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Petroleum Industry in the USA, the Case of the Standard OilTrust and the Antitrust Campaign (1859-1914)

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Dedication

This thesis is tenderly dedicated to my husband Hafid, my kids; Abdelhakim, Abdenour, Abderahim and my dearest Meriem, my parents for their support and encouragement and constant love, and my sisters and brothers.

Thanks to all of those who my words fail to mention.

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Abbreviations

ATTAmericanTobacco Trust

BC Bureau of Corporations

FTC Federal Trade Commission

FTCA Federal Trade Commission Act

ICC Interstate Commerce Commission

IHC International Harvester Company

NSC Northern Security Company

OCR Oil Creek Railroad

PPAProducers' Protective Association

PROC PennsylvaniaRock Oil Company

SIC South Improvement Company

SOC Standard Oil Company

SOT Standard Oil Trust

USA United States of America

USGS United States Geological Survey

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Abstract

The purpose of this doctoral thesis is to shed light on the national craze for petroleum that the USA witnessed during the second half of the 19th century as scientists advanced in the discovery of its potential uses, which led to the emergence of the petroleum industry. The emerging industry organized itself gradually through the creation of small companies that merged to create corporations, and later amalgamated into petroleum trusts. The formation of trusts was not seen with a good eye either by the American people or certain officials. By the late 19th century, abuses of the trust technique to crush competition and create monopolies in numerous industries had become so great that the public demanded something be done about the trusts. As a result, the U.S. Congress passed the Sherman Antitrust Act in 1890 to be used to control the trusts and later to dismantle them during the 1910s. Several questions are raised to set off issues related to the development and role of petroleum in the making of the American civilisation such as: How did petroleum industry emerge and develop in the USA? What was its impact on the development of American industrial society? How did the succeeding American governments regulate the petroleum industry? Why was the Standard Oil Trust created, and why was it dismantled?

Keywords :Industrial Revolution / Petroleum Industry / Standard Oil Company / Standard Oil Trust / Monopolies / Trusts / Anti-trust laws / Sherman Act / Progressivism

Introduction

Energy is essential to life. Its production and consumption constitute some of the most important activities in human life. Therefore, it is not surprising that energy has always been the fuel for the advancement of human societies in the creation of the great world civilizations that the world has witnessed. In ancient times, people relied completely on the caloric energy gained from food that produced kinetic energy of muscles. However, this energy was limited.

Thanks to human intellect, people were able to overcome their physical limits imposed on their own muscle power by using tools and exploiting the energies outside their bodies for their own benefit. They relied for power on controlling the energies available in nature such as domesticated animals (horses and oxen), and on natural elements such as wood fire to create axes, ploughs and other tools, waterpower to turn waterwheels in mills for carpentry, and wind for windmills and sailing ships. Henceforward, people were able to cultivate land more efficiently, build towns and cities, and transport goods to undertake commercial exchanges with other people in very

far areas. The next step in evolution of human civilisation is the quest for other energy resources than wood, which gave birth to the Industrial Revolution in Great Britain by the mid-18th century.

The industrial history of mankind is the history of man's labour with tools and mechanical power for the satisfaction of his wants. Therefore, the Industrial Revolution refers to the great transformation which was brought about mainly during the 19th century by discoveries and inventions that revolutionised fundamentally all the economic functions of society. Important changes occurred in different domains such as manufacturing machines and modern tools, farming, and transportation systems. The basis of today's technology was founded during this period of time. Basic hand tools were replaced with modern machinery that enabled mass production of goods. Farming system changed because farmers did not need to use simple tools and animals any more for working on their farms. Instead, they started using new equipment and trucks to do the job. Industrialization brought with it new types of roads, trains and many other forms of communications which simply did not exist.

The next phase in people's quest for energy, which was the basis for the development of human civilization, was the use of fossil fuels such as coal and natural gas as alternatives to wood fuel. In parallel to this quest for energy resources to power the emerging factories in the textile and steel factories, there was a search for better, cheap, and

safe means of illumination to light the night of the people and to give the factories the opportunity to do night shifts. The quest for a better source of illumination relatively ended with the discovery of illuminating properties of petroleum.

Since antiquity, people knew natural petroleum seeps and collected it to be used for a variety of purposes. Although the existence of petroleum was known to people in ancient and modern times, it was not until the second half of the 19th century that its extraordinary potentialities were discovered. The petroleum industry in the USA emerged when its by-products were revealed and became necessary commodities in people's daily life. Petroleum also contributed in the creation of new and unprecedented industries and in the development of the existing ones as well.

The importance of studying the petroleum industry in the USA lies in demonstrating the importance of private companies in the development of the country's economy, and the restrictions imposed by the authorities to bridle businesses excessive greed and reprimand the unfair practices. From the beginning, the American State and Federal Governments tried to regulate new and unprecedented forms of business organisations and determine the legality of economic and commercial practices that lacked any precedent legislation. The study of the petroleum industry in the USA during its early years provides a good understanding of its emergence, its development from corporate to the trust form of organisation, and the dissolution of the most

prominent petroleum enterprise in the world at that time namely the Standard Oil Trust in 1911. This thesis is limited to the study of these three themes that constitute its overall study plan.

The petroleum industry emerged in the USA from the quest for cheap and abundant source of illumination. The distillation of crude oil and the discovery of its by-products attracted investors to invest their money to make the new industry profitable. The companies that operated in the oil fields either in its production, transporting, refining, or commercialising, came to a standstill because production exceeded demand and competition between the operators. It was the establishment of the Standard Oil Trust by John D. Rockefeller that the industry witnessed steady development and market stability. However, this situation could not be reached without pushing the other companies to bankruptcy. Grievances were put forward to the State and Federal Governments that reacted against the monopolies until the Standard Oil Trust was dissolved to restore competition and free market opportunities.

The three themes introduced constitute the basis on which the problematic of this thesis is built. The development of the petroleum industry in the USA from the 1850s brought about an unprecedented change that relatively shaped every aspect in people's lives until nowadays. Today, it is undeniable that petroleum is at the basis of all international events whether in forging alliances or creating conflicts.

It created huge fortunes and industrial empires mainly in the USA, launched and fuelled wars, promoted the widespread use of petroleum, shaped twentieth-century politics, and much more. Therefore, how did petroleum industry emerge? What was its impact on the American society, politics, and economy? How did the American Government regulate the petroleum industry and market? What was its role in creating monopolies and trusts? What were the measures that the American governments undertook to face the powerful petroleum trust namely the Standard Oil Trust? Why was the Standard Oil Trust dissolved although it stabilised the oil market, developed the industry, provided cheap prices of oil by-products, and conquered international market bringing wealth and power to the nation? Finally, what were the consequences of the dissolution of the trust on the petroleum industry?

Therefore, based on the elements of the problematic, the objectives of this research are determined to supply a thorough understanding of the development of the petroleum industry in the USA from its inception in 1859 to 1914. Four main objectives are set in this research:

1. Determine the prerequisites for the emergence of the petroleum industry in the USA
2. Find out the factors that played an important role in the development of the Standard Oil Trust
3. Display the abuses of the Standard Oil Trust and the reaction against its practices
4. Study the dissolution of the SOT and its consequences.

To reach the above objectives, this research is divided into four chapters. Chapter One is a historical background in which sources of illumination are introduced, along with the early uses of petroleum and the discovery of its illuminating properties. Chapter Two exposes the evolution of the petroleum industry that started in the USA and then became a worldwide network of companies, multinationals, and trusts. It also deals with the period in which the industry emerged to the point it became an important factor in people's lives, and an important element in the country's economic and technological advancement. Finally, while the Third Chapter debates the formation of the Standard Oil Trust and its impact on the country's economy, the fourth deals with the anti-trust campaign that overthrew the existing powerful Standard Oil Trust.

Chapter One

Background to the Petroleum Industry in the USA up to 1859

The Industrial Revolution, which started in Great Britain from the mid-18th century and then spread to the whole world, was at the basis of the development of the human civilisation to an unprecedented level from the late 18th century. This development was caused by the use of different sources of energy successively wood, coal, natural gas, electricity, and petroleum, which were used for two main purposes: heating and illumination. The study of these energy resources provides a background to the emergence of the petroleum industry in the USA, which started from 1859 when the first oil well was drilled by Edwin L. Drake[1] in Venango County, Pennsylvania.

The development of the exploitation of petroleum to procure cheap and much efficient source of illumination than those already used (candles, coal-gas, natural gas, or electricity, although in its early stages) depended on human, financial, and technological prerequisites that were at the basis of the emergence of its industry in the USA. Petroleum's illuminating quality was discovered by Pr.

[1] Edwin Laurentine Drake (March 29, 1819- November 9, 1880) also known as colonel Drake, was an American oil driller popularly credited with being the first to drill for oil in the USA. www.britannica.com/biography/Edwin-Laurentine-Drake.

Silliman,[2] who was an eminent chemist at that time. His discovery spurred entrepreneurship to exploit oil mainly by the Seneca Oil Company, which financed the operations of exploration, drilling, and extract of oil for economic purposes. Such operations depended heavily on the existence of drilling technology that helped in oil extraction.

I. Experimenting New Sources of Illumination (the Illumination Revolution of the 1850s)

The energy resources exploited in the USA from the colonial period until 1859 varied according to the level of energy consumption engendered by the country's social and technological evolution. The colonies relied on wood for the supply of energy, but by the mid-18th century, they witnessed the use of imported coal from Britain at a very small scale. The colonists, mainly the rich ones and some blacksmiths, recognised the energy quality that coal provided, which was far better than that of wood. However, it was only after Independence, precisely from the 1830s, that coal started to be used at a very large scale because of the increase in demand as the population

[2] Benjamin Silliman (August 8, 1779- November 24 1864) was an early American chemist and science educator. He was one of the first American professors of science at Yale College, the first person to distil petroleum, and a founder of the American Journal of Science. www.britannica.com/biography/Benjamin-Silliman-American-chemist-1816-1885

grows.[34] Coal was at the basis of the emergence of the gas industry. The distillation of coal procured coal-gas that was used for lighting, which in turn led to the exploitation of natural gas for the same purpose. The search for better, cheap, and safe means of illumination led to the early experiments on electricity and the distillation of petroleum.

This section aims at studying the energy resources and the sources of illumination that existed and prevailed in the USA from the colonial period to 1859. It also studies the factors that led to the emergence of the petroleum industry in the USA, which began from 1859 when the first oil well was drilled.

A. Wood and Coal as Energy Resources in the USA from the Colonial Period to 1859

The use of wood for heating and lighting is as old as civilization itself. Wood fuel was the source energy that English settlers in North America used in their daily life and in the development of their colonies. The existing forests made wood abundant for the settlers to use it for heating, cooking, forging household utensils, the manufacture of weapons and agricultural tools... etc. The preferred form of wood fuel was the branches. Larger, bent or deformed stems

[3] Frederick E. Saward. *The Coal Trade.* USA: Harvard University. 1910, p.70

were converted to charcoal. From 1742, home heating using wood developed in the United States when circulating stoves were invented because they improved the airflow, providing more heat and less smoke than an ordinary open fireplace. The inconveniences of the maintenance of stoves, their smoke, and the regular need to split wood played in favour of the introduction of other sources of heating such as coal, gas, or oil. Therefore people started using coal instead of wood for heating.

In North America coal had been first used by the Indians [5] long before the first settlers arrived in the New World. Archaeological evidences prove that Hopi Indians, who lived in what is now Arizona, used coal to bake the pottery they made from clay.[6] Coal recorded history in North America started in 1673-74 when Father Jacques Marquette and Louis Jolliet[7] reported their discovery of "*Charbon de Terra*" (coal) at a point on the Illinois River during their

[5] References to the early uses of coal are meagre. Aristotle referred to it as "*bodies which have more of earth than of smoke*" and called them "*coal-like substances*." Coal was used commercially by the Chinese long before it was utilized in Europe. Coal from the Fushun mine in north-eastern China might have been employed to smelt copper as early as 1000 BC. Elwood S. Moore. *Coal, Its Properties, Analysis, Classification, Geology, Extraction, Uses and Distribution*, New York, John Wiley and Sons, Inc. 1922, p. 2

[6] Charles A. Whiteshot. P.101

[7] Father Jacques Marquette, May 18, 1675) sometimes known as *Père* Marquette, was a French Jesuit missionary who founded Michigan's first European settlement, Sault St. Marie, and later founded St. Ignace, Michigan. In 1673, Father Marquette and Louis Jolliet were the first non-Native Americans to see and map the northern portion of the Mississippi River. *The Encyclopaedia Britannica*, USA, Encyclopaedia Britannica, Inc., CD, 2008.

expedition on the Mississippi River.[8] Coal was also discovered by Huguenot[9] settlers in 1701 at Manakin on the James River near Richmond, Virginia. As stated earlier, the colonists did not use coal and relied mostly on waterwheels and burning wood to power colonial crafts, which continued as such until the coming of the Industrial Revolution to the English colonies in North America.

Wood was replaced by coal as energy resource for industrial purposes in Great Britain during the second half of the 18th century. The 13 British colonies in North America were not completely isolated from the changes that were happening in the mother country and in Europe as regards the technological advances and inventions that spurred the Industrial Revolution. Immigration influx of people of different trades and commercial exchanges helped in the transfer of knowledge and skills causing the rise of small-scale industry in the colonies, mainly in the textile and the iron industries.

The first recorded commercial coal production or systematic coal mining in the USA was carried on in the Richmond or Henrico county

[8] Elwood S. Moore. Op. cit., p.4

[9] Huguenots were French Protestants (meaning sworn companion or confederate, or perhaps in combination with a reference to their religious leader and politician Besançon Hugues) who were at the centre of political and religious disputes in France in the 16th and 17th centuries. Above all, Huguenots became known for their criticisms of worship as performed in the Roman Catholic Church, in particular the focus on ritual, images, saints, pilgrimages, prayers, and hierarchy of the Catholic Church. *The Encyclopaedia Britannica*, USA, Encyclopaedia Britannica, Inc., 15th Edition, Vol. 6, p. 127

coalfield, Virginia, in 1748.[10] It was sent across the Monongahela River in canoes to provide fuel for the military garrison at Fort Pitt. By the late 17th century, coal started to be mined on "Coal Hill," now Mount Washington in Pittsburgh, Pennsylvania, where it was dug from the steep hillsides and used by early local population to heat their homes. The Revolutionary War revealed the importance of exploiting the existing coal seams since the British stopped their exports of coal to the colonies. Coal was used in the forging of ammunition and tools needed by the army men.

The coal seams in America provided a breeding ground for the development of industries that were at the basis of the industrialisation of the USA. The first colonial coal users were blacksmiths in large cities, who fired their furnaces with "fossil coal" or "stone coal" imported from England and Nova Scotia. Noticing that coal seams already existed locally, coal extraction began with farmers who attempted to dig coal from beds exposed on the surface and sold it by the bushel,[11] mainly in Richmond, Virginia. It was only after the independence of the USA that coal began to be used at large scale mainly in the emerging industries like iron and steel industry as a consequence of the Industrial Revolution that reached the country in the early years of the 19th century.

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[10] Frederick E. Saward. *The Coal Trade*. USA: Harvard University, 1910, p. 13

[11] A *Bushel* is a unit for measuring grain and fruit equal in volume to 8 US gallons (30.32 litres). It is used to mean a large amount of something. *Encyclopaedia Britannica*, op. cit., Vol. 2, p. 674

After Independence in 1783, the succeeding Governments of the USA had to provide the nation with an energy security scheme that was given much concern during the 19th century by giving freedom to private investments to search for eventual sources of energy. With the rapid growth of the population and the industrial development of the United States, energy supply based on wood could not meet a constantly growing demand.[12] This situation pushed the American Governments of Thomas Jefferson (1801-1809), and then James Madison (1809-1817) to think about a national energy policy based on coal. This policy was shaped by economic nationalists such as Tench Coxe, Albert Gallatin, and Alexander Hamilton, who suggested that the nation's coal trade, which was at that time centred in the Richmond coal basin of eastern Virginia, should serve as a strategic resource for the nation's growth and independence.[13] These politicians initiated interest in coal, which became part of the American energy policy from that time onwards.

During the War of 1812 with Great Britain, in which the USA was blockaded by the British Navy, the Americans felt the urgent need to diversify their resources of energy by adopting a new policy as regards energy and industrialisation. The blockade devastated the American agricultural exports, but it helped stimulate local factories

[12] Sean Patrick Adams. *Old Dominion, Industrial Commonwealth: Coal, Politics, and Economy in Antebellum America*. Baltimore: Johns Hopkins University Press. 2004. P.20

[13] Ibid., p. 22

that replaced goods previously imported.[14] It was the emerging industries like iron and steel that hastened the energy shift from wood to coal and obliged the government to change its energy policy.[15]

Federal energy policy shifted from wood to coal as a matter of practical necessity. Such shift was encouraged by the location of important coal seams inadvertently discovered by army engineers that were authorised by Congress to undertake engineering land surveys to prepare estimates for roads and canals for military, commercial, or postal purposes from 1824.[16] These surveys were soon deviated from their original assignment to locate the potential mineral and fossil fuel seams. The most famous land survey report at that time was made by Olmsted and published in 1824, in which gold-bearing rock was discovered in North Carolina and later in Virginia, South Carolina, and Georgia as well. During the early 1830's, several of the Eastern and Central States established surveys to examine their geological structure, arable lands, and mineral resources that existed within their State boundaries. The surveys helped not only in the

[14] Samuel Harries, Daddow, and Benjamin Bannan. *Coal, Iron, and Oil*. Philadelphia: J. B. Lippincott &. Co. 1866, p. 574

[15] It is worth mentioning that the English manufacturers made great sacrifices in order to control US trade and break down the American manufactures. This is clearly stated in Lord Brougham intervention in Parliament saying that: "...*it was even worthwhile to incur a loss upon the first exportation, in order, by the glut, to stifle in the cradle these rising manufactures in the United States which the war had forced into existence contrary to the natural course of things*." Ibid.

[16] Walcot Gibson. *The Geology of Coal and Coal-Mining*. London: Edward Arnold. 1908, p. 267

discovery of precious minerals, but located sites containing coal, which attracted prospectors, operators, companies, and coal miners who established whole towns near the pits.

The need for extending the railroads westwards boosted industrial sectors such as transportation, and iron and steel to grow rapidly during the second half of the 19th century, and coal helped fuel their growth efficiently. The first major boom for coal use started from 1830 when the first commercially practical American-built locomotive known as *Tom Thumb* was manufactured. The *Tom Thumb* burned coal, and in rapid fashion, relatively every American locomotive that burned wood was converted to use coal. [17] It was from this event that The US coal industry began taking shape.

It is worth mentioning that, the westward expansion of railways was the major cause of the shift in energy from wood to coal in the USA. From the 1840's the railways progressed westwards entering the vast plains and leaving behind the forests. The railway companies found coal as the alternative to wood since its deposits were often found near the new railroad, and because of its higher energy content, which increased the range and load of steam trains.[18] The States that

[17] Hamilton Ellis. *The Pictorial Encyclopedia of Railways*. New York: The Hamlyn Publishing Group. 1968, p. 24

[18] Ibid., p.29

the railroads crossed were rich of coal deposits namely West-Virginia, Ohio, Indiana, Illinois, and Iowa.

