



Commentary/Review Paper

Analytical Study of Opportunities for Next Generation Biofuels Market

(A Review)

Sumeet Gupta¹, Abhilash Chaudhary² and Pranjal Srivastava³

ABSTRACT

The use of first-generation biofuels, made from edible agricultural feedstocks, as a method to reduce greenhouse gases (GHG) emissions has come under scrutiny due to the development of improved science surrounding the issue of land use change linked with the production and use of biofuels. While several nations sought to get into the global biofuels industry, innovative fuels based on cellulosic materials and algae were becoming more and more popular. Liquid biofuels were a widely traded commodity around the world by 2015. The motivation for biofuels stemmed in part from new factors like the need for green jobs and the desire to decarbonize specific economic sectors like transportation, but it was also to offer countries that depend on oil imports with an alternative to increase energy security.

INTRODUCTION

Overview

Biofuels square measure fuels created by a organic chemistry reaction victimisation biological sources like raw materials. By production, biofuels will be classified into first-, second-, and third-generation biofuels. First-generation biofuels, conjointly referred to as standard biofuels, square measure ready victimisation food crops, like soy, rapeseed, corn, and similar others. Second-generation or advanced biofuels square measure created from non-food crops and waste, like forest residues, non-edible oils, crops, like Miscanthus, and others. Third-generation biofuels square

¹ Professor, Core Cluster, University of Petroleum and Energy Studies, Dehradun India. Email: sumeetbgh2007@gmail.com

² School of Business, University of Petroleum and Energy Studies, Dehradun, India

³ Student, School of Business, University of Petroleum and Energy Studies, Dehradun, India, Email: bit2.pranu@gmail.com

measure derived from protocist, that have tried to be the foremost economical supply for biofuel production. The market is predicted to register a double-digit rate throughout the forecast amount, attributed to the accumulated demand from the transportation and also the power generation trade.

LITERATURE REVIEW

Market Definition & Scope

Biofuels are created through trendy biological processes, like anaerobic digestion rather than a fuel created by natural science processes. Second-generation biofuels are made up of non-food crops like organic waste, wood, biomass crops, and food crop waste, whereas third-generation biofuels are supported enhancements inside the assembly of biomass and employs designed energy crops, like algae as its feedstock. Algae-based biofuels are expected to be bought into a decent variety of fuels, like gas, diesel, and jet fuel. Biofuels are prudent and may probably resolve the issues of natural modification and energy security. What's further, Next-Generation biofuels energy proficiency yield can be a heap on high of normal petroleum merchandise and is climate peaceful too. In any case, challenges, similar to, high age value, group action of sensible price, helpless production network, and absence of acceptable pointers are a number of the key factors which can hamper the market development. Also, the creation of Next-Generation biofuels is filling inside the nations with no or less oil holds as a result of it will assist the nations with seizure disbursement towards the import of biofuels. Next-Generation biofuels are created with the assistance of non-food crops that incorporate agricultural buildup, squander from food crops, squander oil, and wood chips. Next-Generation biofuel feedstock is that the nonedible consequence of food crops. For instance, corn husks from corn development and wheat straw from wheat creation are second-age feedstock that is significantly used for the creation of Next-Generation biofuels. The worldwide Next-Generation biofuels market has driven by the weather, a bit like the rectifiable and clean wellspring of fuel, straightforward accessibility of crude materials that are non-food crops and squanders, the lesser centralization of gas depleting substances once contrasted with ancient powers, and legislative impetuses that upholds the advance of Next-Generation biofuel creation innovations.

