the present state of crude oil imports and why it is critical to lower these imports in order to raise the living standards of the common man. Any shift in the cost of crude oil has the potential to have a significant impact on economies all around the globe. However, as the price of crude oil rises, almost every good—consumer and otherwise—sees a corresponding increase in price. Whenever the price of crude oil goes up, it has a negative impact on a country's GDP growth. Changes in the price of crude oil may impact the economy of any



nation, including India. The skyrocketing demand for petroleum products in India has led to a rise in crude oil imports.

Impact of Oil Price on Economic Growth: A study of BRIC nations by Pushpa Negi (June 2015): This empirical research examined data from 1987 to 2014 to determine the impact of the oil price on GDP in the BRIC nations, which stand for China, Russia, India, and Brazil, the four fastest-growing emerging economies. The first step of the empirical investigation was to determine whether the time series were normally distributed. Then, we used the Ordinary Least Square (OLS), Fixed Effect Model (FEM), and Random Effect Model (REM) to find out how oil prices affected GDP. We used the Hausman test, which has an asymptotic chi-square distribution, to pick between the Fixed Effect Model and the Random Effect Model. The results of the Hausman test indicated that the Fixed Effect Model, which was estimated using dummy variables, was the most appropriate model for the inquiry, therefore that was the last step. All things considered, the results show that GDP and oil price go hand in hand.

Declining Crude Oil Prices and its Implications on the Indian Economy by Manvi Mehta, Ruchi Mamania, Manasvi Mehta, (2019): This research study primarily aims to examine the consequences of fluctuating oil prices on the Indian economy. Oil price fluctuations have a significant effect on the economies of developing countries like India's. When it comes to global energy and oil consumption, India ranks third, behind only China and the US. Expansion and modernization of every economy are dependent on the supply of oil. The focus of this study paper is on the production and supply of oil. Our goal in this study has been to attempt to forecast the impact of various market and economic factors on oil prices using a variety of methodologies. In order to have a sense of how a decline in oil prices may impact various economic leading and trailing indicators, this article takes a look at their impacts. This study looks at a variety of economic factors, including inflation, GDP, impacts on foreign reserves, and more. Due to its large dependence on oil imports, India needs comprehensive research to understand the implications of changes in oil prices. The need for oil in India is constantly rising, and the country is highly dependent on supplies from Iraq and Saudi Arabia. From what we can see, the relationship between oil prices and stock prices is inverse, so when oil prices go down, stock prices and the economy benefit.

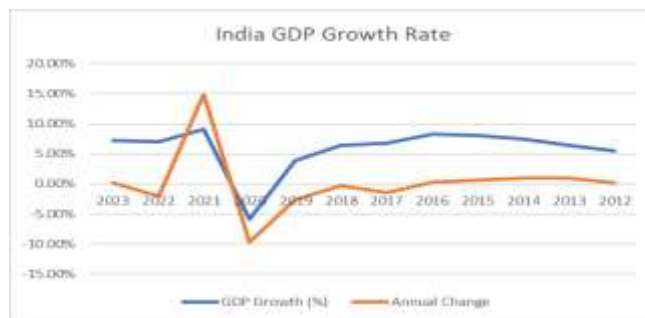
The Effects of Crude Oil Price Surprises on National Income: Evidence from India by Chinnadurai Kathiravan, Murugesan Selvam, Balasundaram Manian, (Jan 2023): The major purpose of this research is to analyze the changes in GDP per capita and exchange rates as a result of changes in the price of crude oil. It analyzes the effects on national income and currency exchange rates of abrupt rises in the price of crude oil. With the

use of annual time series data, this research monitored crude oil prices, the US dollar/Indian rupee exchange rate, and GDP per capita from 1990 to 2020. Various mathematical methods were employed: Multiple regression analysis, including ordinary least squares (OLS), descriptive statistics, and a unit root test. Based on the results of the present study, there is a two-way Granger causality impact between the price of crude oil in Dubai and currency rates, and between exchange rates and the price of crude oil in WTI. All of the diagnostic tests were passed by the computed models. The exchange rate and GDP per capita were both impacted by the price of WTI crude oil throughout the study period, but according to the OLS model, the exchange rate was solely driven by the price of Dubai crude oil.