The growing demand on coal created competition between the existing mining firms. The latter increased their production, which kept coal price and profit margins relatively low, and many colliers slipped in and out of bankruptcy. According to the United States census in 1850, the production of coal amounted to 6,445,681 tons.[19] For example, Ohio's bituminous fields employed 7,000 men and raised about 320,000 tons of coal, and only three years later, the state's miners increased production to over 1,300,000 tons.[20] In Maryland, the George's Creek bituminous region began to ship coal to urban markets by the Baltimore and Ohio Railroad (1842) and the Chesapeake and Ohio Canal (1850). The growth of St. Louis provided a major boost to the coal industries of Illinois and Missouri, and by 1850, colliers in the two states raised about 350,000 tons of coal annually.[21]

Coal became so important and indispensable mainly for the iron and transportation industries[22] that scientists conducted researches to

[19] Frederick E. Saward, op. cit., p. 88

[20] Alfred Chandler, "Anthracite Coal and the Beginnings of the 'Industrial Revolution' in the United States." In: *Business History Review*, N° 46, 1972, p.143

[21] Ibid., p.144

[22] Rapid industrialization of the economy, urbanization, and the growth of railroads led to increased use of coal, and by 1885, it had eclipsed wood as the nation's primary energy source. Coal remained dominant until 1950, when it was surpassed in turn by both petroleum and natural gas.

reveal its nature, properties and possible further uses other than supplying heat for the furnaces and the locomotives. Coal was distilled to obtain coal-gas that proved to be a very good illuminant, which paved the way for the use of natural gas to generate light and the emergence of the US gas industry.

B. The Use of Coal-Gas, Natural Gas, and Electricity for Illumination in the USA (1816-1859)

The devices and means of lighting indoors and outdoors at night varied and developed in accordance with the progress in making better but above all cheaper illumination. During the colonial period, illumination was restricted to domestic use because of its expense. The colonists relied almost entirely on the light of the fireside or candles to light their nights. Others lit their homes using tallow candles, floating tapers that burned assorted greases and lamps that burned oils such as lard and turpentine.[23] Those who could afford candles used them parsimoniously. In the poorest houses, rush-lights and tallow (hard animal fat) were used. Simple oil lamps, consisting of a wick partly immersed in oil, were used in some houses but they smoked badly and smelt even worse than the cheap tallow candles commonly used.[24] The growth of the whaling industry in the late 18th

[23] Charles Whiteshot. *The Oil Well Driller*. Mannington, West Virginia: The Acme Publishing Company. 1905, p. 27
[24] Ibid., p.28

century brought the first major change in illumination when spermaceti, a wax obtained by crystallizing sperm whale oil, became available in quantity. Like beeswax, the spermaceti wax did not elicit a repugnant odour when burned.

Major improvements were made in the late 18th century when the 'Argand' or 'colza' lamp was introduced. Designed by Aimé Argand in Switzerland in 1784 and patented by Matthew Boulton the Birmingham silversmith, the Argand oil lamp[25] was the first in a series of developments that revolutionised lighting. These early lamps burnt colza oil, thick and heavy oil made from rape-seed, which was stored in a separate vessel to one side, above the level of the wick to enable regular oil flow.[26] All the means of illumination introduced showed in practice certain inconveniences and limited supply of light, which incited inventors and investors to search for better source of light.

The revolution in illumination started when coal-gas[27] and natural gas were introduced from 1816 as cheaper and more efficient means

[25] The Argand oil lamp was the lamp of choice until about 1850 when kerosene lamps, which used a flat wick in a cup with a bellied chimney, were introduced. Kerosene was considerably cheaper than whale oil, and many Argand lamps were refitted to burn kerosene. *Encyclopaedia Britannica*, op. cit., Vol. 1, p. 540.

[26] In France, the Argand oil lamp was known as "Quinquets" after Antoine-Arnoult Quinquet, a pharmacist in Paris, who apparently stole the idea from Argand and popularized it in France.

[27] Traditionally, **coal-gas** was made by destructively distilling coal, and as a by-product in the preparation of coke. Its composition varies, but in general it is made up largely of hydrogen and methane with small amounts of other hydrocarbons,

to provide light. Coal-gas and natural gas changed the way people illuminated their nights. It became possible for them to spend more of their nights doing their works at home or in their workshops. The emerging industries also benefited from these new means of illumination to prolong their working hours after sun set.

1. Coal-Gas Use for Illumination in the USA from 1816 to 1859

Coal-gas was obtained from carbonized coal. It was known also as town gas, producer gas, manufactured gas. It became the primary fuel for illuminating the streets and houses in Europe from the 1790s onwards. When first introduced towards the end of the 18th Century, gas lighting was viewed with great suspicion. William Murdoch (sometimes spelled Murdock) was the first to utilize the flammability of gas for the practical application of lighting.[28] He worked for Matthew Boulton and James Watt at their Soho Foundry steam engine works in Birmingham, England. He demonstrated the value of coal-gas by illuminating the Foundry in 1802. In the same year, he lit the outside of a public building in display of gas lighting, which astonished the local population.

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carbon monoxide (a poisonous gas), carbon dioxide, and nitrogen. It is used as a fuel and illuminant. Town gas is a more general term referring to manufactured gaseous fuels produced for sale to consumers and municipalities for indoor and outdoor lighting, cooking, and heating. *Encyclopaedia Britannica*. op. cit., Vol. 3, p. 408

[28] Miall Green, Thorpe, Bucker, and Marshall, *Coal Its History and Uses*, London: Macmillan & Co, 1878, p. 202

Murdoch noticed the existence of coal-gas back in the early 1790s, while he was working on the steam engines introduced in coal mining in Cornwall. He noticed the extremely flammable gas in the mines that caused the death of many miners. He began experimenting with various types of gas, finally settling on coal-gas as potentially effective source of light. In 1806, he presented to the Royal Society a paper entitled "*Account of the Application of Gas from Coal to Economical Purposes,*"[29] wherein he described his successful application of coal-gas to lighting.

Murdoch's statements threw great light on the comparative advantage of gas over candles and contained much useful information on the expenses of production and management of coal-gas. He introduced the first public street lighting in Pall Mall, London, on January 28, 1807. Parliament granted in 1812 a charter to the London and Westminster Gas Light and Coke Company, and the first gas company in the world came into being to introduce gas light in public buildings and in streets.[30] Less than two years later, on December 31, 1813, the Westminster Bridge was lit by gas. By 1816, 26 miles of gas mains[31] had been laid in London for factory and street lighting.

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[29] William Murdoch. "Account of the Application of Gas from Coal to Economical Purposes." In: *Philosophical Magazine Series 1*, Volume 32, Issue 126, November 1808, p. 113

[30] Green, Miall, et. al., op. cit.

[31] Ibid

In the USA, coal-gas was seen as a novelty and a curiosity used by some eccentrics in the illumination of their houses. Among the pioneers of coal-gas industry there were mere individuals namely Benjamin Henfrey and David Melville that tried individually to produce coal-gas on their own expenses and with personally conceived means. Benjamin Henfrey of Northumberland, Pennsylvania, was the first known manufacturer of coal-gas in the United States in 1802. He used a "thermo-lamp,"[32] reportedly based on European design,[33] with which he produced a brilliant light. Despite Henfrey's successful demonstration, he was unable to attract financial support to develop his gas light endeavours because it was still considered as an eccentricity that meant a lot of risk for any financial investment. David Melville also produced coal-gas from a small backyard plant, to light his own home in Newport Rhode Island.

Some early experiments with gas were made in Baltimore in 1807, Philadelphia in the same year, and in New York (City Hall Park) in 1812. Further development in the use of coal-gas came with Rembrandt Peale (1778-1860), who was the first to use coal-gas in Baltimore to illuminate an exhibit at his museum and gallery in 1816. The novelty of gaslight was said to have aroused the public's

[32] Charles Hunt. *A History of the Introduction of Gas Lighting*. London: Walter King. 1907, p. 55
[33] Ibid., p.56

admiration far more than the items Peale had exhibited.[34] However, in the long run, coal-gas began to interest the industrial and commercial businesses.

Industrial and commercial use of coal gas started along the shores of Narragansett Bay, when David Melville began introducing coal-gas into the homes and factories of the Northeast. By 1813, he obtained a patent for his method of manufacturing coal-gas [35] and convinced the owners of small textile mills in Watertown, Massachusetts, and Pawtucket, Rohde Island, to install gaslights in their factories. Among the early companies that commercialised coal-gas there was M. Ambroise & Company of Philadelphia, Pennsylvania. In 1796, the company, which was specialized in the manufacture of fireworks, used coal-gas to illuminate chandeliers at a public gathering in a local amphitheatre.

Peal's demonstration in his exhibition in 1816 aroused attention of the authorities of the City of Baltimore, which passed in July of the same year an ordinance permitting him and his associates to manufacture gas, to lay distribution pipes, and to supply the city with coal-gas for street lights. In February 1817, Peale and his associates chartered the Gas Light Company of Baltimore, the first coal gas

[34] Hunter, Wilbur H. Jr. "Peale's Baltimore Museum." In: *College Art Journal*, Vol. 12, No. 1. (Autumn, 1952). P. 31. *(pp. 31-36).*
[35] Ibid., p.32

company in the USA.[36] Based upon the success of this operation and consumer demand for gas lighting, commercial plants soon sprang up across the nation. Most of these early manufactured gas plants were owned and operated by private-sector entrepreneurs. Statistics compiled by the *American Gas Light Journal* in 1859 showed that there existed 297 gas companies in the United States capitalized at $42,861,174, supplying a population of 4,857,000 through 227,605 private meters.[37]

During the first quarter of the 19th century, the use of coal-gas in illumination was the main cause for the abandoning of whale spermaceti oil,[38] which was beneficial for the mammal since its hunting nearly stopped. Although coal-gas proved to be a successful and efficient illuminant, its cost of production cut down the profits. This led to the use of natural gas, which saved all the costly process of distillation of coal, rendering it financially profitable and easier to use and more abundant.

[36] Ibid., p. 35

[37] Oscar E. Norman. *The Romance of the Gas Industry*. Chicago: A.C. McClurg& Company, 1922, p. 85

[38] James S. Robbins. *How Capitalism Saved the Whales, a Reminder that Technological Progress Can Benefit the Environment*. New York: The Freeman, 1992, p. 312

2. The Use of Natural Gas for Illumination in the USA to 1859

Although natural gas was known in the antiquity, its commercial use is recent. The discovery of natural gas dates from ancient times in the Middle East where its seeps were noticed whenever ignited by lightning or fire.[39] Natural gas was discovered and identified in America as early as 1626, when French explorers discovered native Indians igniting gases that were seeping around Lake Erie. Natural gas was noticed in places accompanying chiefly oil seeps, in coal mines or when it gushed out from the earth. Natural gas was unknown in Europe until its discovery in England in 1659,[40] and even then, it did not come into wide use.

The natural Gas industry started when an American gunsmith named William Aaron Hart, considered as America's 'father of natural gas industry,' drilled in 1821 the first natural gas well in the

[39]The first discoveries of natural gas seeps were made in Persia between 6000 and 2000 BC, where gas seeps provided the fuel for the "eternal fires" of the fire-worshiping religion of the ancient Persians. However, the energy value of natural gas was not recognized. The first to recognise the value of natural gas were the Chinese around 500 B.C. They drilled wells with bamboo poles and primitive percussion bits to search for gas. They used crude bamboo 'pipelines' to transport gas that seeped to the surface, which was ignited to boil the sea water to desalinate it, and to dry the rock salt. Podobnik, Bruce. *Global Energy Shifts: Fostering Sustainability in a Turbulent Age*. Philadelphia: Temple University Press. 2005, p. 100

[40] Paul Gerhard, W.M. *The American Practice of Gas Piping and Gas Lighting in Buildings*. New York: McGraw Publishing Company. 1908, p.78

USA in Fredonia, New York.[41] This led to the creation of the Fredonia Gas Light Company, which was the first gas company in the USA to distribute natural gas.[42] Pennsylvania followed in 1836 by creating the first municipally owned company known as the Philadelphia Gas Works.

During the first half of the 19th century, natural gas was used almost exclusively for illumination. Its use remained local because of the lack of adequate means like pipelines to transport large quantities of it over long distances. At the beginning, rudimentary tools were used for its extraction. Once natural gas was reached, a large barrel was put to cover the well, and gas was directed through wooden pipes. Later, sophisticated equipment in drilling, transporting, and processing was introduced for higher productivity and safer working conditions. For example, the wooden pipes were replaced by lead pipes and then steel pipes, which made it possible the transportation of natural gas under high pressure to processing plants.[43] Throughout the 19th century, natural gas was used almost exclusively as a source of light and its use remained local because of lack of transport structures, making difficult to transport large quantities of natural gas through long distances. The industrial character of the new gas industry incited the authorities to pass laws to regulate it.

[41] Paul Gerhard, W.M, op., cit, p. 80
[42] Ibid., p. 81
[43] Ibid

The regulation of natural gas dates back to the very beginnings of the industry. Economic theory dictates that a company in a monopoly position, with total control over its market and the absence of any competition will typically take advantage of its position, and has incentives to charge overly-high prices. Therefore, local governments recognised that natural gas distribution was a business that affected the public interest to a sufficient extent to merit regulation.[44] They feared the growing monopoly that characterised gas market at the time. The solution, from the point of view of the local governments, was to regulate the rates these natural gas monopolies charged, and set down regulations that prevented them from abusing their market power.[45]

Among the economic impacts of gas, lighting was much longer work hours in factories. This was particularly important during the winter months when nights were significantly longer. Factories could even work continuously over 24 hours, resulting in increased production. However, since some of the chemical properties of gas were unknown, great doubt existed as to its safety, and fears as to its salubrity.[46] The danger of explosion was magnified to the extent that it was asserted and believed, that a town could be destroyed by the

[44]Paul Gerhard, W.M, op., p. 80
[45] Samuel Hughes. *Gas Works*. London: Crosby Lockwood and Co. 7th Edition. 1885, p. 14
[46] Ibid., p.19

explosion of the main pipes in the streets.[47] The search for safer means of illumination might have led to conduct experiments on electricity to provide light.

3. Early Attempts to Use Electricity for Illumination in the USA

Although electricity was at its early stages of experimentation during the first half of the 19th century, it is worth studying it at least to show the early experiments that paved the way for Thomas Edison to invent the light bulb in 1879 and commercialised it in 1882. In fact, there were scientists before him who had conducted experiments on electricity to generate light. Unfortunately, for them, their experiments like those on the arc-lamp were not economically fructuous.

The word electricity comes from "elektron" the Greek word for amber. Thales of Miletus (640-546 BC) is credited with the discovery of electricity when he noticed that amber acquired the property of attracting small objects when rubbed.[48] The early attempts to unveil the mystery of electricity through scientific experiments started with the invention of the static electric generator, which was created by the

[47] Samuel Hughes, op., cit, p.20
[48] Martin Commerford and Stephen Leidy Coles, *The Story of Electricity*, Cornell University Library. New York. 1891, p.9

German Otto von Guericke in 1675. [49] Later, in 1780, further advances in this field happened with the making of the first current generator by Aloisio Galvani.[50] However, at that time, electricity was still a mere curiosity and had few uses. There was a need to store the generated electricity to be used at will, which Georg Von Kleist provided between 1745 and 1746, when he developed the first electric capacitor or the *Leyden Jar* [51] that stored electricity. The first effective storage of electricity was invented by Alessandro Volta in 1800 when he developed the first electric battery. His name was used in creation of the notion of voltage (volt).

When the first large batteries were built in the early 1800s to store electricity, researchers like the English chemist Sir Humphrey Davy (1778-1829) were able to conduct experiments that resulted in the creation of the arc lamp, which gave birth to the science of electric lighting.[52] He noticed that the electric current gave a brilliant light when it leaped across a gap in a circuit from one electrode to the other. However, the arc lamp required expensive batteries or generators to operate, and was difficult to control because the light

[49] Benjamin Park. *The Intellectual Rise in Electricity, a History*. New York: D. Appleton And Company. 1895, p.30

[50] Aloisio Galvani was professor of anatomy in the University of Bologna. He is accredited with the discovery of the convulsion of dismembered frog legs when an electric current is applied to pass through. William A. Durgin. *Electricity, Its History and Development*. Chicago: A. C. Mcclurg & Co. 1912, p. 36

[51] Ibid., p. 24

[52] Ibid., p. 109

fluctuated too much. Although improvements were made to the arc lamp, it was made obsolete during the second half of the 19th century because of better and efficient inventions including the incandescent light bulb, and the discharge lights such as mercury vapour light and fluorescent light, [53] which unlike the arc lamps, were able to provide consistent light without heat excess.

The advances in the study of electricity paved the way for its use to invent of promising means of illumination and to be used in the development of the means of communication when Samuel Morse invented the telegraph in 1840. Among the scientific advances realised by the use of electricity there was the discovery of the principle of electro-magnetic rotation by 1821, which made it possible the development of the electric motor. In addition, the establishment of electricity laws by Georg Ohm in 1826, known as Ohm's Law defined the relationship between powers, voltage, current, and resistance.[54] Ohm's Law helped greatly the understanding of electricity, and the discovery of its potential uses.

The search for a cheap and abundant source of light started successively by using vegetal and animal oil, the distillation of coal to produce coal-gas, natural gas, and electricity. Such innovations and quest for cheap and efficient source of light led directly or indirectly

[53] W. F. Badgley. *Electricity and Its Source*. Guildford: Billing & Sons, Ltd., London Printing Works. 1916, p.136

[54] William A. Durgin, op. cit., p. 71

to the distillation of crude oil, which provided a better and economically profitable source of light.

II. Early Use of Petroleum in the USA from the Colonial Period to 1859 and the Discovery of Its Illuminating Potentials

Although the petroleum industry emerged in the USA from 1859, petroleum had been known and used by people in many regions in the world. In ancient times, people recognized the existence of petroleum on the surface of rivers and lakes, or seeping off in the form of springs or in pits. Among the first people that put petroleum in use were the ancient civilizations of the Middle East. Ruins of Assyria and remaining excavated constructions and walls revealed the existence of bricks cemented with asphalt substance obtained from local pits and seepages.[55]

In Greek literature, Herodotus wrote that bitumen was used as mortar in building the walls of Babylon. The Babylonians brought it from the River Is, a tributary of the Euphrates.[56] Herodotus writings describe oil pits near ancient Babylon and pitch springs near Zante,

[55] Horace Greeley, Leon Case, Edward Rowland, et. al. *The Great Industries of the United States*. Hartford: J. B. Burr, Hyde &, CO. 1872, p.57

[56] Henry J. T. *The Early and Later History of Petroleum with Authentic Facts in Regard to Its Development in Western Pennsylvania*. Philadelphia: Jas. B. Rodgers Co. Printers. 1873, p. 9

which is an island in Greece.[57] Diodorus stated that the inhabitants of the Dead Sea region collected the asphalt cast up on the shores of the sea, and sold it in Egypt for embalming purposes.[58] Early historians mentioned the existence of oil in Sicily, and Baku's oil springs in Azerbaijan were mentioned in Marco Polo's writings.[59] The most interesting description of all is the account of Herodotus, written about 450 B.C, in which he apparently speaks about a regular industry in collecting petroleum from the pits of Susiana, a southern province of ancient Persia.