Market Dynamics

Drivers

Increase in concern toward reducing carbon emissions

Increasing considerations towards the risky effects of gas (GHG) emissions, caused preponderantly by the combustion of fossil fuels into the surroundings ought to facilitate within the growing installation of biofuels generation plants or bio-refineries worldwide. Production of biofuels by the suggests that of aerobic/anaerobic digestion of biomass assists in limiting the usage of fossil fuels for power generation or fuelling vehicles, that square measure anticipated to own a positive impact on the marketplace for porous electrodes for electrolyzers. In line with the IEA, may displace enough fossil

oil to avoid the equivalent of two. Derived from non-edible biomass The first generation of biofuels (ethanol and biodiesel) square measure made from energy-containing molecules like sugar, starch, oil, and animal fats. Fuel made up of these sources will have associate degree antagonistic impact on the food security. Also, the assembly of initial generation biofuel from these sources is restricted. additionally to it, several economists approve that biofuels more less price, whereas protestors and food rioters appealed that the transformation of staple foods into biofuels distorted international agricultural markets. On the contrary, the term second-generation biofuels or next generation biofuels refers to the fuels derived from a wide-ranging array of numerous feedstocks., plastic grain alcohol is that the most advanced second-generation biofuel and springs from the polysaccharide or cytomem brane of plant cells. Potential feed stocks for successive generation biofuels accommodates forest residues (sawdust), business residues (black liquor from the paper industry), agricultural residues (corn stover), municipal waste and property biomass (jatropha, Camelina and switch grass). This aided in partitioning the food versus fuel discussion to an oversized extent and thus paved manner for higher acceptance and adoption of next generation biofuels as a big a part of the energy combine.

Useful by-products add more value to the bio-refinery

Many biomass feedstock (e.g., corn with the ethanol/livestock feed duality) supply the prospects to provide a variety of merchandise out of constant feedstock, consequently enduring by to the construct of a “biorefinery.” The transformation of biomass by means that of heating in absence of oxidizing agents results in three fractions: one solid called biochar, one liquid presently observed as shift oil or bio oil, and one gas called syngas, that is sometimes brought about of monoxide, hydrogen, short-chain alkanes, and dioxide. Biochar, typically considered a solid biofuel, is attaining plenty of stress within the pelletizing business, notably in regions wherever lignocellulosic biomass is fairly cheap. However, for transport fuel, creating of shift oil or syngas is often deliberated as additional favorable intermediaries. On the opposite hand, the biological pathway tends to isolate polysaccharide from lignocellulosic biomass, that is then reworked into biofuel. the extra merchandise made by this approach ar hemicellulose, lignin, and alternative extractives. Among theses, polymer is fairly favorable for a many reasons because it is employed as cogeneration or as a fuel by the pulp and paper business. beside their applications as fuel or as a supply of atomic number 1 in a very biorefinery method, the aromatic monomers from polymer may even be a plentiful supply of high worth chemical compounds that would be utilised within the second-generation bioplastics business, similarly as bioadhesives.

Restraint

High value of production

The most essential challenge for the expansion of next generations of biofuels market is acquisition of economical feedstock. Feedstock value adds eighty to ninety p.c of the final word fuel value for many processes and is crucial to the economic

feasibility of next generation biofuels. Feedstock prices still be comparatively high that is usually because of process (shredding, densifying, pulverizing and handling) and transportation of the feedstock, and not essentially because of growing them. Likewise, market availability and acceptance are constraints that require to be treated, so as to facilitate the market growth of next generation biofuels.

Opportunity

Favorable government policies encouraging cleaner and greener sources of energy

The steps being taken by the governments across the world within the direction of reducing the carbon footprint left behind by the transportation business is one among the foremost opportunities for the market growth of second-generation biofuels market. Since, the requirement to cut back the greenhouse gases emissions from the vehicles similarly as power generation business has been realized, a cleaner supply of energy was in demand. The second-generation biofuels are the answer that we have a tendency to be searching for. Thus, the increase in demand of biofuels for various industrial applications presents an unbelievable chance for the above-named market to flourish to its fullest. Thus, the political atmosphere is in favor of the second-generation biofuels market because the government of many countries are currently giving tax incentives similarly as subsidies to the business to simulate the expansion of therefore, the political atmosphere is in favor of the traction battery market because the government of many countries are currently giving tax incentives similarly as subsidies to the business to simulate the expansion of second-generation biofuels market. Within the Indian context, the Niti Aayog is creating constant efforts to uplift the marketplace for biofuels in Asian nation within the post-pandemic situation.