VI – DATA ANALYSIS & INTERPRETATION

GDP Growth Rate

India GDP Growth Rate - Historical Data		
Year	GDP Growth (%)	Annual Change
2023	7.20%	0.20%
2022	7.00%	-2.05%
2021	9.05%	14.88%
2020	-5.83%	-9.70%
2019	3.87%	-2.58%
2018	6.45%	-0.34%
2017	6.80%	-1.46%
2016	8.26%	0.26%
2015	8.00%	0.59%
2014	7.41%	1.02%
2013	6.39%	0.93%
2012	5.46%	0.22%



Interpretation

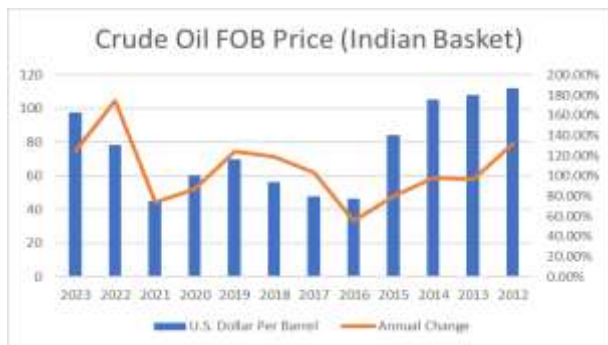
From the above table and graph we can state that, the highest GDP rate is in the year 2021 i.e. 9.05% and lowest GDP rate is in the year 2020 i.e. -5.83%. The data represents the last 10 years of



GDP Percentage which shows 2012 to 2016 in increasing rate and in the year 2017 there was the decrease in the GDP Percentage. In the year 2021 the GDP as increased to 9.05% and later on decreased to 7.20% in the 2023 year

Crude Oil FOB Price (Indian Basket)

Year	US Dollar Per Barrel	Annual Change
2023	97.67	124.91%
2022	78.19	174.45%
2021	44.82	74.12%
2020	60.47	86.53%
2019	69.88	123.83%
2018	56.43	118.65%
2017	47.56	103.01%
2016	46.17	54.86%
2015	84.16	79.76%
2014	105.52	97.73%
2013	107.97	96.50%
2012	111.89	131.50%



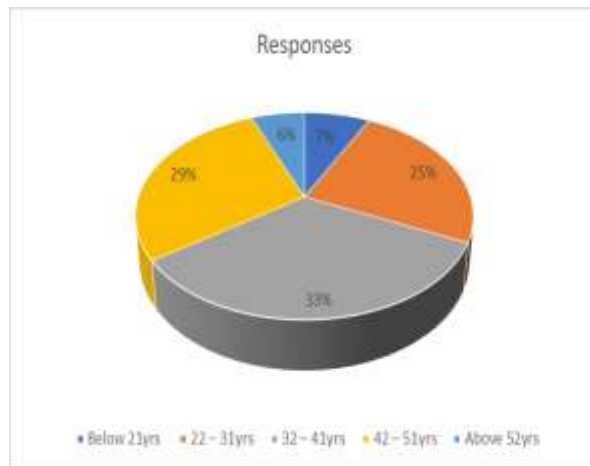
Interpretation

From the above data we can state that, the highest Crude Oil FOB Price in Indian Basket is in the year 2012 i.e. 111.89 U.S. Dollar per Barrel and lowest in the year 2016 i.e. 46.17.

1. Age:

- a. Below 21yrs b. 22 – 31yrs c. 32 – 41yrs d. 42 -51yrs
- e. above 52yrs

Age	Responses	Percentage
Below 21yrs	11	7
22 – 31yrs	36	25
32 – 41yrs	49	33
42 – 51yrs	42	29
Above 52yrs	9	6
Total	147	100



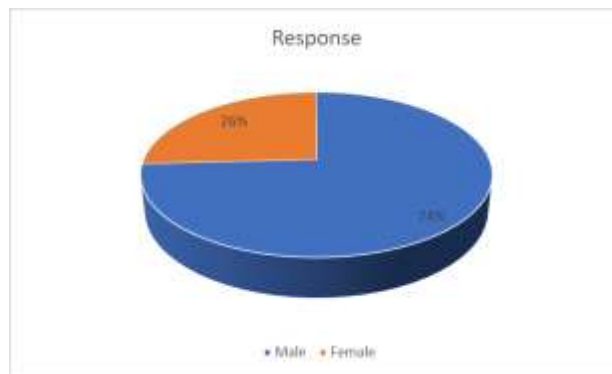
Interpretation

From the above table and graph we can state that, 7% of the respondents age is below 21yrs, 25% of the respondents age group is 22-31yrs, 33% of the respondents age group is 32-41yrs, 29% of the respondents age group is 42-51yrs, 6% of the respondents age is above 52yrs.