A. The American Indians and the Use of Petroleum Oil Seeps

Petroleum was known and used by the North American Indians before the discovery of the New World.[60] Probably, such mysterious substance was adopted for mystic purposes or as a medicine.[61] The autochthons employed the ditching method where cloth, blankets, or

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[57] Henry J. T. op, cit., p. 10

[58] Sheldon Walter Tower. *The Story of Oil*. New York: D. Appleton & Company. 1920, p.22

[59] In this account, he says: *"...at Ardericca is a well that produces three different substances, for asphalt, salt, and oil are drawn up from it in the following manner. It is pumped up by means of a swipe (sweep) and, instead of a bucket, half a wine skin is attached to it. Having dipped down with the swipe, a man draws it up, and pours the contents into a reservoir, and being poured from this into another, it assumes these different forms: the asphalt and the salt immediately become solid, but the oil they collect; it is black, and emits a strong odou*r." Ibid., p. 24

[60] Ida Tarbell. *The History of the Standard Oil Company* . New York: McClure, Phillips & Co. Volume One. 1904, Volume 1. P.4

[61] Sheldon Walter Tower, op. cit., p. 31

other woollen garments were used to gather the oil on the surface of water and then collected it in recipients.[62] After that, the oil was separated from the accompanying water by boiling it. One of the first Europeans to mention the existence of petroleum in America was Walter Raleigh when he referred to the pitch lakes of Trinidad.[63] Later in 1627, the Franciscan Missionary Joseph De La Roche D' Allion described the oil springs of New York in his *L'Histoire du Canada* published in Sagard's. In 1748, Peter Slam, a Russian traveller, published a book on America where he showed a map of the oil springs of Pennsylvania. The English colonists became acquainted with this substance through the Seneca Indians, who gathered small quantities of petroleum found in the springs, known as the Seneca Oil Springs.[64] Attempts were made to introduce petroleum among the colonists as a medicine, but its bad odour and taste made against its popularity. It was used as a cure for rheumatism, burns, coughs, sprains, etc.,[65] under the name of "Seneca oil," found near Lake Seneca, Allegheny County, New York. Pr. Benjamin Silliman Jr.[66]

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[62] Ibid.

[63] Victor Ross. *The Evolution of the Petroleum Industry*. New York: Doubleday; Page & Company, 1920, p. 46

[64] J. H. Thomson and Boverton Redwood. *Handbook on Petroleum*. London: Charles Griffin & Co. Limited. Second Edition Revised. 1906, p.5

[65] Victor Ross. op. cit., p.47

[66] Silliman Benjamin Jr. (1816–85) was an American chemist and geologist. He succeeded his father as professor of chemistry at Yale (1853–70), he was an editor of the *American Journal of Science* and the author of several textbooks. He is best known for his chemical analysis of petroleum from central Pennsylvania in 1855 launching the modern petroleum industry. *Encyclopaedia Britannica*, op. cit., Vol. 10, p. 812.

described the Seneca Oil Springs in 1833 in the *American Journal of Science*. In this description Pr. Silliman says:

> ...The oil spring, or fountain, rises in the midst of a marshy ground; it is a muddy and dirty pool of about 18 ft (5.48 m) in diameter. The water is covered with a thin layer of petroleum, giving it a foul appearance as if coated with dirty molasses, having a yellowish-brown colour. They collect the petroleum by skimming it like cream from a milk-pan. For this purpose they use a broad Hat board, made thin at one edge like a knife. It is moved flat upon and just under the surface of the water, and is soon covered by a thin coating of the petroleum, which is so thick and adhesive that it does not tall off, but is removed by scraping the instrument on the lip of a cup... Gas is constantly escaping through the water, and appears in bubbles upon its surface."[67]

People recognised the existence of petroleum though certain geological surface indications that revealed its existence in certain regions. However, in other regions petroleum remained at a great deep distance from the surface, and drilling was the only way to reveal it. The surface indications of the existence of oil have been classified by geologists as oil seepages or springs, natural gas springs, and outcrops of sands impregnated with petroleum or bitumen in the form of bituminous dikes, or bituminous lakes.

[67] Boverton Redwood. *Petroleum: Its Production and Use*. London: Charles Griffin & Company, Ltd. 1922. p. 86

Salt-water drillers were the first to reach underground petroleum inadvertently. They noticed in some wells that oil made its appearance when salt-water ceased running to the surface after some time. Petroleum was regarded as a nuisance since the works were closed or abandoned after months of hard work in drilling.[68] One of the first drillers that were interested in petroleum there were Samuel Kier and his neighbour M. Peterson. Instead of abandoning the well, Kier bottled petroleum and introduced it as a medicine as did the Seneca Indians. In 1842, he submitted samples of petroleum to Professor J. C. Booth in Philadelphia, who after reflection suggested that the distillation of the crude oil could provide excellent burning oil. Failing to find salt water, the idea came to Lewis Peterson that the oil might be used to oil machinery. In 1845, he presented a bottle of oil from his well at Tarentum to Morrison Foster, of the Hope Cotton Factory, located at Pittsburgh, who experimented the oil in the spinning machines.[69] Morrison soon found that through a certain process oil could be combined with spermaceti oil in such a way as to form a better and cheaper lubricator for the finest cotton spindles than the best spermaceti oil. Peterson supplied two barrels of oil each week

[68] Roswell H. Johnson and L. G. Huntley. *Principles of Oil and Gas Production*. New York: John Wiley & Sons, Inc. First Edition. 1916. P. 287

[69] Charles A. Whiteshot. Op. cit., p. 26

for ten years before it was made known.[70] This was the first practical use of petroleum in America.

B. Chemistry and the Discovery of the Illuminating Quality of Petroleum in the USA up to the 1850s

The word Petroleum is derived from the Latin word '*Petra*' meaning Rock, and '*Oleum*' meaning Oil.[71] The word 'oil' is usually used as a colloquial synonym of petroleum. While the word 'gasoline' or shortly 'gas' is used in the USA to designate the derived product from petroleum for car engines. Petroleum is a natural liquid with a complex mixture that designates 'crude petroleum,' or as it is most of the time referred to as 'crude oil'. While the word 'oil' is widely used by geologists in reference to 'petroleum,' in its commercial sense the word petroleum is a generic term covering the whole group of hydrocarbons, i.e. the refined or manufactured products as well as crude oil.

Scientists are divided in opinion as to organic or inorganic origin of petroleum. Some scientists, mainly geologists, believe in its organic origin, which is the most widely accepted view. For them, petroleum resulted from the natural process of decay or transformation of both animal and vegetal matter that accumulated in the form of deposits brought down by the course of water. Throughout the geological ages

[70] Charles A. Whiteshot. op. cit., p. 26
[71] J. H. Thomson and Boverton Redwood. op. cit., p.3

that earth went through, different parts of land were alternatively raised and then submerged because of the tectonic movements and Earth's surface changes caused by volcanic eruptions and earthquakes, which resulted in the burial of these accumulations under sedimentary strata.[72] Those scientists who believe in the inorganic origin of petroleum are mostly chemists that base their theory on chemical reactions in the formation of petroleum. The inorganic theory postulates that the deposits of oil and gas were formed by the interaction of various inorganic or mineral substances.[73]

It should be noted that the chemical properties of petroleum as are known today were not yet discovered during the early years of the 19th century. What was known came from direct observation of the crude and its distillation. It was noticed that there were light and heavy crudes[74] of petroleum. The light crude was discovered first in the USA in Pennsylvania. The latter was discovered in other regions where oil shale existed in the mid-continent oil fields and those shared with Canada.

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[72]Boverton Redwood. *Petroleum.* op., cit., p. 347

[73] Ibid., p. 348

[74] Heavy crude oil is thicker and generally of lower quality. From its name, heavy crude oil is any type of crude oil that does not flow easily. Production, transportation, and refining of heavy crude oil present special challenges compared to light crude oil. Heavy crude oil is closely related to oil sands, the main difference being that oil sands generally do not flow at all. Physical properties that distinguish heavy crudes from lighter ones include higher viscosity and specific gravity, as well as heavier molecular composition. Generally diluents are added at regular distances in pipelines carrying heavy crude to facilitate its flow**. www.britannica.com/science/crude-oil.**

Early attempts to use petroleum were based on assumptions of men that ignored its nature and properties. It was only when chemistry revealed its chemical properties and constituents that it was used industrially to produce kerosene for illumination and other by-products. The petroleum industry owes much to chemistry to become so indispensable and determinant in the development of modern civilisation. The 19th century witnessed intense and elaborate experimental researches that helped in the recognition of the potentialities of petroleum. In 1830, a German chemist named Baron Karl von Reichenbach discovered a white, tasteless, inodorous, and waxy substance while experimenting with the bitumen found in wood. He called this substance 'Paraffin' because of its antipathy to unite with other substances (*parumaffinis* meaning "lacking affinity",[75] or "lacking reactivity"). However, Reichenbach did not develop his researches on paraffin which remained a laboratory curiosity.[76] Another chemist but in France named Selligne experimented the possibility to procure illumination oils from coal and bituminous shale without any significant results. Although Reichenbach and Selligne worked separately, their researches led to the discovery of Kerosene, also known as coal oil.

The merit of the discovery of what was known later as 'kerosene' from coal goes to a Scottish named James Young who completed the

[75] Charles A. Whiteshot. op. cit., p. 115
[76]Miall Green, Thorpe, Bucker, and Marshall, op. cit., p. 219

research of Reichenbach and Selligne and discovered the value of paraffin by showing how to produce it at will and with great quantities. In 1830, he produced a patent in England for the manufacture of "*Oil Containing Paraffin, and Paraffin from Bituminous Coals*."[77] He first built a refinery for the treatment of petroleum found in a coalmine in Alfreton, in Derbyshire, and made lamp oils, lubricants, and a little paraffin wax.[78] However, the oil was procured with difficulty and in small amounts, which forced Young to look elsewhere for other sources of supply. After examining many samples, he procured coal from Torbanehill, and at once set up a retorting and distilling plant, thus laying the foundation of the Scottish shale-oil industry. This industry enjoyed years of prosperity before it declined because of the keen competition of the more cheaply manufactured petroleum products imported from America as illuminants.

Abraham Gesner invented in 1846 a new method to procure illuminating oil from coal, which he called 'Kerosene' from the production of paraffin patented in the USA as the "*Kerosene Patent*." [79] In 1854, the North American Kerosene Gas Light Company of New York bought the patent of Gesner and began the manufacture of kerosene oil at New Town Creek on Long Island.

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[77] Miall Green, Thorpe, Bucker, and Marshall, op. cit., p. 220
[78] Ibid
[79] James Kewley. *Petroleum and Allied Industries*. New York: D. Van Nostrand. 1922, p, 8

As mentioned earlier, chemistry helped in the discovery of the potential use of distilled petroleum in providing better illumination. Historically, Benjamin Silliman Jr. (1779-1864) analysed petroleum chemically and fractionated it by distillation in 1854. He analysed oil samples from Titusville oil seeps, Pennsylvania, by separating the crude oil into its component parts, or its fractions, and observed the characteristics of each fraction. Using a photometer, he discovered that distilled petroleum burned much brighter than the most expensive and least efficient fuel.[80] He also noted the potential use of distilled petroleum as a lubricant, found it capable of withstanding extremely high and low temperatures, and of keeping its form after use. Pr. Silliman concluded that petroleum was "*a raw material from which...they may manufacture a very valuable product.*"[81] His report is widely viewed as the original impetus for the advancement of the petroleum refining industry and the expansion of oil as an illuminating fuel.

Form these early experiments, it was noticed that the chemical constitution of crude oil varied from one region to another and from one well to another in the same region. The extracted crude oils did not only vary in their composition and property but in the properties of the manufactured products. For example, special lubricating oil could be made with one crude oil but not from others, and that lamp

[80] James Kewley, op, cit., p. 11

[81] Samuel John Mills Eaton, *Petroleum, A History of the Oil Region of Venango County, Pennsylvania*. Philadelphia: J.P. Skelly & Co. 1866, p. 73

oil derived from given crudes gave more illuminating power than lamp oil produced from other crudes.[82] The character of the products derived from petroleum refining and manufacturing processes were of a great variety and this had nothing to do with the manufacturing methods adopted in the refining of crude oil, but depending on the special qualities of the crude.

Light crude oil was used to produce kerosene for lighting, and later to produce gasoline and high-quality diesel. Pr. Silliman Benjamin Jr. was the first to notice the existence light and heavy crude oil and wrote about it in his reports.[83] While the first specimen submitted to him was thick and heavy ditched crude, the later specimen of the extracted from the drake well was of light crude that he favoured for the procurement of kerosene through distillation. Therefore, it was possible to classify the crude oil according to the impurities and consistency. The light crude was demanded because of its sulphur content below 5% and its small amount of impurities, which made it easier to process.[84] It was also noticed that the light crude oil had a low percentage of wax i.e. lower viscosity that made it easier to pump, to transport, and to handle. From the beginning of the petroleum industry, the Pennsylvania light crude oil was preferred by

[82] Boverton Redwood. op cit., p. 63
[83] Samuel John Mills Eaton. op. cit., p. 78
[84] Charles A. Whiteshot. op. cit. p. 85

the refiners making demand on it high, which was profitable for the landowners and the oil operators.

In short, the discovery of different sources of illumination paved the way for the distillation of petroleum to procure kerosene as cheap and efficient illuminant, which led to the emergence of the petroleum industry in the USA in 1859. Although petroleum was known to the people who lived in the nearby of the oil seeps, its use was limited until the 1850s where chemistry revealed its illuminating property and its by-products. The emergence of the petroleum industry started with individuals and newly formed small companies to constitute the basis on which the new industry was launched.

III. Early Attempts to Launch the Petroleum Industry in the USA during the 1850s

The petroleum industry in the USA emerged in the mid-19th century when certain factors were gathered. It needed substantial financial means that a company could supply and required certain level of technology in well drilling. Such technology would not be attained without advances in the iron and steel industries that supplied the tools and instruments necessary to drill deep wells. Finally, it needed men that could take risks and drill oil wells in the wilderness.

A. Early Oil Companies and Their Attempt to Exploit Petroleum during the 1850s

The first company to venture in the exploitation of petroleum was the Pennsylvania Rock Oil Company (PROC), which relied on ditching petroleum at the surface of the oil seeps. Later, the PROC was replaced by the Seneca Oil Company that initiated the drilling technique for the extraction of petroleum based on the drilling techniques already used by water and salt-water drillers. This section is devoted to the study of these factors that played an important role in the emergence of the petroleum industry in the USA.

Among the first people to be interested in the potential use of the oil seeps in Titusville, Pennsylvania, there was Dr. Francis Brewer, who travelled to the region in 1851 to work with a lumbering firm of which he was part owner. Ebenezer Brewer signed the first oil lease ever for the exploitation of that petroleum with a local resident.[85] Instead of drilling directly for oil, however, Brewer merely dug trenches to convey oil and water to a central basin.

Upon his return to New England, Brewer left a small bottle of crude oil with a doctor named Dixi Crosby, who was then a professor of surgery at Dartmouth College. Apparently, Brewer was interested in using petroleum for medicinal purposes since he presented it to a

[85] Charles A. Whiteshot. op. cit. p. 40

doctor. Since Crosby was not a man of chemistry, he showed the bottle to George Bissell, who was a young businessman and lawyer in New York, for consideration. George Bissell was the first to think of exploiting petroleum industrially.[86] He decided with his business partner, Jonathan G. Eveleth to organize a company, buy the land, develop the spring, and market the collected petroleum if they could find a good supply of it. Thus, on November 30, 1854, Bissell and Eveleth purchased the Hibbard farm from Brewer, Watson and Company of Titusville, for $ $5,000.[87] The principal petroleum springs in north-western Pennsylvania were located there and the following month they organized the Pennsylvania Rock Oil Company of New York.

However, before the operation could begin, Bissell needed to attract financial backing of $250,000,[88] which would not be easy to realise because only quite few people knew the extent of petroleum's usefulness to invest in. In order to attract investments, he needed scientific guaranties of the utility of petroleum. As mentioned earlier, he sent a bottle of crude oil to Benjamin Silliman, Jr. of Yale University, who after distilling the crude provided some scientific backing in a report released in April 1855. Silliman estimated that at least 50% of the crude oil could be distilled into a satisfactory illuminant for use in camphene lamps, and that 90 % of the distilled

[86] Thomson J. H. and Boverton Redwood. Op. cit., p.88
[87] Samuel John Mills Eaton, op. cit., p. 67
[88] Charles Whiteshot. Op. cit., p. 40

products held commercial promise,[89] which encouraged Eveleth and Bissell to found the first petroleum company in the USA in 1855 named the Pennsylvania Rock Oil Company. This company was organised under New York incorporation laws with a capital of $ 500,000 [90] to explore, drill, transport, refine petroleum, and selling its by-products. Soon, they re-organized their company at New Haven under the same name with Pr. Silliman as its president. Apparently, Eveleth and Bissell appointed Pr. Silliman as the president of the company with the intention to attract more investors because they continued to hold the controlling interest. However, on September 18, 1855, Bissell incorporated the P.R.O.C under the laws of Connecticut with a capital of $300 000[91] because the investors were convinced that the company would make more profits if moved from New York to Connecticut.

The PROC started exploiting petroleum on a tract of 105 acres of land in Cherrytree Township, Venango County, Pennsylvania, that Bissell obtained for $5000.[92] The first two years were not successful because of the lack of harmony among the stockholders.[93] Practically, the company did not make the expected profits because the

[89] Charles Whiteshot. Op. cit., p. 44
[90] Ibid., p. 50
[91] Reid Macbeth Sayers. *Oil, the New Monarch of Motion*. New York: Markets Publishing Corp, 1919, p. 56
[92] Ibid
[93] Reid Macbeth Sayers. op, cit

production of petroleum was based on ditching oil at the surface.[94] In 1858, Bissell read one of the circulars written by Keir in which it was stated that he obtained crude oil from a depth of 400 ft. (121.92 meters).[95] This information gave Bissell the idea of drilling a well, later known as Drake Well, to extract oil in considerable quantities. From the beginning, Eveleth agreed on Bissell's idea but they could not finance it. Financing the operation came from a certain Mr Havens of New York, who was a prominent Wall Street real investment broker, under one condition that the two men (Bissell and Eveleth) should obtain a lease[96] to exploit the Hibbard farm for the PROC. However, before they could begin drilling for oil, the Panic of 1857 overwhelmed them and forced them to postpone the operation.

In fact, the lease was made to three people successively. The first lease was given to Havens under the terms of agreement to

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[94] In fact, the Seneca Indians along Oil Creek were the first to gather the oil that floated on the water from the oil springs or seeps with blankets or log coops. The whites noticed such practice and imitated the Senecas not only in the method of gathering oil but in its use as a cure for rheumatism, burns, coughs, sprains, and hair lubricant oil. Ibid., p. 47

[95] Ibid., 62

[96] This is a copy of the first oil lease. Source: Thornton W.W, *The Law Relating to Oil and Gas*. Cincinnati: The W.H. Anderson Co. 1904. p. 28

"*Agreed this fourth day of July, A. D. 1853, with.. D. Angier of Cherrytree Township, in the County of Venango, Pa., that he shall repair up and keep in order the old oil spring on land in said Cherrytree Town-ship, or dig and make new springs, and the expenses to be deducted out of the proceeds of the oil, and the balance, if any, to be equally divided, the one-half to J. D. Angier and the other half to Brewer, Watson & Co., for the full term of five years from this date. If profitable*."