Growing stress on biofuel blends

The industrial developments being created within the direction of enhancing the applying of biofuel blends, preponderantly within the automotive business. Biofuel blends are utilized in typical cars with very little or no engine alteration, that boosts the usage of homogenised fuels in vehicles. Biodiesel may be homogenised and utilized in various concentrations. The foremost common are B5 (up to five biodiesel) and B20 (6% to twenty biodiesel). With acceptable fuel tank maintenance and fuel mixing, biodiesel blends of B20 or lesser concentrations may be utilized in any diesel. The automotive and aviation industries globally are attentive towards the applying of economical nevertheless ecologically friendly fuels that may facilitate withdraw the transport business. As next generation biofuels meet the greenhouse emission mitigation objectives similarly as robust craft requirements, these biofuels have mature into an ideal selection. Next generation biofuels are economical and safe enough to drive typical jet engines and use existing fuel delivery systems. Additionally, within the automotive or aviation market, the employment of advanced biofuels permits passengers to understand constant potency.

Impact of Covid-19 pandemic on Next Generation Biofuels Market

As the consequences of the COVID-19 pandemic have stricken nearly each trade across the planet, it's flaunted to cause adverse effects on the biodiesel trade also. The position during which fuel demand is far lower, thanks to provide chain disruptions also because the reduced production in feedstocks, has placed a vast pressure on future generation biofuels market. In Canadian states like Quebec, wherever the biofuel trade was impending at giant former to the COVID-19 pandemic, their biodiesel plants conjointly stayed futile in Apr. At present, they're performing at 50-70% of their total put in capability and therefore the biodiesel trade has afterwards begun to boost slowly.

The biofuels market in North America region witnessed a drop in demand of biofuels. The pandemic has amplified the marketplace for ethanol-based merchandise like hand sanitizer, the merchandise is a smaller amount remunerative than fuel-based fermentation alcohol. Another region leading in next generation biofuel production is geographical region. Biofuel is crucial for the evolution to wash energy in Latin American because it consumes but 8 May 1945 of the world's transport energy however is liable for twenty third of the world's demand for biofuels. like most world economies, the COVID-19 pandemic has conjointly taken a toll on Latin America's biofuel trade with analogous tough circumstances, i.e. cut demand of biofuels by the automotive trade thanks to the travel bans obligatory all across the planet to forestall more unfold of the COVID-19 sickness.

Impact of presidency rules & laws

In U.S, future Generation Fuels Act 2020 become presently value-added withinside the U.S. House of Representatives via manner of means that of Illinois Rep. Cheri Bustos. This law acknowledges the advantages of the high-octane, low-carbon emission of fermentation alcohol and assists within the widespread acceptance and adoption of a higher-octane fuel within the U.S. The invoice may reduce gas emissions and meet demands for superior, cleaner and a lot of economical motors. the appearance of the invoice follows varied years of labor via manner of means that of the National Corn Growers Association to strengthen long-time amount corn necessitate clean, low price fermentation alcohol. future Generation Fuels Act lays out a route to transition to higher fuels and vehicles that employment as a system, like withinside the on the far side whereas Americans stopped the employment of lead and rapt to unleaded fuel, or whereas fermentation alcohol modified dangerous alkyl radical tert-butyl ether.

OBJECTIVES

1. To analyse the impact of Covid-19 on the next generation biofuels business and key developments across industry players.

Secondary Research: Secondary research is a research method that involves using already existing data.

NEXT GENERATION BIOFUELS MARKET, BY BIOFUEL TYPE

Overview

On the premise of biofuel sort, ensuing generation biofuels market is segmental into biodiesels, biogas, biobutanol, and others. The others phase dominates ensuing generation biofuels market and is projected to stay the fastest-growing phase. In 2020, the others phase generated the very best market share of forty four.0% within the next generation biofuels market. The biogas phase calculable to grow with moderate CAGR of twenty seven.7% throughout the forecast amount.