2. Gender

- a. Male
- b. Female

Gender	Response	Percentage
Male	109	74
Female	38	26
Total	147	100



Interpretation

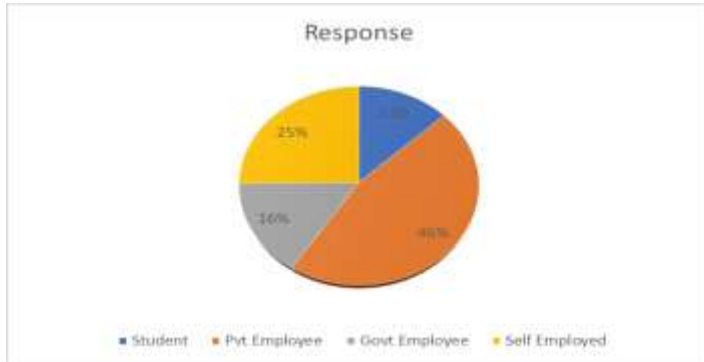
From the above data we can state that, 74% of the respondents are Male, 26% of the respondents are Female

Occupation

- a. Student
- b. Pvt. Employee
- c. Govt Employee
- d. Self Employed



Occupation	Response	Percentage
Student	19	13
Pvt Employee	68	46
Govt Employee	23	16
Self Employed	37	25
Total	147	100



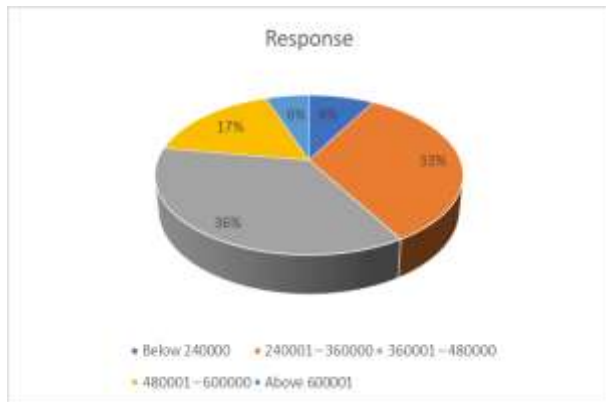
Interpretation

From the above data we can state that, 13% of the respondents are Students, 46% of the respondents are Pvt. Employees, 16% of the respondents are Govt Employees, 25% of the respondents are Self Employed

3. Income

- a. Below 240000 b. 240001-360000 c. 360001-480000 d. 480001-600000 e. above 600001

Income	Response	Percentage
Below 240000	12	8
240001 – 360000	49	33
360001 – 480000	53	36
480001 – 600000	25	17
Above 600001	8	6
Total	147	100



Interpretation

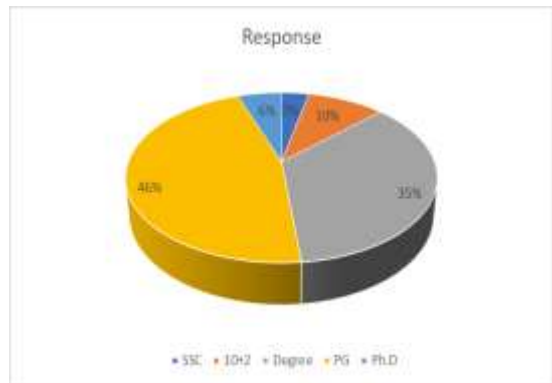
From the above data we can state that, 8% of the respondents income is below 240000, 33% of the respondents income is

240001-360000, 36% of the respondents income is 360001-480000, 17% of the respondents income is 480001-600000, 6% of the respondents income is above 600001

4. Educational Qualification

- a. SSC b. 10+2 c. Degree d. PG e. Ph.D

Educational Qualification	Response	Percentage
SSC	5	3
10+2	14	10
Degree	52	35
PG	68	46
Ph.D	8	6
Total	147	100



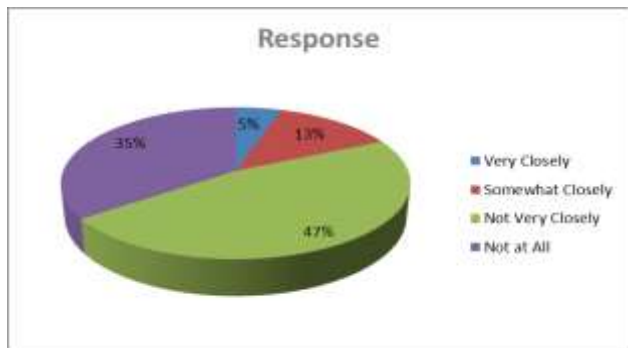
Interpretation

From the above table and graph we can state that, 3% of the respondents educational qualification is SSC, 10% of the respondents are 10+2, 35% of the respondents are Degree holders, 46% of the respondents are PG, 6% of the respondents are Ph.D.