Brewer, Watson & Co." " J. D. Angier."

commence operations within a year, and to pay 12 cents a gallon as royalty on all oil produced for 15 years.[97] When Havens did not comply with the terms of the lease, the new investors who adhered to the PROC made a second lease to E.E Bowditch and E.L. Drake at a royalty of five cents and half (5 ½) a gallon.[98] This lease was soon revoked and Bissell and his associates surrendered their third lease to James M. Townsend, President of the City Savings Bank in New Haven, at a royalty of 12 cents a gallon for a period of 45 years.[99] Townsend became a leader of the oil investors in Connecticut and major stockholder in the Pennsylvania Rock Oil Company of Connecticut. However, the property was leased to the Seneca Oil Company (SOC) founded in 1858 by Bissell and associated after he had abandoned the PROC. The SOC put down the first well by assuming the lease and financed the oil drilling operations.

The global petroleum industry started in the Appalachian Basin in Titusville, north-western Pennsylvania[100] because of the oil seeps that it contained. Although Titusville is in Crawford County, the first oil well was drilled outside of town, less than a mile inside of the Venango County boundary.

[97] Charles Whiteshot. Op. cit., p. 46
[98] Ibid., p. 47
[99] Ibid., p. 50
[100] Victor Ross, op. cit., p.23

B. Edwin Drake and the Drilling of the First Oil Well in 1859

The drilling operations for petroleum extraction were initiated by the Seneca Oil Company, which was formed on March 23, 1858 with a capital of $300,000.[101] In the history of the petroleum industry, the Seneca Oil Company is the first oil company to undertake operations of financing, drilling, and commercialising petroleum. The company appointed Edwin L. Drake as General Agent and sent him to Titusville in the spring of 1858 to drill for oil. There, he hired a salt well driller, William A. Smith, in the summer of 1859 to drill an oil well.

An oil well is a term for any perforation through the Earth's surface designed to find and release both petroleum oil and gas hydrocarbons. The basic principles of oil well drilling engineering go back to the water and salt-water drillings that were applied before 1859. The Drake Well was the first well drilled for the purpose of finding oil for its commercial exploitation. As such, it launched the modern oil industry in 1859.

Before any drilling was undertaken, there was much concern about the site where to drill and the techniques to be used in drilling. Since geological studies concerning the region of Crawford and Venango

[101] Sheldon Walter Tower. Op. cit., p. 44

Counties were not available at that time,[102] the Seneca Oil Company associates relied on the oil seeps as surface indication for underground reservoirs of oil, and chose the Titusville oil seep known as Oil Creek to start the drilling.

William Drake started drilling the well in May 1859. He adopted the cable-tool or percussion method to drill the well based on the drilling techniques and materials used by salt-well drillers. [103] The drilling started with a hole punched into the ground by a heavy cutting tool called a bit that was attached to a cable and pulley system. The cable hanged from the top of a four-legged framework tower called a derrick. With every elevation of the derrick end of the walking-beam, the drill stroked the rock. The heavy links of the "jars", which slid into each other, prevented any jerking strain on the rope.[104] The pounded rock at the bottom of the well was mixed with water that the driller dripped into the hole to form a pasty form. After a while, the drill was hoisted out and a sand-pump was dropped into the hole. The sand-pump system was very simple because it was made up of a copper tube, about 5 feet long (1.524 m), and a little smaller than the drilling bit.[105] It had a valve in its bottom opening upwards and inwards. When the tube of the sand-pump was dropped into the hole, the pasty mass rushed into it through the valve and

[102] John Herbert Aloysius Bone, *Petroleum and Petroleum Wells*, Philadelphia: J.B. Lippincott & Co, 1865, p. 47
[103] Sheldon Walter Tower. Op. cit., p. 45
[104] Ibid., P. 37
[105] Roswell H. Johnson and L. G. Huntley. Op. cit., p. 115

remained there. This operation was repeated many times until the hole was clear. After that, the sand-pump tube was hoisted out and the drill continued.

The drilling was very slow and very difficult for Drake and Billy Smith as the operations advanced. They felt the need for a steam engine that saved the drillers much effort and time. Since steam engines were available, Drake purchased one in Erie, Pennsylvania, for cranking the drill bit up and down, and for lowering other tools into the hole. This method is sometimes still used for drilling shallow wells through hard rock.[106] It took some time for Drake to get through the layers of gravel. At 16 ft. (5 m), the sides of the hole began to collapse.[107] At this point, he devised the idea of lowering down the hole a drive pipe that consisted of 10 ft. long joints (nearly 3.048 m) into the ground to stop the collapse of the sides of the pit. At 32 ft. (10 m), they struck bedrock and the progression of the operation was slow at the rate of just 3 ft. (nearly 1 m) per day.[108]

Initially, the operation, nicknamed "Drake's Folly,"[109] proved to be unproductive because of the difficulty of locating the necessary parts to build the well. Drake was also running out of money because the

[106] Almost all present-day deep wells are bored by rotary drilling equipment, which works like a corkscrew or carpenter's drill. Rotary Drilling made it possible for oil drillers to reach relatively inexhaustible supplies of oil and natural gas at 2500 ft. (762 m) and beyond.
[107] Sheldon Walter Tower. Op. cit., p. 46
[108] Ida Tarbell. Op. cit., vol. 1. p. 10
[109] Ida Tarbell. op. cit., vol. 1. p. 10

Seneca Oil Company had abandoned him financially, and he had to rely on friends to back the enterprise. On August 27, Drake's drill bit reached a total depth of 69.5 ft. (21 m) and hit a crevice.[110] The next morning, Billy Smith was surprised and delighted to see crude oil rising up from the well. Drake was summoned and the oil was brought to the surface with a hand pitcher pump. It took three months to drill the well, and cost $3,000 to make it produce 25 barrels a day on February 1, 1860.[111]

Drake's success had a tremendous impact on the quiet farming region because it created an 'oil rush' towards western Pennsylvania. New companies were created to begin drilling throughout the Venango region and within just 15 months, the narrow valley of Oil Creek, averaging only around 1000 ft. (nearly 330 m) wide, was quickly leased hastily. Between 1859 and 1869, 5,560 wells were drilled of which 4,374 were dry-holes that cost from $3,000 to $8,000[112] according to its location. Towns sprang up out of nowhere, and people came to make their fortunes. However, Oil Creek had lost its quietness to become polluted by the noise of the steam engines and other types of machinery necessary to drill wells that sprang up in the valley.

[110] Ibid., p. 22
[111] Ibid., p.10
[112] Ida Tarbell. op. cit., Vol. 1. P.22

The petroleum industry in the USA emerged from 1859 as an answer to a growing demand for better and cheap source of illumination. The distillation of crude oil to produce kerosene provided an affordable illuminant for all social backgrounds.[113] The growing factories also benefited from this product since they could work at night to boost their production and eventually their profits. The early oil industry was disorganized and only moderately successful because of a constantly fluctuating market caused by the fact that petroleum was unfamiliar substance and much of it on the market was unrefined because there were few and small refineries that could not absorb all the oil produced. These were the main characteristics of the petroleum industry and market during the 1860s.

The growing strategic importance of petroleum for the nation's energy pushed the American Government to take measures and issue laws to regulate the industry and the oil market. The organisation and development of the US petroleum industry owes much to John D. Rockefeller and the formation of the Standard Oil in 1870.

[113] Illuminating oil distilled from the crude petroleum is said to have been used in Prague as early as 1810, this making it the first case on record where a refined oil was used for lighting. Sheldon Walter Tower. Op. cit., p.26

Chapter Two

US Petroleum Industry, from Chaos to Industrial Organisation up to 1872

Technical inventions changed people's lives during the 19th century by the introduction of new ways of doing work in different industries to produce goods and services. These industries worked at a large scale, which made the introduction of machines to replace the traditional means of production a necessity to accelerate the pace of production. What was done in weeks was finished in hours, and trips that took months were made in few days. By the end of the 19th century, human civilisation became characterized by speed, which petroleum fuelled efficiently. Practically, every human activity became dependent on the petroleum industry at varying degrees.

The exploitation of the petroleum in the USA gave birth to complementary sectors that rendered oil not only a very useful article, but also a fortune-maker. The industry included the global processes of production, transportation, refining, and marketing. Therefore, the industrial exploitation of petroleum in the USA depended on human,

financial, and technological prerequisites that were at the basis of its emergence and development. Scientific advances and technological progress in these sectors developed efficient means and techniques to the point that crude oil became indispensable in people's lives and an important component of the US national energy policy.

I. Development of Petroleum Drilling, Extraction, Transportation, and Refining (1860's-1870's)

The discovery of petroleum in Pennsylvania attracted investments, prospectors, and labour force in a region that had been once pure wilderness without any prospect of being developed into a profitable economic centre. However, oil could not be easily found and many people invested their money in vain by drilling dry wells. The nature of the existence of petroleum deep underneath of the surface gave birth to different methods to find it, which ranged from absurd craft to very strange scientific experiments.

The only way to minimise the risk of missing oil was to establish geological surveys that would provide studies of the geology of petroleum and the lands that would contain it. Such surveys started from Pennsylvania and then other States established theirs to know if petroleum existed within their State borders.[114] The geological surveys

[114] The oil producing territory was further extended westwards from Pennsylvania to Ohio, West Virginia, Kentucky, and Indiana. In West Virginia, oil development

were of great help to the oil prospectors since they provided geological studies of the oil counties in Pennsylvania, and supplied oil well records, statistics, and accounts on the methods and techniques utilised in oil drilling and extraction. Therefore, it is necessary to expose the development of the methods of oil exploration and production as well as the transportation means and refining methods employed in the oil producing states and their evolution from 1859 to the 1870s.

A. Development of Oil Drilling and Extraction in Pennsylvania

Once the geological examination was undertaken and the site of drilling chosen with all the papers and contracts legally issued, the oilmen started drilling. The early drillings were hard, painful, and slow; but the development of the tools and techniques made it possible to drill very deep wells. When oil was reached, the wells of low gas pressure had to be pumped from the beginning. The high gas pressure made oil in some wells flow with great quantities called "gushers" that flowed for some time and then suddenly stopped because of the decreasing gas pressure. [115] At this stage, the extraction

followed closely that of Pennsylvania just before the Civil War. The next line to be discovered was The Indiana-Illinois line, and later California and the gulf coast oil territories were discovered. It was the Mid-Continent oil field revealed itself as the greatest producing section of the USA. Texas was reached from the Oklahoma and Kansas field in the Mid-Continent.

[115] Sheldon Walter Tower. Op. cit., p. 52.

of oil started by mounting a pump. The fact that the oil wells were located in private farms, it was necessary to establish agreements between the farm owners on the spacing[116] of neighbouring wells. This section aims at exposing the first operations in the petroleum industry related to the drilling, transporting, and extraction and refining of oil and their development, and the legal issues that accompanied such operations.

1. Development of Drilling Techniques and Tools

As mentioned earlier, the petroleum drilling was undertaken essentially through the percussion techniques, which were already employed by the water well drillers.[117] The oil drillers mostly used the percussion methods, which differed from one oil well to another in the various oil fields. In general, the percussion drilling method consists of the rising and dropping of a heavy steel tool, known as the 'bit' and by means of additional weight from the stem. The size and weight of the tool varied according to the depth of the well. The bit cut through the formations by breaking or piercing the rock. There are

[116] L. S. Panyity. *Prospecting for Oil and Gas*. New York: John Wiley &Sons, Inc. 1920, p. 143

[117] It was not until 1901 that the hydraulic rotary method was invented and replaced the percussion drilling method.

different types of percussion drills[118] including the Standard Rig, Imperial, California, Krupp, and others designed for certain class of hard or soft geological formations.

There were two main methods of drilling utilised during the early years of the petroleum industry: the abrasion or core drill method, and the percussion method.[119] These two methods were used according to the drilling parameters that the drillers encountered such as the depth of the well, the nature of the strata to be penetrated, and the amount of water found.

The core drill method was not frequently used because it was slow and expensive. It was mainly used for prospecting or drilling test holes. This method provides the geologist with valuable geological data on the dip of the strata, and intact fossils. The drillers used a circular shoe or bit attached to the end of a rotated hollow tube. The lower end of the bit was either set with diamonds, or cut into teeth somewhat like a saw known as a calyx, or a plain, which revolved on a number of chilled shot that was placed in the hole.[120] while the diamond drill was first used in 1863, the calyx method was developed in 1873. The chilled shot method was used later. These methods

[118] Isiah Bowman. *Well-Drilling Methods*. United States: Government Printing Office. US Department of the Interior, Geological Survey. 1911, p. 66
[119] Isiah Bowman, op., cit, 79
[120] Isler C. *Well-Boring for Water, Brine, and Oil, a Manual of Current Practice.* New York: Spon & Chamberlain. Third Edition. 1921, p. 192

provided cores up to 15 inches (12.7 c.) diameter that were subject to geological and paleontological studies.[121]

The percussion system needed the establishment of a derrick, which was either made of wood or steel. Wood was used because it was cheap but caused problems of maintenance. In some places wooden derricks could be ruined by climatic conditions or by insects like white ants. Steel derricks were the most used by the drillers because they were lighter and more durable. The derricks were either established as permanent derricks and portable ones. The permanent ones were mounted at the well and used for both drilling and extracting. The portable ones or cable-tool rigs were mounted on wheels and could be moved from one potential oil site to another. The portable rigs could be rotary[122] or percussion, or both at the same time. It is evident that such operations had to be undertaken in conformity with the state laws that regulated well drilling operations.

The derrick, the well casing, and other appliances used in drilling and operating the well, were considered by law as trade fixtures that might be removed by the owner or lessee during the term of the lease. However, they became the property of the landowner if not removed by the lessee during the term of the lease, or at least within a

[121] Isler C. op. cit., p. 197
[122] L. S. Panyity. op. cit., p.154

reasonable time after its expiration, which had to be written beforehand in a clause in the lease.[123]

For practical reasons, it was usual for oilmen to off-set wells,[124] which means that the opposing producers either by mutual agreement or through custom had to stay at equal distances away from each other's property line. In case a well was drilled about 300 feet (91.44 m) from the property line, and it proved to be a good producer, the owner of the adjoining lease will off-set his well, and stay 300 feet from the line, making the entire distance between the two wells 600 ft. (182.8 m). This was the rule that was kept for deep wells. However, in a shallow oil field where the depth of wells did not exceed 500 feet (152.40 m), the rule was that the wells should not be less than 400 feet apart (121. 92 m), i.e. about 150 or 200 feet (45.72 or 60.96 m) from the property lines.[125]

When oil was reached, the oilmen started the extraction operation. Oil extraction depended on the nature of the oil well as regards its flow. The oilmen adapted their methods of extraction according to the wells' flow, which gave birth to different oil pumping techniques.

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[123] James Kewley, op., p.79

[124] This rule was later proved to be false. The new oil fields discovered in Texas and California where wells were drilled close to each other and were still very productive. Since no two territories were alike, the methods of spacing wells became dependent upon three factors: 1. The porosity of the sand, 2. The dip of the formation and the water in the sand, 3. The physical properties of the oil and the pressure of gas. L. S. Panyity. Op. cit., p. 144

[125] Ibid

2. Development of Oil Extraction

After oil had been obtained, the problem of handling the wells had to be taken into consideration. In general, there are natural and mechanical factors in the handling of wells. The natural factors[126] are:

1. Gas pressure.
2. Character of the oil sands.
3. Character of the oil, specific gravity and viscosity.
4. Effect of one well upon another.
5. Water conditions.
6. Number of oil strata.

Flowing wells, known as 'gushers,' depended on the presence of natural gas a natural expulsive force for oil. The loss of natural gas was the loss of good lifting power. Therefore, instead of allowing the gas to escape, the oilmen shut it in, and drilled another well lower on the dip for oil. Therefore, the oilmen needed knowledge of the texture and the specific gravities of the sands that helped in the handling of oil. Free open textured sand allowed oil to flow rapidly into the drill hole, but the life of such wells would be shorter than wells with closer-grained sands.[127] In addition to the texture of the oil sand, the specific gravity of oil determined the method of operating its

[126] Dorsey Hager. *Oil Field Practices.* New York: McGraw-Hill Book Co. Inc. First Edition. 1921, pp. 105-106
[127] Victor Ross. Op. cit., p.22

extraction. While heavy asphaltic oil needs more power and time in its pumping because it flowed less through sands, light oil required less power and was pumped quickly.[128] As specified above, drilling wells close to each other was forbidden by law because they had the effect of drawing production from each other because it was noticed that when the pumping of a well was stopped for maintenance or any other reason, the adjoining wells increased in production.[129] . That is why off-setting wells was respected between oil producers.

Water conditions had an important relation to oil production. The existence of a large amount of water in oil sands reduced the oil production, and increased extraction expenses. It was understood that the problems caused by water could be avoided if careful drilling and casing methods had been followed.[130] Where water was found in the same sand with oil there was the problem of pumping both together, which added in the expenses since water and oil had to be separated. The earth strata determined the cost of production and the method of extracting oil since more powerful pumps had to be used mainly when oil did not flow.[131]

Technically, the mechanical factors concerned the different pumping methods employed when oil was reached. Technological development helped in the amelioration of the pumping methods

[128] Dorsey Hager. Op. cit., p. 111
[129] Ibid., p. 113
[130] Ibid., p. 125
[131] Dorsey Hager. Op. cit., p. 125

utilised because not all oil wells flowed. In all, there were four main oil pumping methods: the mechanical operated pumps, airlift system, baling, and swabbing.[132] In the mechanical operating pumps, there were four main pumping methods: The walking-beam, the pumping-jack, the electric motors, and the vacuum pump. The walking-beam pumping consisted simply of using the engine used for drilling as power for the purpose of pumping oil. At first steam engines were used, but were replaced by gas and then electric engines, which proved to be cheaper. The walking beam engines were used especially for wells over 1500 ft. (457.2 m) in depth.[133] They were kept to pull heavy rods in the maintenance of the wells whenever necessary.

In cases where the well did not yield oil, the vacuum pumping and the shooting methods were used. The vacuum pumps were used in old wells where the gas pressure was nearly exhausted in order to increase temporarily the yield of oil. In some states, vacuum pumps were unlawful because the operators that used them had advantage over those who did not. The 'shooting' method was often employed in order to increase the yield of a well. It was also known as the 'torpedo technique,' [134] which consisted of lowering a charge of many quarts of nitro-glycerine in a canister into the well, and to be exploded

[132] Isiah Bowman. Op. cit., p. 47
[133] Ibid
[134] Raymond Bacon Foss and William Allen Hamor. *The American Petroleum Industry*. New York, McGraw-Hill Company, Inc. First Edition. Vol. I. 1916. pp.332-333

by means of a time fuse. The powerful explosion at the bottom of the well resulted in a series of cracks radiating from the well that enabled the oil to flow more easily. This method often increased considerably the well's oil production, but was very dangerous since the drillers had to handle nitro-glycerine, and in other cases, the charge was so powerful that the barren formation might become shattered to such an extent as to render the wells valueless.

This procedure was patented in 1862 by Colonel E. A. L. Roberts, who believed that the oil was contained in crevices in the rock, which might not have been tapped by the borehole. Therefore, he suggested the use of nitro-glycerine, gunpowder, or other explosives, to break up the rock at the bottom of the well, so that these rich crevices or 'pockets' might be brought into communication with the well.[135]

In wells under 1500 ft., the jack system was generally used. In this system, power was generated from a central station fuelled by steam, gas, or electricity[136] that drove a belt, which in turn drove a shaft that was connected with shackle rods. The latter were connected to the pumping rods by a pumping device shaped as a jack. The jack works a simple lever.