Biogas

Biogas is made with the assistance of exploitation anaerobic fermentation of perishable substances or with the assistance of exploitation the motion of anaerobic organisms (bacteria) on natural count. Mostly, the gas is made with the assistance of exploitation rotten municipal waste, plant substances, meals waste, and manure. during this method, natural count is biologically broken among the presence of chemical element. Anaerobic fermentation permits producers to remodel undesirable gases that embrace laughing gas and alkane into biogas. The gas is AN mixture of concerning 50–70% alkane and 30–40% CO₂.

Key market trends, growth factors, and opportunities

Increase in attention concerning the precarious impact of greenhouse emission (GHG) emissions into the environment is supposed to help among the developing established of biomass generating plants across the globe. The producing of biofuel is projected to assist cut back the problems of waste dumpsites and landfills that's foreseen to supply a constructive impact which ends up within the production of biogas. A lower demand among the rock oil reserves in addition to disturbances owing to rock oil charges is foreseen to spice up the market growth. additionally, the developing alertness among the growing population concerning atmosphere is projected to own AN encouraging impact on the market growth.

Biodiesel

Biodiesel may be a swish renewable gas noninheritable from biomass. Biodiesel is to boot termed inexperienced diesel. it's a long-chain mono-alkyl organic compound of carboxylic acid derived from vegetable oils and fat via the technique diagnosed as trans esterification that converts oils and fat into chemicals. Biodiesel may be a replacement gas having comparable operate homes to plain fuels. Normally, it's so much applied as a chance gas for oil diesel or may be used as combination with ancient diesel with it. Biodiesel finds intensive application as a fuel in business fuel, automotive, power, marine fuel, and agriculture industries.

Key market trends, growth factors, and opportunities

The producing of biodiesel with the assistance of exploitation various international locations has helped makers in decreasing their dependence on overseas oil reserves,

because it is made in an exceedingly lots of abundance and will be utilised in any internal-combustion engine with little changes to the engine or the gas system. Biodiesel is popping into a cheap possibility thanks to the unsteady charges of petroleum-primarily based mostly product that is projected to drive the expansion of ensuing generation biofuels market. Governments of many nations have created law for the cars to run on distinctive blends of biodiesel. These authorities' work is additionally to push the usage of biodiesel in automotive applications which can bring new opportunities for the market.

Biobutanol

Biobutanol is helpful as another for oil and may be in real time applied in inner combustion engines while not engine alteration. once as compared with bioethanol, biobutanol provides various inherent benefits that embrace higher electricity density owing to doubling of carbon atoms ANd an extended burning time among the engines thanks to higher boiling purpose. it's relatively less venturesome and fewer absorbent and has fewer ignition troubles. It possesses intersolubility in conjunction with higher body and lubricity.

Key market trends, growth factors, and opportunities

Increase in use of propenoate compound ANd co-polymer as an adhesive in creation and advance work is anticipated to drive market toward growth within the approaching years. propenoate is employed as chemical intermediate due to its chemical form and functionalities square measure foreseen to guide market towards important growth. Most of the world's bio-butanol is from sugarcane, starch, sugar beet, wheat, plastic sugars, and candy sorghum juice. restricted offer of sugarcane feedstock within the returning years, thanks to its much loved use in meals intake has caused uncertainty in sugarcane accessibility which may be a limiting issue for the bio-butanol production and restraint for the market.

Others

Other next generation biofuels embrace biomass derived dimethyl ether (Bio-DME) and Bio-oils. Biomass derived dimethyl ether (Bio-DME) may be a swish artificial gas that has excessive cetane large choice and comparable bodily homes as LPG. The combustion of bio-DME generates tiny amount of Nox, nearly with none traces of SOx and stuff. Thus, bio-DME is taken into thought as a property different to diesel and LPG. Bio-Oil may be a beauty oil which may be useful in skin treatment and is so employed in numerous care product. It may cut back wrinkles and reduce physiological state of the skin. The oil has AN extended part listing that consists of flower, lavender, rosemary, and camomile. Lavender has antifungal properties and may combat zits. It conjointly includes vitamins E and A, and totally different skin-improving substances like E.