5. How closely do you follow News related to Crude Oil Prices?

- a. Very Closely b. Somewhat Closely c. Not Very Closely d. Not at all

Particulars	Response	Percentage
Very Closely	8	5
Somewhat Closely	19	13
Not Very Closely	69	47
Not at All	51	35
Total	147	100



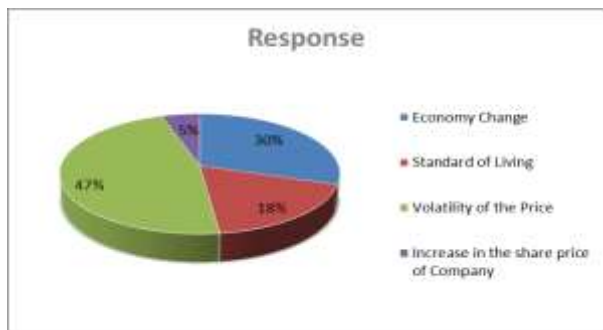
Interpretation

From the above table and graph we can state that, 5% of the respondents watch Crude oil Prices Very Closely, 13% of the respondents somewhat closely watch, 47% of the respondents Not Very Closely watch, 35% of the respondents doesn't watch at all.

6. What changes may occur when there is a price change in the crude Oil

- a. Economy Change
- b. Standard of Living
- c. Volatility of the price
- d. Increase in the share price of Company

Particulars	Response	Percentage
Economy Change	44	30
Standard of Living	27	18
Volatility of the Price	69	47
Increase in the share price of Company	7	5
Total	147	100



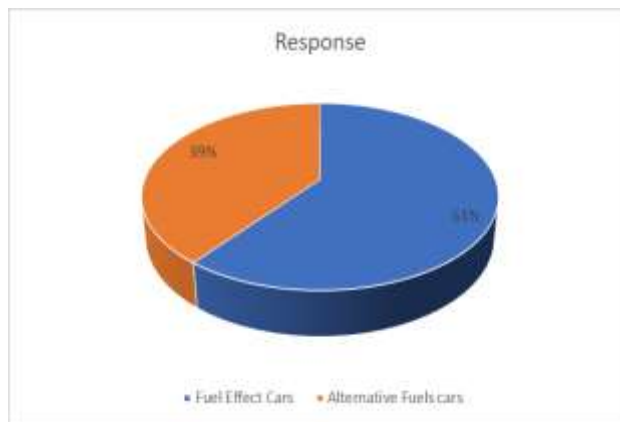
Interpretation

From the above table and graph we can state that, 30% of the respondents says there is an Economy Change when the Crude Oil Price Changes, 18% respondents says Standard of Living, 47% of the respondents says volatility of the price. 5% of the respondents says Increase in the share price of company.

7. When the price of crude oil is High, do you prefer fuel efficient cars or ones that use alternative fuels?

a. Fuel Efficient Cars b. Alternative Fuels Cars

Particulars	Response	Percentage
Fuel Efficient Cars	89	61
Alternative Fuels Cars	58	39
Total	147	100



Interpretation

From the above table and graph we can state that, 61% of the respondents will prefer Fuel Efficient Cars when crude oil Prices are high. 39% of the respondents will prefer Alternative Fuel Efficiency Cars

VII – FINDINGS

- The highest GDP rate is in the year 2021 i.e. 9.05% and lowest GDP rate is in the year 2020 i.e. -5.83%. the data represents the last 10 years of GDP Percentage which shows 2012 to 2016 in increasing rate and in the year 2017 there was the decrease in the GDP Percentage. In the year 2021 the GDP as increased to 9.05% and later on decreased to 7.20% in the 2023 year
- The highest Crude Oil FOB Price in Indian Basket is in the year 2012 i.e. 111.89 U.S.Dollar per Barrel and lowest in the year 2016 i.e. 46.17.
- According to the analysis, 7% of the respondents age is below 21yrs, 25% of the respondents age group is 22-31yrs, 33% of the respondents age group is 32-41yrs, 29% of the respondents age group is 42-51yrs, 6% of the respondents age is above 52yrs.
- According to the analysis, 74% of the respondents are Male, 26% of the respondents are Female
- According to the analysis, 13% of the respondents are Students, 46% of the respondents are Pvt Employees, 16% of the respondents are Govt Employees, 25% of the respondents are Self Employed
- According to the analysis, 8% of the respondents income is below 240000, 33% of the respondents income is 240001-360000, 36% of the respondents income is 360001-480000, 17% of the respondents income is