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[135] Isiah Bowman. Op. cit., p. 51

[136] As indicated from its name, the electric pump method was the most used method in the 1890s because it provided many advantages. The electric drive eliminated most of the troubles generated by the other systems such as rod breakages, clogged steam lines, or troubles with the engines themselves. Electric engines were used not only to save money, but also to save labour since one pumper could look after a great number of wells in one day. Charles A. Whiteshot. Op. cit., p. 871

On the other hand, in some fields the airlift system was used in the extraction of oil. The operation of this system depended on the aeration of the column of oil in the well by means of a jet of compressed air emitted from the bottom of a central tube lowered to the bottom of the well. The pressure caused by the aerated column of liquid had to be less than the pressure due to the existing column of liquid, which engendered a flow of oil.[137] The introduction of these oil extraction systems were not safe for the workers. In the early years of the petroleum industry, the main concern was the profitability of the oil operations, and the safety of the workers was not given priority.

Oil extraction operations were very dangerous and caused serious injuries and even the death of the operators because of the flammability of oil and gas. The first oil well explosion happened on April 17, 1861 at Little &Merrik well on Buchannan Farm. The well was flowing about 3000 barrels a day. An explosion occurred and the flames burned 19 persons to death, and 11 others were seriously injured.[138] The high risks and dangers that the drilling and extraction of oil engendered pushed the legislature to pass laws to guarantee the safety of the oil operators.

Oil extraction was regulated by laws to preserve the environment from flowing oil that in different counties destroyed the nature mainly the streams and rivers that both the flora and fauna and

[137]Kewley. op., cit, p. 81
[138] Reid McBeth Sayers. op. cit., p. 61

people depended on for their living. When wells ceased to yield oil in remunerative quantity, the usual practice was to draw out the iron casing for use in other wells. However, this operation, known as "flooding,"[139] allowed surface water to gain access to the oil-sand, which reduced considerably the yield of adjacent wells. The Pennsylvania legislature enacted that abandoned wells should be "plugged"[140] by filling them with sand. In the end, the oilmen had to transport their extracted oil to the refining centres to drive profits from such operations.

B. Development of Petroleum Transportation in Pennsylvania

Oil drillers were aware of the fact that their labour was in vain if oil was not transported to the refineries. Therefore, different means of transportation were introduced to transport oil to the nearby refineries or to the shipping points. The evolution of these means depended greatly on their availability and capability to reduce the cost of production by making cuts in the labour and transport expenses. Three main means of transporting oil were used during the early years of the oil industry namely the teamsters, the railway tanks, and the pipelines. First, teamsters were used to transport oil barrels from the well to the water shipping points. Since water transportation

[139] Charles A. Whiteshot. op. cit., p.119
[140] Ibid

became very expensive and risky, oilmen opted for railways that provided tank cars to transport their oil safely with low fares. However, all these means were made obsolete by the introduction of pipelines to transport oil since 1865.

1. Land Carriage and Water Transportation of Petroleum

All the means of oil transport had their termini at Oil City, which became the principal shipping point of the Oil Region in western Pennsylvania. The transportation of oil barrels by land carriages in the form of wagons drawn by horses, known as teamsters, was the most common means of transporting oil to the refineries or to the shipping points in Pennsylvania.

The teamsters monopolised the transport of oil and could easily fix the price of transportation without taking into consideration the price of oil in the market, which was not often at the aspirations of the oilmen. Oil transporting started with the first shipments of five-gallon cans (19.5 L) slung on the back of a packhorse from Oil Creek to Pittsburgh.[141] When the roads were favourable, oil in great quantities was drawn in wagons from the Oil Creek Valley to Franklin covering a distance of twelve to fifteen miles. Some three hundred (300) teamsters were engaged in the oil transporting business to link Oil

[141]Sheldon Walter Tower. Op. cit., p. 82

City with Franklin.[142] Undoubtedly, such business was subject to the market forces of demand and supply, which had an impact of the price of transporting oil.

The price of transporting oil varied according to the cost of labour and the conditions related to the distance, the road, the weather, and the market. Generally, for the distance of twelve miles, the price paid was about two and a half dollars per barrel.[143] The development of the oil industry provided employment for big number of people to work as teamsters. It was estimated that in the region of Oil Creek there were about 6,000 wagons[144] used in oil transport. In the Allegheny alone, there were over one thousand horses full time employed.[145]

The working conditions of the teamsters were hard, which made the transport of oil very expensive for the well owners. Therefore, other means of transport were introduced to diminish the cost. When the oil industry started to develop, the Allegheny River was the only way of conveying the product to the market. When the teamsters arrived at the water shipping points, oil was transported by flat-bottomed boats, also known as bulk or tank barges to the refineries in Pittsburgh, which was the principal oil market.

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[142]Boverton Redwood. op., cit. p. 39
[143] John Mills Eaton. *Petroleum*, *A History of the Oil Region of Venango County*, *Pennsylvania*, Philadelphia: J.P. Skelly & Co. 1866. p.169
[144] Victor Ross. op. cit., P. 81
[145] J.M. Eaton.op. cit., p. 281

The inconvenience of transporting oil by bulk-barges led to the construction and the introduction of tank-barges and steamboats as safer and more practical means of transport. The first tank-barge to transport oil was built in Pittsburgh by Richard Glyde. It was 130 feet by 22 feet by 16 feet (39.6 m by 6.7 m by 4.87 m), and divided into eight compartments that could hold 2,200 barrels.[146] The steamboats stored oil in the hold and on the lower deck carrying an average of five hundred barrels. The cost of transportation varied according to the number of boats running and the demand for carriage. Customarily, the price ranged from forty cents to one dollar per barrel. By 1862, there were over 1,000 boats, 40 steamers, and 4,000 men being engaged in the traffic.[147] This business was quite profitable, and provided employment to a large number of people, but not for a long time. Boats capsized due to the heavy loads or the caprices of the Allegheny River engendering the death of the workers and loss of precious cargos. The inconveniences and dangers presented by the water transportation paved the way for the introduction of better and safer means to transport oil namely the railways.

[146] Boverton Redwood, op. cit., p. 41
[147] Ibid., p. 42

2. Transportation of Oil by Railways in Pennsylvania

The teamsters and barge transporters created a monopole that was soon overthrown by the introduction of railways in the transportation of oil. Railway companies were interested in the growing oil industry since profit could be made in transporting a product from one point to another. The prosperity brought by the oil business made the railway men think about expanding their business to the oil regions.

Oil Creek Railroad (OCR) was the first railway company that started oil transportation in the oil region of Pennsylvania. It was organized in 1862 by a group of capitalists headed by Thomas Struthers of Warren County, Pennsylvania. The Charter granted to this company the construction of a railway from any point along the Philadelphia & Lake Erie Railroad to Titusville i.e., along Oil Creek to Oil City and Franklin.[148] In the Same year, the OCR built a line from Corry to Titusville. Corry was selected as the northern terminus to connect the Philadelphia & Lake Erie and the Atlantic & Great Western Railroads. Within two years, the OCR constructed a line from Titusville south along Oil Creek to the Shaffer farm. From the beginning, the OCR had an overwhelming amount of business. During its first 14 months of existence, it carried 430,684 barrels of oil,

[148] William T. Brannt. *Petroleum*. Philadelphia: Henry Carey Baird & Co. 1895, p.220

459,424 empty barrels, 22,727 tons of merchandise and 59,987 passengers.[149]

The Oil Creek Railroad and the Atlantic & Great Western Railway, along with other railway companies such as the Allegany Valley Railway and the Jamestown Railroad, proposed the transportation of oil using tank-cars as a solution to the problems engendered by the use of teamsters and water means of transport.

The advent of railways in rapid succession revolutionized the mode of oil transportation and of doing business in the Oil Region. In 1867, the Pennsylvania Oil Region had a direct connection by rail, with all the principal railways East and West, North and South, and with the commercial cities of the country. The railways traversed the entire Oil Region, forming a circle, having four outlets: at Oil City by the Alleghany Valley and Atlantic and Great Western Companies, at Corry with the same companies in addition to Philadelphia and Erie Company, at Meadville by the Atlantic and Great Western, and at Irvineton by the Philadelphia and Erie. By 1870, there were six railways in oil region having a total length of over 200 miles (321.8 Km).[150]

The distance covered by railways was in constant growth as oil reached new remote markets. The railways proposed good and

[149] William T. Brannt, op. cit., p. 222
[150] Ibid., p. 208

reliable services to the oilmen. However, such services were at the expense of the profits of the oilmen that struggled for their existence in a very fluctuating market. The oilmen were ready to adopt any new means of transportation that would cut the cost of producing oil mainly in labour and transportation.

3. Transporting Oil by Pipelines from 1865

The growth of the petroleum industry, as regards its production and consumption, made it difficult for the existing means of transportation to cope with the constant evolution of the industry. The inconvenience of land carriage, water transportation, and railways was in their cost, which the oilmen sought to cut to make their enterprise more profitable. The solution was found in transporting oil through pipelines joining the well with the shipping points of the nearest railway stations or ports, or directly to the refineries and other states.

The idea to build pipelines to transport oil was introduced by S. D. Karns. In November, 1860, he proposed to lay a 6-inch (15.2cm) pipe from Burning Springs to Parkersburg, West Virginia, through which the oil would flow along a distance of 35 miles (56.3 Km) by gravitation to the Ohio River.[151] Although, this pipeline was never

[151] Raymond Bacon Foss and William Allen Hamor. op. cit., p. 247

constructed, it inspired other oil operators to try it. A bill[152] was introduced in the Pennsylvania State Legislature to authorize the construction of a pipeline from Oil Creek to Kittanning in 1862. However, the vigorous opposition of the teamsters prevented the bill from being passed.[153] Later, a plan to lay a line down the Allegheny River to Pittsburgh failed for the same reason.

In 1862, the New Yorker L. Hutchinson laid a line on the Tarr Farm to transport oil over a hill to the refinery. He used the siphon principle to make oil flow up the hill, and a year later constructed another of 3 miles (4.8 Km) long from the Sherman well to the railway at Miller Farm.[154] To equalize the pressure, the line was provided with air chambers at intervals of every 50 or 100 feet (15.24 or 30.48 m).[155] However, the excessive leakage at the joints of the pipes rendered Hutchinson's attempt unsuccessful.

Two successful pipelines to transport oil were laid in 1865 and 1866. Samuel Van Syckel of Titusville, Pennsylvania, was the first to put down a working line in 1865.[156] He solved the problem of oil leakage by joining the pipe sections with fitted screw-sockets. Although this line was only 4 miles (6.4 Km) long extending from Pithole to the railway at Miller's farm and carried but 80 barrels per

[152] Raymond Bacon Foss and William Allen Hamor. op. cit., p. 247
[153] Ibid., p. 248
[154] Reid Macbeth Sayers. Op. cit., p. 169
[155] Raymond Bacon Foss and William Allen Hamor. Op. cit., p. 249
[156] Victor Ross. Op. cit., p. 83

day, [157] it demonstrated the practicability of transporting petroleum through pipelines. The second successful pipeline was laid by Henry Harley by the end of 1865 from Benninghoff Run to the Shaffer farm.[158] The two lines were bought by a company known as the Alleghany Transportation Company,[159] which was the only company that held a charter granted by the Legislature of the State of Pennsylvania to transport oil from the wells to the railway stations through pipelines. By the fall of 1867, Abbott & Harley purchased the stocks of this company and renamed it as The Alleghany Transportation Company. On January 25, 1869, the first Board of Directors was elected including Henry Harley, W. H. Abbott, Joshua Douglass, J. P. Harley, and Jay Gould. At a subsequent meeting of the Board, Mr. Henry Harley was elected President, Mr. Abbott as Secretary, T. W. Larsen as Treasurer, and William Warmcastle as General Superintendent.

These early pipelines proved that oil could be transported to any location with the least costs possible. Therefore, oilmen adopted the pipeline method that led to the disappearance of the early means of oil transportation such as the teamsters and the bulk-barges. The introduction of pipelines in oil transportation was beneficial to the oilmen but not for the teamsters, barge transporters on the Allegheny River, and railways. The owners and drivers of oil wagons saw that

[157] Reid Macbeth Sayers. Op. cit.
[158] Ibid., p. 170
[159] John Mills. Eaton. op. cit., p. 531

this mode of transportation deprived them of occupation, and they did what they could to retard the progress of the works by cutting the lines, setting fire to the tanks with which they were connected, and even threatening the proprietors and managers.[160] The reaction of the pipeline proprietors was to set armed patrols to protect the pipes. The attacks on the pipes stopped as soon as the leaders were arrested. Only boat tankers and railways remained in service during the 1860s and the 1870s since the pipelines were not yet laid under water or to the principle seaboard shipping points.[161]

The transportation of crude oil by pipelines to the refining centres became very important as it provided a considerable price cut and safety. The refining business near the producing field of Oil Region was adversely affected to the point of extinction by the laying down of pipelines to the seaboard from 1878 to 1882, and the erection of large refineries at the Atlantic seaboard and on the Great Lakes.[162] Further expansion of the pipelines occurred with the development of oil districts in Indiana, Ohio and Illinois. Pipelines were also laid to the Gulf Coast When the Louisiana, Texas, Oklahoma and Kansas fields were opened. The California fields developed separate pipeline system due to the far distance from the eastern and mid-oil fields. California pipelines were given connection with the Pacific coast ports, where the refining industry flourished.

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[160] Charles A. Whiteshot. op. cit., p. 145
[161] Raymond Bacon Foss and William Allen Hamor. op. cit., p. 151
[162] Ibid

C. Petroleum Refining Industry in the USA up to the 1870s

The refining of crude oil in the USA is attributed to Samuel M. Kier as the first to introduce refined petroleum for public use. As early as 1849, he erected a small refinery and started commercialising refined oil as illuminator in Pittsburgh. At the time of the striking of the first oil well by William Drake in 1859, the value of petroleum, at least as an illuminator, had been practically demonstrated by the chemists.

The development of the petroleum industry in the USA during the 1860s and 70s was caused by the gradual scientific and technological advances that enabled the early American refiners to distillate the crude oil. The refining of petroleum for illuminating purposes was a new branch of the industry that required investments and technology in its manufacture. The purpose of refining crude oil was to get rid of its offensive smell, its smoke when burned, and to render it non-explosive. In the refining process, each oil by-product (kerosene, gasoline, gas oil, waxes…) was obtained when crude oil was heated gradually at a precise temperature.[163] The first product or "cut" in the jargon of the petroleum refining industry consists of naphtha or crude gasoline. While the second product is the kerosene group, the third is gas oil. In practice, three different groups were distinguished among the distillates: [164]

[163] Sheldon Walter Tower. Op. cit., p. 106
[164] Ibid., p. 107

1. Light oils that distilled up to 302° F. (150° C.)
2. Illuminating oils distilling at 302° to 572° F (300° C.)
3. Residuum

Light Oils were variously subdivided and named according to their boiling points. By increasing the temperature of distillation over 572°F (300° C.), two by–products are obtained:[165]

1. Heavy oils, which pass over with continued distillation according to their density, are divided into lubricating oil and paraffin oil to be used for candles and as an insulating material.
2. Coke, which remains as a solid body in the still, is used for fire and heating.

The refiners were mostly concerned with the quality and the quantity of their production of petroleum by-products as their applications grew larger. In the early years of the industry, while certain petroleum by-products like kerosene, which was used for lighting, witnessed an increasing demand, others like gasoline were considered as useless because it was volatile, and people did not find an application for it.[166] The refiners considered it as a joint product of crude petroleum because it was commercially unprofitable, and could not be manufactured as a single product.

[165] Sheldon Walter Tower. op. cit., p. 107
[166] Ibid

There were about ninety refineries in Venango County in 1866, with a capital range from ten thousand dollars to about a million dollars each.[167] At Titusville, there were five refineries, mostly of small capacity,[168] the principal being the Bunker Hill Works. There were also about twenty refineries scattered along Oil Creek down to its mouth. Near Petroleum Centre there were six, the largest of which had four stills with a capacity of thirty-barrel on the Storey farm. The largest refineries that were established around Oil City were the Union Works and the Oil City Petroleum and Refining Company that had four stills each, with a capacity of processing three hundred barrels per week. In the Oil City Register of June 2, 1862, it was stated that there were 25 refineries in Oil City.[169] One of the most important refining companies was the Atlantic Refining Co. that was established in 1862 at Pittsburgh. It established two other companies namely the Atlantic Refining Co. at Point Breeze and another with the same name at Franklin in 1866 and 1872 respectively. The company totalised an investment of $20,100,176 and processed more than 43,500 oil barrels daily in 1872.[170]

The success of the refineries in these cities was due to the fact that they were close to the shipping points to transport their oil by-

[167] J.M. Eaton. op. cit., p. 225
[168] William Wright. *Oil Regions of Pennsylvania*. New York: Harper & Brothers Publishers. 1865, p. 203
[169] James H. G. *Refining Industry of the United States*. Oil City, Pennsylvania: The Derrick Publishing Company. 1916, p. 10
[170] Ibid

products,[171] and close to the market where to sell them. These refineries needed supplies and maintenance, which the metallurgic factories of the city could easily afford. They were built near wharves and railway facilities. Therefore, the place and the proper location of the refineries was determinant in their success since charges and cost of production could be reduced. The introduction of pipelines in the transportation of oil facilitated its conveying from the well to the distilling stills at the refinery.

In the refining of crude oil, four main systems proved to a certain extent their efficiency in the distillation of most oil by-products whether in quantity and quality. In chronology of their introduction in the refining of crude oil, these systems were the periodic system, the continuous system, and the vacuum or pressure system.

At its simplest form, a periodic system refinery[172] was composed of a still, a cooling tank, a tail-house or separating house, and storage tanks. The still was made of wrought iron generally cylindrical in shape. Its capacity ranged from 10 to one thousand barrels, but it usually contained from twenty to fifty barrels.[173] It was set in masonry, with a furnace underneath for the adjustment of fire. It was capable of withstanding a high degree of heat.

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[171] The most important and commonly used petroleum by-products are: Gasoline, Naphtha, Kerosene, Gas Oil, Fuel Oil, Spindle Oils, Cylinder Oils, Paraffin Wax, Petrolatum, Dust Laying Oils, Road Binders, and Coke. James. Kewley. op. cit., p.208

[172] See Diagram p. 79

[173] J. H. Thomson and Boverton Redwood. op. cit., pp. 50-51

The still was provided with different holes and valves that had different functions. While the filling pipe supplied crude oil inside the still, the draw off pipe or the vapour line drew the steam from the heating of oil to the condenser. A man-hole was manufactured on the still from which the distiller could penetrate inside to clean or inspect it. A steam-pipe was perforated so as to inject steam in the still. There were necessarily gauge glasses, and vacuum and pressure valves among others. The forms of the still varied as technology evolved but its function remained the same.

The condensers or coolers consisted essentially of a system of pipes cooled by water in which the draw off vapours from the still were condensed and cooled. In some refineries, crude oil was used as a cooling agent instead of water. In fact, crude oil did not cause the corrosion of the pipes and conserved the heat of the vapour better than water. While crude oil was used as a condensing agent mainly in plants that used the Continuous System of oil distillation, water was generally used as a cooling agent in plants that used the Periodic System of distillation. [174]

The simplest form of condenser consisted of a series of cast-iron pipes of diminishing diameter, placed in a cast-iron box filled with water or any other cooling agent. The vapours entered at the top and descended to be collected at the bottom as condensed distillate. It was usual to attach a gas vent to the outflow pipe in order to allow any

[174] James. Kewley. op. cit., p. 158

uncondensed gases to escape. The condensing surface depended on many conditions such as the thickness of the tubes, the temperature of the distillate to be condensed, condensing water, among others.[175]

The tail-house was the next step after the condensers where the distillate liquid flowed through pipes to the storage tanks. The look box permitted to the refiner to test and analyse the distillates and tell by their specific gravity and colour when to cut the flow from one rundown storage tank to another because each oil by-product had to be stored in its specific receiving tank. This was done by a system of manifolds and valves that controlled the flow to each receiving tank.