Key market trends, growth factors, and opportunities

Rise in policies toward excessive emission fuels within the transportation space is likewise conducive to the overall DME demand as a result of it's higher cetane selection that presents the next ignition fee to within the finish reduce pollution from the atmosphere. These traits square measure anticipated to get swarming increase avenues for the market length with within the approaching years. Bio-oils are getting used in numerous medical and for skin product that leads market towards the numerous growth.

NEXT GENERATION BIOFUELS MARKET, BY PROCESS

On the idea of method, following generation biofuels market is divided into organic chemistry method and thermochemical method. The organic chemistry method phase dominates following generation biofuels market and is projected to stay the fastest-growing phase. In 2020, the organic chemistry method phase generated the very best market share within the next generation biofuels market. Whereas, the thermochemical method phase is calculable to grow with moderate rise in growing graph throughout the coming timeframe.

Thermochemical method

Thermochemical process is victimisation heat to push chemical variations of biomass into strength and chemical product. The six techniques mentioned on this science lab area unit combustion, gradual transmutation, torrefaction, speedy transmutation, flash transmutation, and chemical process. These represent the techniques receiving the utmost interest throughout the thermochemical platform for generating heat, power, fuels, biochars, and chemicals. All those techniques produce many quantities of three products: solid, liquid and gas. every technique makes use of exclusive response conditions to optimize the producing and quality of additional precise product.

Key market trends, growth factors, and opportunities

Agricultural biomass as a strength aid has various environmental and cheap advantages and has capability to notably contribute to supply days' gas demands. Currently, thermochemical method for agricultural biomass to strength transformation seem promising and possible. The relative gain of thermochemical conversion over others is owing to higher productivity and compatibility with current infrastructure facilities. Thermochemical transformation is really impartial of environmental things for producing functions. Therefore, it'd be important to acknowledge the options of thermochemical biofuels to judge their destiny marketplace capability and commonplace boom of the marketplace.

Biochemical method

Biochemical conversion of biomass entails uses of bacterium, microorganisms and enzymes to breakdown biomass into vaporish or liquid fuels, consisting of biogas or bioethanol. the utmost famed organic chemistry technology is anaerobic digestion (or biomethanation) and fermentation. Anaerobic digestion could be a sequence of chemical reactions at some stage in that natural material is rotten via the metabolic pathways of

definitely occurring microorganisms in associate degree atomic number 8 depleted atmosphere. Biomass wastes can also yield liquid fuels, consisting of plastic alcohol, which can be wont to update petroleum-primarily primarily based completely fuels.

Key market trends, growth factors, and opportunities

Biochemical processes have the gain of low process temperatures and excessive property of merchandise generated. However, they usually need preprocessing stages, drawn-out process times, unhealthy coordinate system yields, and difficult downstream process, that embody distillation that will be electricity intensive. organic chemistry method technologies area unit moderate, pure, clean, and economical. Moreover, biomass could also be was numerous intermediates through screening distinctive enzymes or microorganisms through organic chemistry conversion technologies, therefore conveyance several platform materials for the conversion of renewable materials, fuels, and chemicals because it can bring a lot of opportunities for the market.

NEXT GENERATION BIOFUELS MARKET, BY material

On the idea of raw materials, following generation biofuels market is classified into lignocellulose, jatropha, camelina, algae, and others. The genus *Jatropha* phase dominates following generation biofuels market and is projected to stay the fastest-growing phase. In 2020, the genus *Jatropha* phase generated the very best market share within the next generation biofuels market. The lignocellulose phase calculable to grow with moderate growth throughout the forecast amount