480001-600000, 6% of the respondents income is above 600001

- According to the analysis, 3% of the respondents educational qualification is SSC, 10% of the respondents are 10+2, 35% of the respondents are Degree holders, 46% of the respondents are PG, 6% of the respondents are Ph.D
- According to the analysis, 5% of the respondents watch Crude oil Prices Very Closely, 13% of the respondents somewhat closely watch, 47% of the respondents Not Very Closely watch, 35% of the respondents doesn't watch at all.
- According to the analysis, 30% of the respondents says there is an Economy Change when the crude Oil Price Changes, 18% respondents says Standard of Living, 47% of the respondents says volatility of the price. 5% of the respondents says Increase in the share price of company.
- According to the analysis, 61% of the respondents will prefer Fuel Efficient Cars when crude oil Prices are high. 39% of the respondents will prefer Alternative Fuel Efficiency Cars
- According to the analysis, 11% of the respondents strongly Influence of buying car when there are changes in the price of Crude Oil, 33% of the respondents Somewhat Influence, 36% of the respondents influence, 7% of the respondents are Neutral, 13% of the respondents do not influence.
- According to the analysis, 40% of the respondents says Yes they are well informed on the present patterns and volatility in the price of crude oil and 60% of the respondents says No
- According to the analysis, 27% of the respondents as seen the changes in the people buying cars when price of the crude oil is high, 73% of the respondents as no seen anyone.
- According to the analysis, 47% of the respondents says Yes the Automobile Industry respond sufficiently to fluctuations in price of crude Oil, 29% says Maybe, 24% of the respondents says No.
- According to the analysis, 28% of the respondents says Industry adjust the changes in the price of crude oil in Introduction Stage, 39% of the respondents says Growth stage, 20% of the respondents says Maturity stage, 13% of the respondents says Decline Stage.
- According to the analysis, 50% of the respondents says yes govt actions have in reducing the effects of changes in the price of crude oil on the automotive Industry, 30% of the respondents says Maybe, 20% of the respondents says No.
- According to the analysis, 21% of the respondents says Tax Policies could be used to tackle this problem, 33% of the respondents says Strategic Reserves could be

used to tackle this problem, 35% of the respondents says Diversification of Energy Sources, 11% of the respondents says Educational Awareness.

- According to the analysis, 52% of the respondents says during times of High Cost in Crude Oil then automobile industry will be positively impacted by developments in electric and hybrid Vehicles, 20% respondents says No Impact, 28% of the respondents says Negative Impact.
- According to the analysis, 60% of the respondents says Yes they are interested in buying a hybrid or electric car soon, 40% says No

VIII – SUGGESTIONS

- The economy should be able to withstand the ongoing changes in oil prices induced by geopolitical events on a global scale if enough safeguards are put in place to prevent such catastrophes.
- People shouldn't have to bear the brunt of such price increases, and the government should try to do something about it.
- The country should be able to increase its own production of crude oil and not rely on other countries that produce oil. Building reserves gives the country a chance to become self-sufficient and stop losing valuable foreign cash.
- An focus on more fuel-efficient vehicles has been shifted in car production in India as a result of fuel price rises. Introduce compressed natural gas (CNG) automobiles as a solution to the ever-increasing price of gasoline.
- One way to lessen the blow of gas price swings is to use public transit.
- Establishing diplomatic ties with favourable states is a must if the government intends to pursue international oil exploration seriously.
- To enhance its oil refining potential, the country needs additional refineries.

IX – CONCLUSION

It elucidates the complex interplay between changes in the price of crude oil and many macroeconomic indicators in India, such as GDP growth, trade balances, unemployment, and inflation. Understanding the car industry's inner workings revealed how oil price fluctuations affect manufacturing costs, consumer preferences, and the market overall. The need for the auto industry to adapt to changing consumer attitudes is underscored by evidence from studies of consumer behavior showing that petrol prices substantially influence purchasing choices. To remain effective in the face of fluctuating oil prices, which greatly affect production costs and supply chain dynamics, it is crucial to plan ahead. Information on the financial health of major organizations in the Indian automobile industry was uncovered



by the stock market study, highlighting the sector's susceptibility to changes in oil prices and the need of adaptable approaches. The policy evaluations emphasized the need of being subtle and flexible when formulating regulations, due to the fact that crude oil prices are quite unpredictable.

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