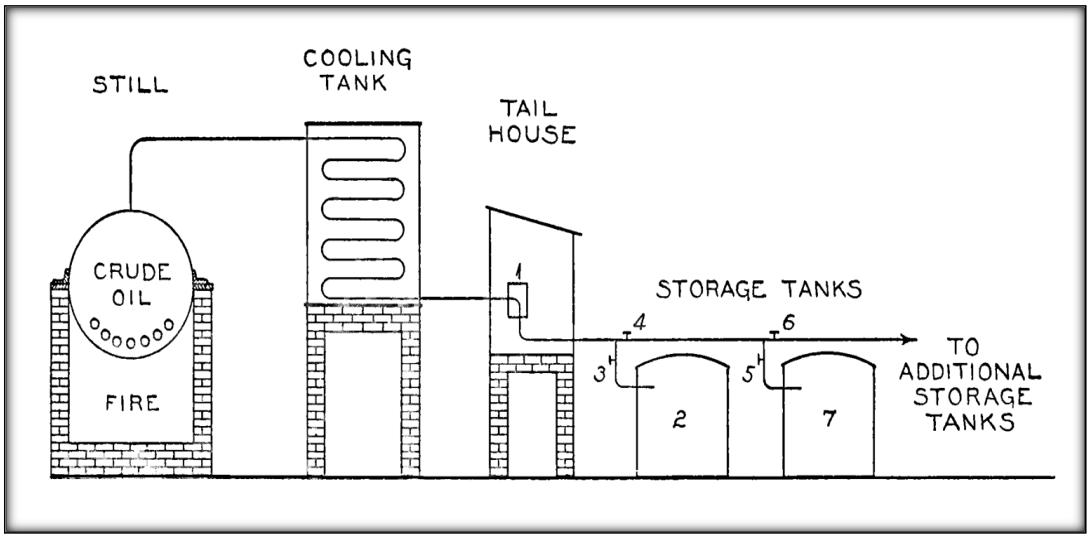


Diagram of the Refining Process in a Plant Using the Periodic System.[176]

Although the continuous system[177] of oil distillation was an improvement over the periodic system, it was far from being efficient

[175] Ibid., p. 161
[176] Charles E. Bowles. Op. Cit. p. 163

since the distilled products rarely exceeded 35 to 40% of the amount of the initial oil.[178] The refiners found a solution to increase the amount of distillates and by the same token reduce the cost of heating by using the heat of the vapours and even the residue in the last still, which might be over 300° F. (148.8 C.), as pre-heaters[179] of the incoming oil.

These pre-heaters were practically stills heated by internally placed coils through which the vapours from the main stills were passed. These vapours were completely or partially condensed. The vapours from the main stills were allowed to enter the distillate pre-heater and were partially condensed in passing through the tubes, which heated the contents of the pre-heater. A pipe in the bottom to the coolers conducted the condensed vapours in the pre-heater. The vapours that have escaped condensation passed in another pipe to further water-cooled condensers. Each pre-heater was connected with inlet and outlet pipes.

[177] See Diagram p.81
[178] James Kewley. op. cit., p. 164
[179] See Diagram p. 81

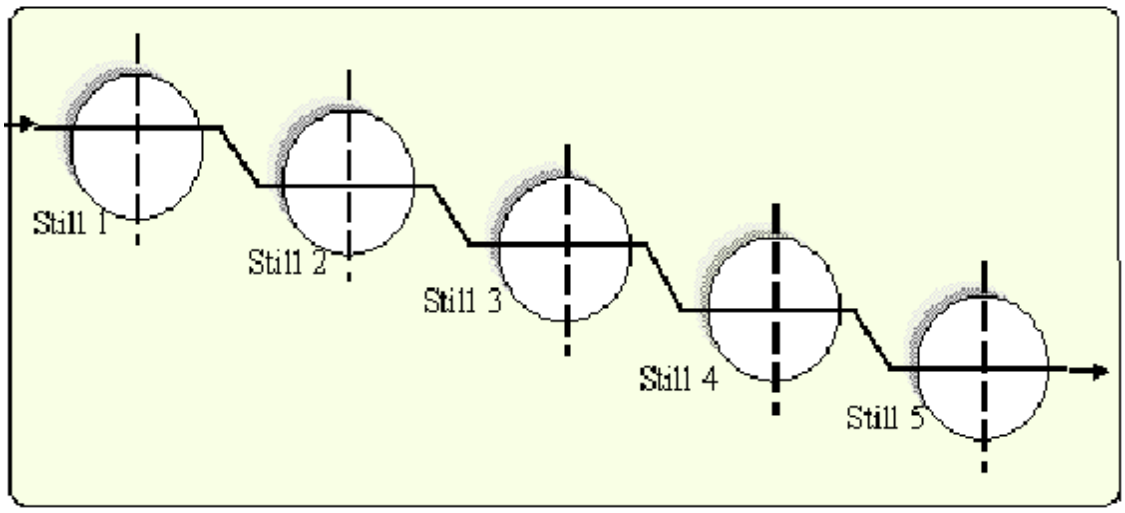
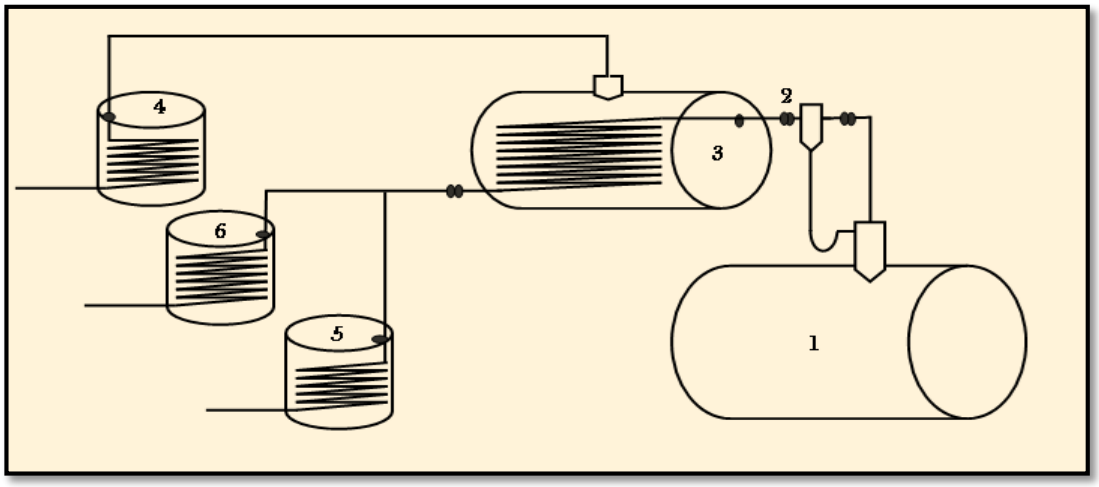


Diagram of Cascaded Organisation of the Stills in the Continuous System[180]



Arrangement of a Still Fitted with Distillate Pre-heater[181]

1.The main still. **2.** The main vapour pipe. **3.** The distillate pre-heater in which the crude is heated and to some extent distilled by the latent heat of the condensing vapours. **4.** The condenser for the distillates given off from this distillate pre-heater. **5.** The cooler for the condensed vapours which issue from the heating coil of the distillate pre-heater. **6.** The condenser for the vapours which escape condensation in the heating coil.

[180] Charles E. Bowles. op. cit., p.165
[181] Ibid., p. 167

The third refining system is the vacuum system of oil distillation that was introduced in the refining industry based on the scientific fact that the boiling point of a liquid depends on pressure. The inconvenient that the refiners found in boiling the crude at high temperature was that it became unstable and began to 'crack,' i.e. to split up into hydrocarbons of lower molecular weight, usually with separation of carbon and sometimes hydrogen.[182] Therefore, the vacuum system was utilised to enable the boiling points to be lowered or raised to avoid the cracking of oil. Vacuum distillation was technically employed in the manufacture of the best qualities of lubricating oil.

The second reason that led to the use of vacuum system was the fact that by the ordinary means of distillation, a sufficient yield of benzene could not be obtained in sufficient quantities with the periodic and continuous systems. Practically, although such improved results were encouraging and more profitable in comparison with the results of the ordinary methods, the early refiners found that the difference was not great to the point that they had to abandon the periodic and the continuous systems. Economically, the profits gained in the increased yield were used in the cost of installation and operation.[183] The next step in the search for the best system that gave much yield in the distillation of oil at low cost led to the revival of the 'pressure distillation.'

[182] Charles E. Bowles. op. cit., p p. 171
[183] Raymond Bacon Foss and William Allen Hamor. op. Cit., Vol. 2. P. 459

The pressure distillation was invented in 1865 by the English chemist James Young who patented[184] this method in England. By using pressure in oil distillation, he increased the yield of Benzene and Kerosene. However, this method was hazardous and was avoided for a long time because of the danger engendered by the pressure involved in distillation. Since then, several oil-cracking techniques based on the method of Young were patented.[185] In 1866, Vincent, Richards and others patented[186] a process to facilitate cracking by which the vapours partly condensed and dropped back into the hot residue in the main still. In 1871, Thorpe and Young described the formation of hydrocarbons of the paraffin and olefin series, by heating paraffin wax under pressure. In 1889, Redwood and Dewar patented[187] a process for cracking by distilling and condensing the vapours under pressure.

1. The Distillation Process of Crude Oil and Its By-Products

As the refining industry grew larger, the refining of oil became more a specialty than a random distillation of the crude. The greater portion of all the crude oil produced in oil region was used for the manufacture of light products or essences like benzene, illuminating oil, and in working the residuum into lubricating oils. The existing

[184] Eng. Pat, 3345 of 1865
[185] James Kewley. Op. Cit., PP.229-230.
[186] Eng. Pat. 616 of 1866
[187] Eng. Pat. 10277 of 1889, 13016 of 1890, 5971 of 1891

refining companies gradually confined themselves to the distillation of one of the above components. Therefore, the residuum to the refiner of illuminating oils became crude material to the manufacturer of lubricating oils. In turn, the residuum of the lubricating oils was sold as raw material to the gasoline manufacture refineries.[188] The specialisation of these refineries in the production of one group of oil fractions gave birth to three types[189] of oil refineries:

1. Skimming plants
2. Lubricating and wax plants
3. Complete run down refineries [190]

Both the skimming plant and the lubricating and wax plant started with crude oil and got from it gasoline, kerosene, gas oil and fuel oil. The difference between the two was that while the skimming plants stopped at these fractions, the lubricating and wax plants broke up the fuel oil into equal parts of paraffin distillate and cylinder stock.[191] The paraffin distillate was broken up into lubricating oils and paraffin wax while the cylinder stock was sold. On the other hand, the complete run down refinery started with crude oil and made all of the products that the skimming plant and the lubricating and wax plant made in addition to making bright stock and petrolatum, from which other products were produced.[192] The production of theses fractions

[188] Raymond Bacon Foss and William Allen Hamor.op. cit., p. 230
[189] Charles E. Bowles. op. cit., p. 93
[190] See Diagram p. 85
[191] Reid Macbeth Sayers. Op. cit., p.151
[192] Charles E. Bowles. Op. Cit. P. 94

was based on different systems of distillation that evolved from the try and error of the refiners who were backed by chemists that were of great help in understanding the nature of petroleum and the ways to exploit it.

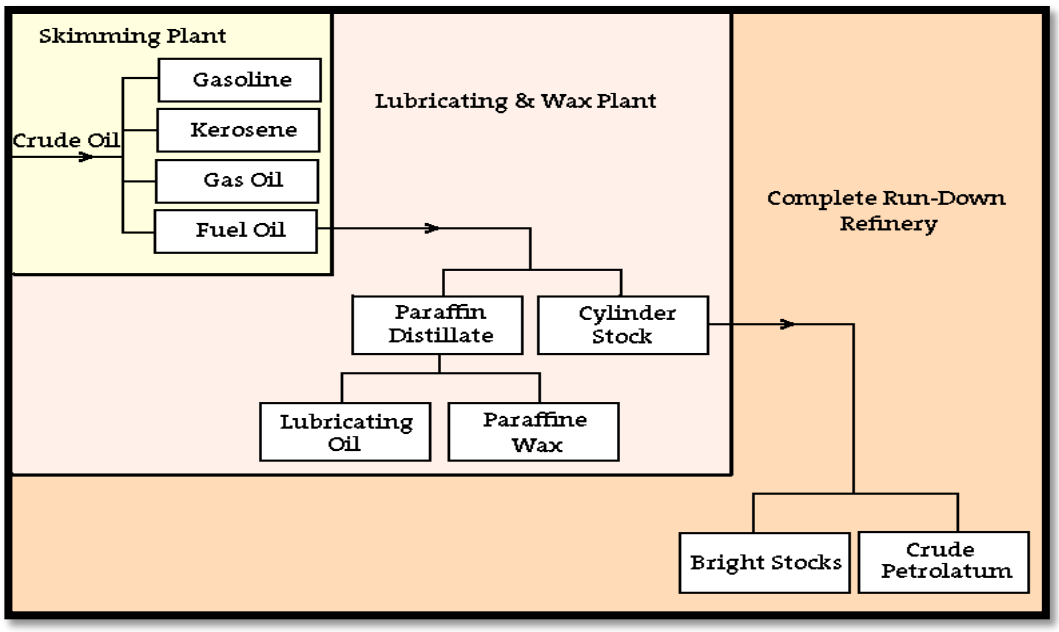


Diagram Showing the General Classification of Refineries with Principle Products Made by Each[193]

Technological advances also played an important role in revealing the potential uses of petroleum by-products. For example, the invention of the internal combustion engine required a volatile combustible liquid, which made gasoline become more important than kerosene. The increasing demand for gasoline surpassed all other oil by-products, which pushed the refiners to find other methods and varieties of gasoline. There were varied commercial supplies of gasoline namely: natural or straight-run gasoline, volatile

[193] Ibid

gasoline derived from natural gas, synthetic gasoline made by 'cracking' heavier petroleum distillates, and naphtha, which alone would rank as light kerosene. The following table[194] provides the boiling point of petroleum and its by-products.

Light Oils	Boiling Point	Use
Petroleum Ether (keroseline, rhigolene, Sherwood oil).	104° to 158° F. (40° to 70° C)	Solvent for resins, caoutchouc and oil; as a local anaesthetic in surgical operations, and in refrigeration.
4. Gasoline (canadol).	158° to 176° F. (70° to 80° C.)	For the extraction of oils from acids etc., freeing wood from fat, for air-gas machines and as an illuminant in lamps of special construction
5. C-petroleum-naphtha (petroleum benzene safety oily Dan forth oil)	1 76° to 212° F. (80° to 100°C.)	For the removal of stains, for the adulteration of petroleum, in large quantities for firing purposes, and as an illuminant in lamps of special construction.
6. B-petroleum-naphtha (ligroine).	176° to 248° F. (80° to 120° C.)	For burning in lamps of special construction, in the preparation of illuminating gas, in painting in place of oil of turpentine, it drying more rapidly than the latter.
7. A-petroleum-naphtha (Putzoel, polishing oil).	258° to 302° F. (125° to 150° C.)	For cleaning parts of machinery, as a substitute for oil of turpentine, for thinning oil-paints, varnishes,

Table: Boiling point of petroleum to produce its by-products

[194] William Brannt. Op. Cit., P. 75

The growing importance of petroleum and its by-products gave impetus to individuals to create their own oil companies and existing companies to invest in the domain. The companies specialised in one of the major sectors of the petroleum industry namely drilling and extraction, transport, or refining. Others specialised their business in trading in the oil market in trade or investment. Such rapid development of the petroleum industry pushed the authorities whether local, state or federal to keep the pace with the frenetic development of the industry by passing laws and regulations with the objective to set order and fair practices, and organise the industry as regards the foundation, activities, and practices of the oil companies.

II. Petroleum Laws and the Organisation of Its Industry during the 1860s

The growing importance of oil industry as a strategic source of energy pushed the Federal and State Governments in the USA to take legislative measures for the regulation of the oil industry, the oil market, and the relationship between the oil operators. Legislation was directed to define among other things the ownership of the land and the extracted oil, the cases of forfeiting, the payable rents and royalties, and government taxation. The beginnings of the petroleum

industry were to a certain degree chaotic since almost everything related to the oil business was relatively new and required time and experience in the different fields of the industry to organise it in the most profitable way. It was the Standard Oil Company under the presidency of John D. Rockefeller that the first attempt was made to organise the emerging industry. This section deals with the early years of the petroleum industry in the USA as regards the early laws that accompanied its emergence, and Rockefeller's vision of industrial organisation that shaped the industry during the second half of the 19th century.

A. Public and Private Oil Land Legal Issues and Legal Status of Oil Ownership

At the beginning , when oil revealed itself as 'a fortune maker', the first thing that the states legislatures, the landowners, and the oilmen started giving more importance to the legal issues that concerned the exploitation of oil lands. Legislative acts and decrees were issued, court decisions, and customs were established to regulate and control the different sectors of the petroleum industry.

1. Public and Private Oil Land Legal Issues

The land legislation involved in the drilling for oil was based on the early legislation concerning the regulation of coal mining land. The exploitation of the mid-continent and western coal seams had to be regulated legally since the land subject to mining operations was either under government or private ownership. During Andrew Johnson's Presidency, the miners had the right to stake mining claims to extract gold, silver, cinnabar (the principal ore of mercury), lead, tin, and copper. When Congress passed the *General Mining Act of 1872*,[195] the following expression was added "or other valuable deposits heretofore located,"[196] to give greater scope to the law.

Through the 1872 Mining Law, the Federal Government sought to encourage settlement in the West by granting extra-lateral rights to lode claims,[197] and fixed the maximum size of lode claims as 1500 feet (457m) long and 600 feet (183m) wide.[198] The federal mining land was sold for $2.50 per acre under the condition that owner had to spend

[195] Forty-Second Congress. Sess. II Ch. 149, 152. Sec. 03. 1872. Approved, May 9, 1872

[196] Forty-Second Congress. Sess. II Ch. 149, 152. CHAP. CL. II. Sec. 01. Approved, May 9, 1872. 94

[197] Extra-lateral claim gave the owners of the surface outcrop of a vein of gold or silver the right to follow and mine the vein wherever it led, even if its subsurface extension continued beneath other mining claims. This provision, also known as the Law of the Apex led to lengthy litigation and even underground battles, especially in Butte, Montana and the Comstock Lode.

[198] Dorsey Hager. op. cit., p. 19

only $100 a year to keep his claim valid.[199] This Law reflects the political orientation of President Ulysses S. Grant (1869-73 and 1873-77) who believed that government should not own land and federal land could be privatized for mining but not for other uses like ranching. Those who wished to use 'mining land' for other purposes were confronted with burdensome transaction costs that impeded their efforts.