Jatropha

Jatropha curcas botanist could be a species of spermatophyte within the family Euphorbiaceae|rosid dicot family}, Euphorbiaceae. It are often known a tree or ligneous plant that's native to the yank tropics, principally North American country and Central America, however it grows beneath a variety of agroclimatic environments and is normally found in most of the tropical and subtropic regions of the planet. Therefore, it guarantees a rational production of seeds with terribly negligible attention. The oil content of genus *Jatropha* seed varies from half-hour to thirty fifth by weight. straightforward propagation, fast growth, drought tolerance, gadfly resistance, higher oil content than different oil crops, adaptation to a good vary of ecological things, tiny biological time, and optimum plant size and design area unit a number of the properties of genus *Jatropha*, that makes it a promising crop for biofuel. The therapeutic compounds from genus *Jatropha* are often used as anti-microbial, medicinal drug, healing, physiological condition, anti-cholinesterase, anti-diarrheal, anti-hypertensive and anti-cancer agents in trendy pharmaceutical trade.

Impact of Covid-19 pandemic on Next Generation Biofuels Market

COVID-19 is associate degree communicable disease that originated in Hubei province of the city town in China in late Gregorian calendar month, 2019. various nations had to impose lockdowns, travel bans and trade restrictions so as to stop the

widespread of the deadly virus. Covid-19 pandemic has compact the porous electrodes for electrolysers market within the following ways:

As the consequences of the COVID-19 pandemic have smitten nearly each trade across the planet, it's showed cause adverse effects on the biodiesel trade still. The position during which fuel demand is far lower, thanks to offer chain disruptions still because the reduced production in feedstocks, has placed a colossal pressure on following generation biofuels market. In Canadian states like Quebec, wherever the biofuel trade was close at hand at giant former to the COVID-19 pandemic, their biodiesel plants additionally stayed futile in Apr. At present, they're engaging at 50-70% of their total put in capability and also the biodiesel trade has after begun to enhance slowly.

The biofuels market in North America region witnessed a drop of nearly hour in demand of biofuels. although the pandemic has amplified the marketplace for ethanol-based product like hand sanitizer, the merchandise is a smaller amount moneymaking than fuel-based alcohol. Another region leading in next generation biofuel production is geographic region. Biofuel is crucial for the evolution to wash energy in Latin American because it consumes but V-day of the world's transport energy however is accountable for twenty third of the world's demand for biofuels. like most international economies, the COVID-19 pandemic has additionally taken a toll on Latin America's biofuel trade with analogous troublesome circumstances, i.e. faded demand of biofuels by the automotive trade thanks to the travel bans obligatory all across the planet to stop more unfold of the COVID-19 sickness.

CONCLUSION

Bio Fuel is required as a substitute for conventional fuel. It is catering to the objective of Sustainable Development Goals. Bio Fuel is having fast possible opportunities due to following reasons:

1. Low Emission
2. Contributing to Sustainable Development Goals
3. Contributor to Energy Basket

REFERENCES

- Book Chapter titled, "Factors affecting the Psychological needs of medical workforce in COVID19 situation " in the book, "Emotional Intelligence for Leadership Effectiveness" published by Francis and Taylor.
- Garg A. and Gupta. S. (2020), High Speed Railway (HSR): India and the World Comparison of existing systems. *International Journal of Innovative Technology and Research*. Volume No.8, Issue No.4, 9516-9530.
- Garg A. and Gupta. S. (2022), Analytical Study of Best Practices for Energy Conservation in MRT Projects, *Water and Energy International* (2021), 64 (10), pp 37-44

- Gupta K. and Gupta T. (2018). Durkheim's Theory of Anomie and the 2016 American Election, *Journal of Global Economy*, Research Centre for Social Sciences, Mumbai, India, vol. 14(1), 28-39.
- Gupta, S, (2018) Antidisestablishmentarianism in the American Election: The Rise of Donald Trump and Far Right Parties in Europe, Identity Politics in the light of Niccolo Machiavelli's Treatise "The Prince", *Journal of Global Economy*, Research Centre for Social Sciences, Mumbai, India, vol. 13(4), pages 25-267, May 2018
- Gupta, S, and Verma, R (2008) Comparative Analysis of Financial Performance of Private Sector Banks in India: Application of CAMEL Model, *Journal of Global Economy*, Research Centre for Social Sciences, Mumbai, India, vol. 4(2), pages 160-180, June.
- Gupta, S. and Gupta, T. (2012). Enhancing Marginal Field Development Economics: Leasing Operated Production Facility Approach, *Journal of Global Economy*, Research Centre for Social Sciences, Mumbai, India, vol. 8(1), pages 63-71, March.
- Gupta, S. , Pahwa, M. S. and Gupta A. (2013). Innovative Price Adjustments Technique for Thermal Coal: A Study of Operation Function under changing Techno Environment. *Global Journal of Management and Business Research*, Apr. 2013. ISSN 2249-4588.
- Gupta, S. & Agrawal, A., 2021, "ANALYTICAL STUDY OF FINTECH IN INDIA: PRE & POST PANDEMIC COVID-19," *71 Indian Journal of Economics and Business*, Vol 20 No 3 ,pp 33-71
- Gupta, S. & Kadyan, S; Bhasin, K.N, 2021, "Analytical Study of Behavioral Finance In Bank Merger: Impact of Digitalization", *Academy of Accounting and Financial Studies Journal*, Vol 25 No 3, pp 1-17
- Gupta, S. (2009) "Pre and Post Merger Valuation- A Study of Tata Corus Merger Deal," *Journal of Global Economy*, Research Centre for Social Sciences, Mumbai, India, vol. 5(4), pages 299-319, December.
- Gupta, S. (2013) Accounting and Assessment of Capital Expenditure of New Feeder Airport in India: A Case Study of Idukki Airport, *IBA Journal of Management and Leadership*, Vol 5(1), July 2013, ISSN 2230 – 7524
- Gupta, S. (2017). Financial Intelligence. *Journal of Global Economy*, Research Centre for Social Sciences, Mumbai, India, Vol 13(3), Nov 2017
- Gupta, S. (2021) "Analytical Study of General Insurance in India", *Journal of Global Economy*, 17(2), pp. 115–129.
- Gupta, S. (2021) "FUNDAMENTAL & TECHNICAL ANALYSIS OF CRUDE OIL PRICES", *Journal of Global Economy*, 17(1), pp. 3–20.
- Gupta, S. (2021). FUNDAMENTAL & TECHNICAL ANALYSIS OF CRUDE OIL PRICES. *Journal of Global Economy*, 17(1), 3-20, April 2021
- Gupta, S. (2022) "Forensic Accounting: Innovative Tool for Corporate Sector", *Journal of Global Economy*, 18(1), pp. 43–52.
- Gupta, S. and Gupta, A. A. S. (2022) "Applications of AIS data analysis in bunkering Industry and its related factors", *Journal of Global Economy*, 18(2). doi: 10.1956/jge.v18i2.646.
- Gupta, S. and Mritunjay Rawat (2022) "Machine Learning : A Contributor to Sustainable Development Goal: Machine Learning : A Contributor to Sustainable Development Goal", *Journal of Global Economy*, 18(1), p. 67.83