In addition, the 1872 Mining Law stipulated that the extraction of valuable minerals on federal land had to take place with minimal payments to the treasury that was set to 5 dollars per acre.[200] This policy was not accepted by some politicians because the profits generated by mining federal lands were huge and belonged to the taxpayers, not to the private mining industry. Under the 1872 Mining Law, it was considered as illegal practice to divert the land claimed to other uses. For these reasons, many critics of the Mining Law of 1872 argued that the land had to be maintained under federal ownership of mineral reserves to control and safeguard the nation's energy resources from the negative effects of economic crises and from being depleted because of over-exploitation.[201] Since these resources could easily be depleted and shortages were coming, it was maintained that the government had to act to preserve national reserves and to distribute those resources more fairly than would private markets.

[199] Forty-Second Congress. Sess. II Ch. 152. Sec. 05. 1872. 95
[200] Forty-Second Congress. Sess. II Ch. 152. Sec. 11. 1872. 95
[201]Dorsey Hager. op. cit., p. 20

However, over the years, Congress removed many lands and minerals from regulation under the 1872 Mining Law for the benefit of private enterprises.[202]

The classification of the public lands was in charge and responsibility of the United States Geological Survey (USGS). The latter was officially established on March 3, 1879, in the *Land Ordinance of 1879* [203] by President Rutherford B. Hayes (1877-1881), as an agency in the Department of the Interior. The USGS not only classified the public lands, but also examined the geological structure, the mineral resources, and products of the national domain. The task of the USGS was based on the Mining Law of 1872, which determined the public or private land subject to mining for gold, silver, coal, the extraction of petroleum or natural gas, or any other mineral.

On the other hand, private lands could be either exploited by their owners or leased. An example of laws regulating land property and leasing are those of Pennsylvania where the first exploitations of coal, petroleum, and gas started. A lease is a contractual agreement between the lessor and the lessee. The lessor is the owner of a mineral tract and grants the right to develop deposits of the mineral to the lessee or the producer. Fossil fuel or mineral deposits (coal, oil, gold, silver, etc…) could be sold or leased separately to different parties.

[202] Acts of Congress of August 4 and of February 11, 1894 granted the entry of Government lands. Oil public lands could be entered as placer mining claims.

[203] Ray Allen Billington. *Westward Expansion: A History of the American Frontier*. New York: Macmillan. 1949, pp.212-213

Different deposits of the same mineral could also be leased or sold separately.[204] A lessee would have the right under contract to sell or reassign a mineral lease to another party. Leases should be recorded at the Recorder of Deeds Office of the county where the leased tract was located. A lease was usually secured by annual rental payments or a royalty on production paid to the lessor.

In Pennsylvania, the mineral estate might be separated from the surface (real) estate, and ownership of minerals on the same tract might be separated from each other (oil, gas, coal, etc...).[205] All surface and mineral owners had property rights under the law, which recognized the owner's right to recover mineral and the landowner's right to be protected from unreasonable encroachment or damage.[206] However, in many cases land was the cause of disputes that required new legislation mainly those related to the exploitation of Indian reservations.

Historically, land was the main cause of the wars waged between the Indians and the Americans. The conflict ended with the confinement of the Indians in reservations, which were first created in Oklahoma under the *Indian Appropriations Act of 1851*. The objective of creating Indian reservations system was to control the inhabitants easily in areas of worthless land, where they would lose their

[204] Dorsey Hager. op. cit., p. 23
[205] George Bryan. *The Law of Petroleum and Natural Gas.* Philadelphia: George T. Bisel. 1898, p. 49
[206] Ibid., p. 50

traditional way of life and would no longer be a threat to the settlers. While the goal of the Act was to protect Indians from the expansion of the Americans westwards over the reservations, in reality Oklahoma reservations began to shrink to satisfy the new white settlers of the growing want of land. To satisfy such want, President Ulysses S. Grant (1869-1877) created new reservations where many tribes were relocated.

The Americans on the frontier often objected that the Indian reservation lands were too large, prompting the government to reduce their size. Many Native Americans were by force relocated after bloody wars. By the end of Grant's Presidency, his Native American policies failed to achieve durable peace between the Indians and the Americans. His successor Rutherford B. Hayes adopted a new approach concerning the Indian reservation by enacting the *Dawes Act in 1887,*[207] which instituted a policy of giving parcels of land to individual Native Americans, rather than to tribes as a whole. Therefore, the individuals could be easily convinced to lease their parcels for the extraction of minerals, and the 'Excess' land that resulted from this segmentation was given to anyone that wanted to exploit it.

[207] Dawes Act 1887. *"General Allotment Act (or Dawes Act)", Act of Feb. 8, 1887 (24 Stat. 388, ch. 119, 25 USCA 331),* Acts of Forty-ninth Congress-Second Session, 1887

Considered as an irony of fate, the creators of the reservation system placed the Indians on valuable lands holding enormous quantities of different valuable minerals including bitumen.[208] Therefore, the Government considered the Indian Lands as 'ward lands' like those in eastern Oklahoma, which meant that the leases to exploit the minerals and fossil fuels had to be made with the Indians directly upon approval of the Department of the Interior.

2. Legal Status of Oil Ownership

The early years of the industry were characterised by the absence of legal organisation due to its novelty and the fact that oil wells were drilled in the wilderness. The courts had to answer new questions and treat new and unprecedented cases. The Supreme Court of Pennsylvania remarked in 1893 that: "*...a new question, and one that is full of difficulty. We find ourselves upon a new road, without chart or compass to guide us, and we propose to move slowly*."[209] Petroleum industry started in Pennsylvania and developed rapidly as regards the operations and relations between the operators. However, the legislation could not keep the pace with the development of the industry. It should not be assumed that Pennsylvania was a reference

[208] A mineral containing 90% of bitumen, and known as gilsonite, uintahite, or uintaite, occurs in the northeastern part of Utah, near Fort Duchesne, east of the Uintah Indian Reservation, and in the Umcompahgre-Ute Reservation, near the Colorado State line. Boverton Redwood. *Petroleum*. Op. cit., p.130

[209] George Bryan. Op. cit., p.1

to the new oil states as regards oil legal issues, but it was the states of Ohio, Indiana, and Texas, among others, that enacted the bulk of the petroleum legislation in the USA.

The early oil or gas legislation in Pennsylvania was based on the mining laws which stipulated that the owner of the soil was vested the ownership of the oil, gas or any other minerals beneath the surface. This was based on the common law of all minerals, except gold and silver that belong to the king by virtue of the royal prerogative.[210] The other minerals, like coal, belonged to the owner of the soil, unless there had been a severance of the title to the mine from that of the surface. There are several examples of court decisions in Pennsylvania concluding that oil is a mineral and part of the realty like coal or any other mineral product, which forms part of the land.[211] In *Kier vs. Peterson, 41 Pa., 357 (1861)*, the court concluded: "It (petroleum) is part of the land. It is land."[212]

However, the legislation of the State of Indiana, which was approved by the State Supreme Court, stipulated that the landowner had only a qualified right to the oil and gas in the underground. Oil was considered as part of the realty only if the landowner extracted or conducted it in pipelines or stored it in tanks, or any other

[210] George Bryan. op. cit., p.2
[211] "Coal and minerals in place are land. It is no longer to be doubted that they are subject to conveyance as such." *Caldwell vs. Fulton*, 31 Pa., 475 (1858)
[212] George Bryan. op. cit., p. 21

receptacle.[213] Oil that remained under the surface was considered as public interest and could be leased to a second party to exploit it. If by natural phenomena oil migrated to a neighbouring land, the second proprietor became the owner. Because of this legislation, landowners saw oil and gas escape from their hands and possessed by others mainly oil companies.

The Supreme Court of Indiana resorted to this decision because it compared the ownership of oil to that of wild animals Feraenaturae.[214] The owner of the land did not own the wild animals that might be living upon it, until he reduced them into possession. Although the landowner had the right to prohibit taking the animals as long as they lived on his land, he did not have the right to claim property of the animals that would migrate to the neighbouring lands or other regions. Apparently, the legislators of the state of Indiana were aware of the importance of oil and gas at that time upon which the development of the State rested. Therefore, it was necessary to introduce such legislation that regulated the extraction, transport, and refining of oil and the relationship between the landowner and the person or company granted the right to exploit oil lands.

[213] Ibid
[214] Daniel D. Donahue. *A Treatise on Petroleum and Natural and Manufactured Gases*. Bloomington, Illinois: Pantograph, Printing And Stationery Co. 1902. p.11

B. Severance of Oil from Realty, Royalty, and Taxation Legal Issues

Problems arose from the contracts that were established for the exploitation of agricultural lands for the extraction of petroleum. In Pennsylvania, the Supreme Court decided that the severance of minerals by artificial means rendered them property of the landowner (the lessor) or to the lessee for mining purposes. [215] A mineral right was an independent interest in land. It formed a distinct possession subject of sale, devise or inheritance, as the surface land as stated in the court case of *Caldwell vs. Copeland*.[216] In mineral lands the surface or soil, as adapted to cultivation, may be separated from the mineral right or the right to dig under the surface for ore, and one person may own one of these rights and another person the other as decided in *R.R, Co., vs. Sanderson* court case.[217]

If the act of severing the minerals was set at a given time and the act of carrying in another, it was considered as larceny and the severed mineral belonged to the landowner. The extraction of the mineral and the carrying had to be done at the same time and continuously. This was applied for solid minerals and was generalised to include oil and gas. [218] The oil extracted and confined in

[215] George Bryan. Op. cit., P. 49
[216] *Caldwell vs. Copeland*, 37 Pa., 427 (1861).
[217] *R.R, Co., vs. Sanderson*, 109 Pa., 583 (1885)
[218] Daniel D. Donahue. Op. cit., p.65

tanks or pipelines belonged to the well proprietor although the oil remains on the premises of the landowner. On the other hand, oil became the property of the lessee if he owned the well unless the landowner was entitled to a specific part to make the well jointly owned. The crude oil was jointly owned by the lessor and the lessee even if it was taken out of the property until a division was made. In case oil was taken unlawfully, the owner had the option to recover the oil or its value.[219] The property of the land had to be proved before any drilling and the landowner was entitled by law to spare 10 acres near the dwelling house on which no wells were to be drilled.[220] The lessee was compelled by law to plug the disused well so that gas would not escape in the open air. The above sample provisions of the legislation concerning the business and legal relationship between the lessor and the lessee demonstrate the intricate and complicated nature of the oil leases. Generally, such leases present conflicting covenants and conditions, that the courts considered legally to be taken as rules and principles laid down by the courts in construing oil and gas leases. Such rules and principles were aimed to determine the liability of the lessee or his assignee.[221]

In issuing legislature or court consideration as regards the forfeiture of the leases, the purpose was to preserve the rights of the

[219] Ibid., p . 207
[220] The guardian of the land of an infant, insane, or an incompetent had no right to drill a well and extract oil, or any other mineral, and sell it.
[221] Daniel D. Donahue. Op. cit., p. 202

lessor and the lessee as well. The rights of the landowner as well as of the State were protected by law from being infringed by unexecuted and profitless leases because the oil operators might neglect to develop their leased premises, or delay the operations waiting for better prices of oil. It was argued that without such protective law, lands would be covered with subletting leases, riddled with holes, bristled with derricks, and the infringement of the lessor financial rights.[222] Therefore, it was found necessary to regulate the boring of oil wells, their number, the time of succession, the period of commencement and of completion, and other matters that required strict regulation.

Among the most important oil lease regulations was the clause of forfeiture to compel performance and to put an end to the lease in case of injurious delay. In the forfeiture clause of the lease, stipulation was added explaining that if the lessee did not commence operation at the time specified he had to pay the landowner $ 30 for each month until he started drilling. [223] Even if the well was not completed or that the premises were worthless, the lessee had to pay a certain sum annually decided by law until the operations completed.

On the other hand, the lessee had the right to abandon the premises and nullify the lease if the test well was proven a dry hole yielding neither oil nor gas. Then the lessee could remove all machinery from

[222] Ibid., p. 17
[223] Ibid., p. 198

the premises abandoning all further operations. Knowing that the well was dry and abandoned, the lessor had no right to claim money due under the lease for the years granted to exploit the underground.[224] The lessee could waive a written notice of forfeiture, which enabled the lessor to grant a lease to another party.

There had been various methods of fixing lease rents or royalties that were paid to a mining or oil lessor. The rent might be an annual or periodical sum, or any fixed sum agreed on. It could be a royalty on the amount of the minerals or oil extracted payable at fixed times. It could also be a specified sum paid yearly. In case of oil lease, the lessee had to pay certain percentage of the oil taken out of the premises.[225]

Taxes on oil business operations could be perceived as stipulated in the contracts,[226] which made it possible that the lessee paid all the taxes assessed against the entire premises, and oil was taxed only when severed from the soil it became the property of the lessee. Exempts from taxation by statute included the boilers, engines, and derricks used for the extraction and transportation of oil and any materials that aided in its production.

As far as Government taxation was concerned, an oil corporate stock was taxed on the value of the corporation, which was

[224] Daniel D. Donahue. op. cit., p. 153
[225] Ibid., p. 201
[226] Thornton W.W. op. cit., P. 839

determined by the value of property it represented. To tax both stock and property was considered as double taxation.[227] Property not used for a public purpose as houses for tenants even for workingmen of the company were taxed.[228] On the other hand, a pipe line company that transports its oil through its pipes from one state to another was taxed in the latter State because it was doing business in that state. The tax was perceived as a percentage of the receipts from the transportation of the oil.[229] This tax was proper to the state where the business was undertaken and did not interfere with inter-State commerce.

C. Standard Oil Company and Rockefeller's Attempt to Organise the Oil Industry

The most important petroleum companies, which gave birth to the petroleum industry during the 1860s, were of different structures and characteristics. They were in general sole proprietorship companies that relied on the entrepreneurship of one person that invested his money or that of his family. There were also joint stock companies, or corporations that prevailed because the petroleum operations developed from small entrepreneurships that did not require huge financial resources to complex operations that squandered huge financial investments.[230] As the oil industry proved to be a lucrative

[227] Thornton W.W. op. cit., p. 831
[228] *West Chester Gas Co. v. County of Chester*, 30 Pa. St. 232
[229] Daniel D. Donahue. Op. cit., p. 83
[230] Henry J. T. op. cit. p. 69

business, more and more companies were incorporated whether in Pennsylvania or other states such as New York and Ohio to operate in one of the three oil business fields namely drilling and extraction, transport, and refining.

Oil refining was the business that witnessed the incorporation of a large number of companies, as the oil industry grew larger and larger. However, the rise and fall of the early oil companies was subject to different factors mainly the price of oil and the fierce competition that grew intense between the oil operators. In this intense business environment, it was considered as a normal state of affair[231] that the strong companies eliminated the weak ones, or merged with others to create giant corporations that monopolised their own fields of business. Massachusetts, Pennsylvania, Maryland, Ohio, and New York were among the various States that encouraged the incorporation of oil companies in the form of corporations.

The most illustrative company in the history of the US petroleum industry is the Standard Oil Company that had a great impact on the industry as regards its operational or structural development. The Standard Oil Company illustrates the foundation of the corporate system, its fields of operation, and their development. It was founded by John D. Rockefeller and associates in Cleveland as a petroleum refining company. During the early years of the industry, Pennsylvania monopolised the production and refining of petroleum.

[231] Horace Greeley, Leon Case, Edward Rowland, et. al. op. cit., p. 1035

However, new centres for petroleum refining emerged in other states and started competing with Pittsburgh and Oil Creek. By 1865, Cleveland, Ohio, became the chief competitor of Pittsburgh since it incorporated some thirty refineries with a capital of about a million and half dollars and a daily refining capacity of about 2000 barrels.[232] A year later, the Cleveland Board of Trade declared the number of fifty refineries, and in 1868 it announced that Cleveland matched Pittsburgh as regards the receiving capacity of the crude, which reached 300 000 barrels.[233] It was in 1869 that Cleveland surpassed its competitors by refining petroleum more than any other place in the country thanks to the Standard Oil Company (SOC) that was founded by John D. Rockefeller and associates. The latter was the most important figure that shaped the emerging petroleum industry.

It all started in 1862 when the English Samuel Andrews asked Rockefeller, who was then a young man of twenty-three years old, and M. B. Clark to back him in starting a refinery. The three accumulated 4000 dollars,[234] which enabled Andrews to launch his project. The refinery was so prosperous by 1865 that Rockefeller abandoned all his other activities and devoted himself to the refining of oil by putting all his money in a firm with Andrews. In this new firm, Andrews had the task of manufacturing and Rockefeller attended to the development of the business and the buying and

[232] Ida Tarbell. Vol 1. Op. cit., p.39
[233] Ibid.
[234] Ibid. 40

selling of the refined oil. They started a new refining company named *William Andrews and Rockefeller* with H.M. Flagler as a new partner, and opened a new company for selling oil in New York. Rockefeller was at head of these companies, which he combined into one company known as Standard Oil Company in June 1870, and five partners namely John D. Rockefeller, Henry M. Flagler, Samuel Andrews, Stephen V. Harkness, and William Rockefeller. J. D. Rockefeller declared that: "*The cause leading to the combination was the desire to unite our skill and capital, in order to carry on a business of some magnitude and importance in place of the small business that each had separately heretofore carried on*."[235]

The incorporation of the Standard Oil Company marked the beginning of a new era of doing business in the petroleum industry in the USA. This new era was characterised by cutthroat competition, and the concentration of wealth in the form of capital and power in the form of big monopolistic companies. Between 1870 and 1877, the struggle of the oil companies was mainly on transportation facilities.[236] Such companies had the same equal market opportunities since they produced and bought oil at the same price and sold the manufactured by-products without market price distinction.

[235] Ida. Tarbell. Op. cit., p. 7
[236] Ibid., p. 15

The key to surpass the others was to acquire freight rebates from the transport companies.[237] It is generally argued that discriminating freight rates bargained by Rockefeller were the main factor that enabled the Standard Oil Company to the most important company in the industry and later to monopolise it. In seven years between 1870 and 1877, SOC grew from controlling 4% of the refined oil output into a company that controlled 95% of it.[238] At this date, the SOC did not venture in entering the business of transporting oil by rails or pipelines because they required huge amounts of money as Rockefeller advanced. On the other hand, his influence was very strong in the oil market because he maintained his oil prices lower than his competitors, which enabled the SOC to control both petroleum domestic and foreign markets.

III. Domestic and Foreign Evolution of the US Petroleum Industry

A few years from its inception in 1859, the petroleum industry in the USA reached a high degree of effectiveness and proficiency as regards the production, the distribution, and the consumption of oil by-products. The production of crude oil grew more rapidly than the normal industrial development of the country. The huge supply of petroleum was the result of the highly competitive, individualistic methods of production during the 1860s and 1870s. The total

[237] Ida Tarbell, op, cit., p.34
[238] Ibid., p.12

American production in 1859 was 2000 barrels, in 1869 it had risen to 4,215,000 barrels. [239] The solution that the oil businessmen resorted to was to extend the home market and open new ones abroad. This oversupply problem was devastating to the oil operators since the prices were drawn to very low figures causing great losses. However, such problem pushed the oil operators to make great efforts to adapt this raw material to industrial and social needs by organising the industry of transportation and refining as a closely integrated enterprise, handling tremendous volumes of products.