- Gupta, S. and Sharma R.K. (2012). Pricing and Taxation in Oil and Gas Sector: A study with special reference to ONGC. *Journal of Global Economy*. Research Centre for Social Sciences, Mumbai, India, vol. 8(3), 233-260.
- Gupta, S. and Verma, R. (2008, May), Changing Paradigm in Indian Banking. *Professional Banker* , 21-2.
- Gupta, S. (2016). Factor Analysis in holistic approach for Project Performance framework of Oil and Gas projects in India, *International Research Journal of Social Science and Management*, India, vol. 2(1)
- Gupta, S., & Sacchar, S. (2017). Cost Optimisation of Warehousing Operations in FMCG: An Analytical Study of Supply Chain. *Journal of Global Economy*, 13(3), Nov 2017
- Gupta, S., & Srivastava, S. (2016). Pre Disinvestment & Post Disinvestment Financial Analysis of Oil and Gas Company in India, *Journal of Global Economy*, 12(3), 205-214.
- Gupta, S., Tyagi R., Sharma A. and Singh H, (2021). Human Wealthsurance: Analytical Study on Financial Planning of Community Investors during COVID-19. *International Journal of Management (IJM)*. 12(1), 2021, pp. 1453-1473.
- Gupta, Sumeet .(2013)Techno-Economic Evaluation of Exploration & Production," *Journal of Global Economy*, Research Centre for Social Sciences,Mumbai, India, vol. 9(2), pages 153-171, June.
- Gupta, Sumeet; Heggde, S, Githa; (2022), "Integrated Supply Chain Model for Supply Chain Efficiency" *Empirical Economics Letters* (2022), Special Issue 2- ABDC C
- Gupta, Sumeet; Heggde, S, Githa; De , Debkumar (2022), "Development of Compressed Natural Gas in India: A Geo-Technical Study" *Empirical Economics Letters* (2022), Special Issue 2- ABDC C
- Jayaraj, R ., & Gupta, S. (2011) "An Empirical Analysis of the Impact of Foreign Direct Investment on Economic Activity of India," *Journal of Global Economy*, Research Centre for Social Sciences,Mumbai, India, vol. 7(2), pages 100-120, June.
- Kandpal, V., Mehrotra, R., Gupta, S." A study of post-demonetisation impact of limited-cash retailing in uttarakhand, India" *Humanities and Social Sciences Reviews*, 2019, 7(5), pp. 1007–1020
- Kaushal, Ajit. & Gupta, S.(2014). Confidentiality in International Commercial Arbitration: Presumption and Reality, *IUP Law Review*, 4(2), 33-40, April 2014
- Ravindra Shrivastava; Sumeet Gupta; Ankur Mittal; Brijendra Saxena," Critical Risk Factors Causing the Time and Cost Overruns of Indian Railway Projects in India" , *International Journal of Engineering and Advanced Technology (IJEAT)* PP: 5395-5401 | Volume-9 Issue-1, October 2019 |DOI: 10.35940/ijeat.A3075.109119
- Rawat, A., Gupta, S. and Rao, T.J. (2021), "Risk analysis and mitigation for the city gas distribution projects", *International Journal of Energy Sector Management*, Vol. 15 No. 5, pp. 1007-1029. <https://doi.org/10.1108/IJESM-10-2020-0001>
- Rawat, A., Gupta, S. and Rao, T.J. (2022), "A review on prospective risks and mitigation for oil and gas projects: implication for Indian CGD companies", *International Journal of Energy Sector Management*, Vol. ahead-of-print No. ahead-of-print. <https://doi.org/10.1108/IJESM-01-2021-0016>
- Rawat, A., Gupta, S., Joji Rao, T., Rai, S.K.' Natural gas demand estimation for India: Error correction modelling" *International Journal of Engineering and Advanced Technology (IJEAT)*; 2019, 8(5 Special Issue 3), pp. 429–437
- S. Surya, Sumeet Gupta, Abolfazl Mehbodniya, Jeidy Panduro-Ramirez, Prabhakara Rao Kapula, Tanweer Alam, Karthikeyan Kaliyaperumal, "Addressing the Real World

Problem of Managing Wireless Communication Systems Using Explainable AI-Based Models through Correlation Analysis", *Mathematical Problems in Engineering*, vol. 2022, Article ID 3390075, 6 pages, 2022. <https://doi.org/10.1155/2022/3390075>

Sumeet Gupta, Dr., Manvinder Singh Pahwa, Dr.; "Analysis of Price Volatility in Energy Commodities" *FIIB Business Review*; 2018 , <https://doi.org/10.1177/2455265820110112>

Swarupa Deshpande; Hiranmoy Roy; Tarun Dhingra; Sumeet Gupta; "Sustainable procurement for improving project performance for oil and gas projects" *International Journal of Procurement Management*, 2020 Vol.13 No.2, pp.143 – 179, DOI: 10.1504/IJPM.2020.106555