A. **Development of Oil Production in the USA up to the 1870's**

As mentioned earlier, the petroleum industry in the USA started in what is known as the Oil Region in western Pennsylvania with a daily production of 2,000 oil barrels. The oil discoveries made the production to be far in excess for the market demand. The production was increased in a very short time in Oil Creek from 1200 to 2000 barrels per day in 1859, and between 8,000 to 10,000 barrels per day in 1860, the production was estimated at 12,000 to 20,000 barrels per day by the end of 1861. [240] In the same year, both Pennsylvania and New York produced a total of 2,113,609 barrels per day. Figures of oil production in the USA between 1859 and 1869 show a constant

[239] Victor Ross. Op. cit., p. 41

[240] Andrew Cone and Walter B. Johns. *Petrolia: Pennsylvania Petroleum Region, Its Development, Growth, Resources, From 1859 to 1869*. New York: D. Appleton And Company. 1870. P. 73

increase except in periods of market depression caused by over-production. [241] The effect of this large production upon the business was, for the time, disastrous. The prices declined to a mere nominal rate, oil was sold as low as ten cents per barrel at the wells.[242]

Until 1864, the development of the petroleum industry was confined to the localities in the Oil Region. However, from this date, Oil Creek operations were extended to Cherry Run, and there was a great deal of excitement in other counties in Pennsylvania. The next year, 1865, which saw the collapse of many speculative oil propositions, witnessed the discovery of the Pithole pool.

Pithole was a typical oil city that was built up in a very short time with a population estimated at 14,000 to 15,000 before the end of September 1865.[243] However, as its production decreased, its prosperity rapidly declined and within two years of its foundation it was practically deserted. As the producing fields changed throughout the oil region, the population shifted with the fields, and the towns that had sprung in the wilderness disappeared as quickly as they had grown. By the end of 1867, Pithole had lasted nearly two years because the wells began to decline and it was quickly deserted.[244]

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[241] See table of oil production p. 110
[242] Andrew Cone and Walter B. Johns. op. cit
[243] Gilbert Holland Montague. *The Rise and Progress of the Standard Oil Company*. New York: Harper and Brothers Publishers. 1902, p.13
[244] Boverton Redwood. Op. cit., p.90

Different factors contributed to such phenomenon. By the end of the Civil War in 1865, soldiers were discharged from the army, which created an increasing demand on jobs. Hundreds[245] of them headed towards Pithole in the oil region of Pennsylvania to make a fortune. In addition, the speculative bubble of 1864 and 1865 [246] caused the creation of new companies that were ready to lease or buy land wherever there was a promise of oil.

Public oil fervour came in succession as long as oil was struck in the neighbouring farms of Pennsylvania oil counties. By 1865 and 1866, the Woods and Stevenson farms on Oil Creek, near Petroleum Centre, attracted attention. Oil discovery occurred in Tidioute, or Dennis Run and Triumph Hill, and in Shamburgh, on Upper Cherry Run from 1867.[247] Again, public excitement was renewed when the Pleasantville and Petrolia oil fields were discovered in 1868 and 1870, respectively.[248] Wells also were drilled successfully in various other localities. Clarion County began to attract attention in 1866, and a small well was struck near Bradford in 1868. It is estimated that in 1869 there were 1,186 producing wells in Oil Region.[249] Butler, Armstrong and Clarion counties and Church Run, near Titusville, became the centres of activity. The Butler and Armstrong cross belt was discovered in 1874, and Warren County became an oil county in

[245] Ida Tarbell. Vol. 1. Op. cit., p. 25
[246] Ida. Tarbell. Op. cit., p.32
[247] Raymond Bacon Foss and William Allen Hamor. Op. cit., p. 220
[248] Gilbert Holland Montague, op. cit., p. 21
[249] Reid McBeth Sayers. Op. Cit., P. 61

1875. Further oil discoveries reached its height in the Allegheny field in 1882. The year 1883 saw the development of the Balltown and Cooper pools in Forest County. Washington County was added to the list in 1885, with Greene County and McKean and Elk Counties. It became clear that the petroleum industry was not meant to be a local industry, but a global one that played in many respects a big role in shaping every aspect of world economy and politics, and social evolution.

Year	Pennsylvania and New York	Ohio	West Virginia	California	Kentucky & Tennessee	Colorado	Indiana
1859	2,000						
1860	500,000						
1861	2,113,609						
1862	3,056,690						
1863	2,611,309						
1864	2,116,109						
1865	2,497,700						
1866	3,597,700						
1867	3,347,300						
1868	3,646,117						
1869	4,215,000						
1870	5,260,745						
1871	5,205,234						
1872	6,293,194						
1873	9,893,786						
1874	10,926,945						
1875	8,787,514	200,000	3,000,000	175,000			
1876	8,968,906	31,763	120,000	12,000			
1877	13,135,475	29,888	172,000	13,000			
1878	15,163,462	38,179	180,000	15,227			
1879	19,685,176	29,112	180,000	19,858			
1880	26,027,631	38,940	179,000	40,552			
1881	27,376,509	33,867	151,000	99,862			
1882	30,053,500	39,761	128,000	128,636	160,933		
1883	23,128,389	47,632	126,000	142,857	4,755		
1884	23,772,209	90,081	90,000	262,000	4,148		
1885	20,776,041	661,580	91,000	325,000	5,164		
1886	25,798,000	1,782,970	102,000	377,145	4,726		
1887	22,356,193	5,022,632	145,000	678,572	4,791	76,295	
1888	16,488,668	10,010,868	119,448	690,333	5,096	297,612	
1889	21,487,435	12,471,466	544,113	303,220	5,400	316,476	33,375
1890	28,458,208	16,124,656	492,573	307,360	6,000	368,842	63,496

Production of petroleum in the United States, 1859-1890, by years and by states. (Barrels of 42 gallons.)[250]

[250] Charles A. Whiteshot. Op. cit., P.800

B. **Growth of Petroleum Domestic Market up to 1870**

The petroleum market in the USA started with Edwin Drake since he was the first to make a contract with Samuel Keir of Tarentum in 1859 on the basis of a regular supply of oil. Keir had the right to sell oil to any other that would come on the market, and to reduce the price paid to Drake in case oil appeared from other sources on the market. Under this arrangement, Drake shipped almost $3,800 worth of oil to Kier and over $5,000 worth to W. MacKeown, another oil distiller in Pittsburgh.[251]

Interested by the enlargement of the oil market by 1860, the oil operators from the Seneca Oil Company wanted to create a monopole in both the production of oil and in its refining by establishing an agreement with William Ferris, who was a New York oil dealer. In this agreement, the Seneca Oil Company offered to sell to Ferris and his associate MacKeown all oil they had to spare, if a satisfactory price could be agreed upon, without distilling or selling oil to others. In return, the company wanted Ferris and MacKeown to distil only the oil that the Seneca Oil Company sold them. Under this arrangement, the company would control the crude oil, Ferris and MacKeown the refined one. This plan to monopolise the oil market failed because of MacKeown's reluctance to accept it.[252] Apparently, the idea to enlarge the oil market in its early days was perceived as a risky manoeuver

[251] Gilbert Holland Montague, op. cit., p. 58
[252] Ibid

with both financial and economic adverse consequences. Still, the idea to enlarge the oil market was tempting because the more oil was sold whether crude or refined the more profits could be made.

The search for new oil markets obliged Edwin Drake to make a trip to Erie, Chicago, Cincinnati, and Pittsburgh in February 1860, in order to introduce oil. As stated earlier, the main objection to oil was against its disagreeable odour, its impurities, and its dark muddy colour, although some machinist recommended it as a lubricant. However, while he was in Pittsburgh, Drake succeeded in striking a contract[253] with George M. Mowbray, a chemist associated with the wholesale drug firm of Schieffelin Brothers and Company of New York, under which he had to ship to the Schieffelins all the oil except what was already obligated from the wells of the Seneca Oil Company. In return, the Schieffelins guaranteed all sales, agreed to return all proceeds after deducting the charges, and for this service, they were to receive a commission of 7.5 %.[254]

Drake and his associates became aware of the fact that if they wanted to enlarge the existing oil market and open new ones, oil had to be deodorized, decoloured and purified before it could be sold extensively. Since there were only small refineries of Kier, MacKeown, and Ferris, the Seneca Oil Company decided to go into the refining business, but without potential success concentrating

[253] Charles A. Whiteshot. Op. cit., p. 54-55
[254] Gilbert Holland Montague, op. cit., p. 61

only on oil production leaving its refining to other refining companies.

From 1860, more refineries were built along Oil Creek and the Allegheny River, in farms such as Union Mills, Corry, and Erie. In the fall of 1860, W. H. Abbott, James Parker, and William Barnsdall built the first refinery in Titusville. When completed, the refinery consisted of six stills and six bleachers, with all the tanks and fixtures, and its first run of oil was made on January 22, 1861, with a yield that did not exceed 50 % of the crude.[255] Since they did not know how to utilise the remaining "useless" by-products, they either dumped them into Oil Creek or burned all the tar and naphtha.

The number of refineries rapidly increased. Pittsburgh, which became the largest refining centre because of its location on the Allegheny River, had five large refineries in 1860, and by 1863, it had 60, representing a capital investment of $1 million.[256] The refineries employed 600 men and had a total weekly capacity of 26,000 barrels.[257]

During the early days of the industry, the oil operators found the oil market very limited since the real value of petroleum had not yet been discovered, which adversely affected its price. People were divided in opinion between those who thought that it was dangerous,

[255] J. H. A. Bone. *Petroleum and Petroleum Wells*. Philadelphia: J. B. Lippincott & Co. 2nd edition, 1866. 21
[256] Andrew Cone and Walter B. Johns. Op. Cit., P. 68
[257] Andrew Cone and Walter B. Johns. op. cit.,p. 69

and those who believed in its great potentialities. Therefore, the supply was generally in advance of the demand. The market could not absorb the production, which made the price of oil fall.[258]

The oil obtained from the well of the Pennsylvania Rock Oil Company was sold at 50 cents per gallon in 1860, and by July of the same year, the price at the wells had declined to seven cents per gallon. [259] In October, it was 10 cents per gallon and it reached 25 cents per gallon on January 1st, 1861. It continued at about that figure until toward the end of February. However, on the 1st of March, it declined to 15 cents, and on the 18th of March, it was only 10 cents per gallon.[260] The decline continued as the supply increased by the discovery of large flowing wells in the summer of 1861, and the price of oil fell to 05 cents per gallon or 02 dollars per barrel.[261]

This over-supply almost entirely destroyed the value of oil in the market. While some oilmen flowed thousands of barrels to waste, others who had some storage capacity stored their oil waiting for better market prices to sell it.[262] Nevertheless, the market went further down since some sales, during July, were made at 10 cents per barrel. In August and September, the sales made were as low as 50, then sales were made at 40 cents per barrel between October and

[258] Ibid
[259] J. H. A. Bone. Op. cit., p. 25
[260] Ibid., p.26
[261] Ibid
[262] Gilbert Holland Montague. Op. cit., p. 79

December. In January 1862, the price advanced to 5 cents per gallon without any hope to redress the market. Nearly all these sales proved to be unprofitable.[263]

While price fluctuation was the main feature of the US oil market, speculation revived the oil business. In October, the price was carried in New York as high as 50 cents per gallon, [264] by December it had receded to 25 cents per gallon, and during 1863, it ranged between 18 and 25 cents. In 1864, the price increased from 29 cents and a quarter in January, to 56 cents per gallon in July. It continued high with some fluctuations until January 1865, when crude was sold at 49 to 50 cents per gallon, which gave the producer a profit between 3 and 7 dollars, and even 10 dollars per barrel at the wells that became of immense value.[265]

The development of the oil market in the USA during the 1860s and 1870s mirrored the development of the industry itself. The main feature of the oil market in the early years of the industry was that it grew from the individual enterprise of the oil well drillers. The production of oil was highly competitive which gave instable markets and prices. The production of oil proved unprofitable[266] as more and more oil producers sold their oil in already saturated market. The great flood of oil reduced the price at the seaboard to nine cents per

[263] Andrew Cone and Walter B. Johns. Op. Cit., P. 79
[264] Ibid., P. 80
[265] Gilbert Holland Montague, op. cit., p 85
[266] Andrew Cone and Walter B. Johns. Op. Cit.,P. 79

gallon in May 1862, causing a considerable loss to the sellers. The high supply and low demand for oil in the home market pushed the oil businesses to open the foreign markets for the consumption of oil mainly in Europe.

As in any trade, profitability in the oil business depended on the high degree of proficiency in the distribution and marketing of its products. The oil business was different from the other trades by the fact that the distribution of the products was in the most part operated by the industry itself as an integral part of its manufacturing activities.[267] For the marketing of refined products, the large refining companies maintained distributing stations at the leading cities throughout the country. Some of these installations received the refined products in bulk, which they packed for the retail trade.

As the Pennsylvania's production approached its maximum. From 1871 to 1878, annual production was estimated to have averaged about 10 million barrels. The region from 1879 to 1886 reached an average of 25,000,000 barrels.[268] As stated earlier, the internal combustion engine had a reflationary effect on the market because of the increasing demand on gasoline and other oil by-products, which was engendered by the increasing number of cars up to the end of the 19th century and beyond.

[267] Andrew Cone and Walter B. Johns. op. cit.,
[268] Reid Sayers Macbeth. Op. cit., p. 62

C. US Oil Exports to Europe and the Development of Petroleum World Market to 1870

The low prices in the home-market pushed the oil merchants who had ventured in the trade, to seek new foreign markets mainly in Europe. The first exportation of refined oil happened in 1861 when the American Consul at Antwerp, Belgium demanded 40 oil barrels.[269] Latter in the same year, the US petroleum foreign trade started when the shipping firm of Peter Wright & Sons, of Philadelphia, chartered a brig, the *Elizabeth Watts*, to carry a cargo of oil in barrels to London. The objective was to introduce petroleum and its by-products and create a demand for it. Other oil shipments increased rapidly and new countries and regions were tried, and within two years oil and its by-products were exported to practically every port in Europe, to Egypt, the Orient, East Indies, Australia, New Zealand, and nearly all the countries of the Western hemisphere.[270]

The exportation of oil in the USA was in constant growth. The exports for the year 1862 were 1,112,476 gallons (43,386,564 L), or 27,812 barrels.[271] When this flood reached the European ports, the market did not respond positively since demand on oil was less than the supply. The exporters that had bought oil in New York at nominal prices suffered heavy losses. At least, the product was brought to the

[269] Victor Ross. Op. cit., p.117
[270] Walter Sheldon Tower. Op. cit., P.223
[271] Ibid., p. 79

attention of the public in Europe, and the way was opened for future and increasing demand. The exports to Europe reached nearly 800,000 barrels in 1864, which is a big quantity because the total production of crude oil then barely exceeded 2,000,000 barrels [272] annually. Add to that, the fact that the Civil War was still waged and the Confederate cruisers hampered to a certain extent the traffic from and to the main Northern ports. The amount of US refined products exported to Europe and registered at the most important ports during 1866, 1867, and 1868, can be enumerated in the following table:[273]

Port of Delivery	**1866**	**1867**	**1868**
Bremen	108,886	180,840	280,755
Antwerp	278,927	340,898	339,790
Rotterdam	37,500	80,000	145,245
Hamburg	67,655	83,041	139,679
Stettin	19,000	49,500	84,270
London	99,906	94,036	88,270
Liverpool	62,118	63,211	50 ,236
Total in Barrels.	673,442	891,526	1,128,803

The following figures[274] show clearly the amplitude of the growth of the exports to foreign markets in the interval of just one year.

Product	**1867**	**1868**
Refined	60,046,384	82,391,524
Crude Oil	5,262,562	7,770,833
Benzene	1,771,300	8,771,599
Total in Gallons	67,080,246	98,933,959

[272] Walter Sheldon Tower. Op. Cit., P. 225.
[273] Andrew Cone and Walter B. Johns. Op. Cit., p. 608
[274] Andrew Cone and Walter B. Johns, op. cit., p. 617

The most important increase in the export of crude oil and its by-products to the cities of London, Liverpool, and Bristol, for example, happened in the years 1872 and 1873 as shown in the table below.[275] Such increase in the consumption of oil and mainly kerosene in Great Britain was the coal famine that country suffered from in 1873. Therefore the prejudices against kerosene as an illuminator was undermined, which made the oil trade between the USA and Britain acquire vast proportions.

	1872	**1873**
London	353,433 barrels	1,741,551 barrels
Liverpool	255,708 "	1,150,877 "
Bristol	136,534 "	781,852 "

The American domination of oil foreign markets had been entirely undisputed until after the completion of the Caucasus railroad and the rise of Baku as an oil producing region about 1883. The Baku operators began their attempts to introduce Russian oil in small amounts into the important trade of Smyrna[276] and other cities of the near East, which did not affect the American interests in the region, but announced the beginning of a struggle for the oil world trade. The Americans began to fear Baku's competition when the Swedish Nobel brothers arrived at Baku and started organising the industry there by laying down pipelines and creating associations of oil producers and

[275] Henry J.T. op. cit., p. 313
[276] Walter Sheldon Tower. Op. cit., p. 226

refiners. [277] Since then, the Americans for the first time had a rival against whom they had to struggle for the big markets in the world.

The first setback suffered by the Americans happened when they were driven out of the Russian market. The Russians speedily accomplished this result by improving the Baku refined product until it was a satisfactory substitute for the high-grade American oils, and by imposing a heavy tariff on all petroleum imports.[278] Therefore, the Russians reduced their imports of American petroleum products from thousands of barrels to a few hundred gallons, except for some special brands that they could not manufacture, but eventually they stopped imported any products from the USA.[279] The Nobels[280] were largely responsible for this since they raised the standard of refined products, and commanded the entire Russian market. The competition between the Americans and the Russians for the oil world markets was further heightened by the advent of the Rothschild firm at Baku,[281] who enabled the Russian oil to reach out for foreign markets.

The international competition for the control of the oil market announced the beginning of a new era characterised mainly by speed. The Second Industrial Revolution that started relatively from the

[277] Ibid., p. 207-208
[278] Ibid., p. 232
[279] Ibid.
[280] The Nobel Brothers were Alfred, Ludvig, and Robert. They produced oil in Baku. When the Nobel Prices were established in 1901, 12% of the price money was drawn from the Nobel Brothers' Petroleum Industry.
[281] Ibid., p .233

1880s put an end to the traditional means of lighting, motion, and production, exchange, distribution and consumption of goods and services. The petroleum by-products greased and fuelled light generators, automobiles, trucks, trains and ships, and the machines of factories... etc. At this level, a new form of organisation of the petroleum industry in the USA, namely the Trust, was born. The Trusts were in fact the consolidation of the existing companies in the different sectors of the industry (production, transportation, manufacturing, and marketing) into giant corporations that monopolised the market of petroleum and its by-products.

Chapter Three

The Organisation of the Standard Oil Trust and the Campaign against its abuses from 1872 to 1890

The technological and scientific developments brought about by the industrialisation of the USA had an important impact on the organisation of the country's economy. Changes in business practices obliged the state and federal governments to pass corporate laws to organise the establishment of corporations and cope with the constant and rapid evolution of the industries. The state and federal legislators relied on the existing laws that regulated the companies and corporations, even those issued during the colonial period like the Tudor Industrial Code.[282] However, in most cases they had to pass acts to legislate for new and unprecedented economic phenomena and industrial and commercial practices. For instance, in its early

[282] The Tudor Industrial Code sought to assure profit to the English entrepreneur by guaranteeing him an adequate labour supply at a subsistence wage and at the same time to safeguard the worker against unrestrained exploitation in order that agricultural and industrial labour needs might continue to be met over the long term. Richard B. Morris, *Government and Labor in Early America*. New York: John Wiley & Sons. 1946, p. 9

stages, competition was common between the storekeepers and the producers of the same product, but it had become sharp with the development of the factory system. This competition needed both state and federal laws to suit the principles of the laissez faire policy such as fair competition, free enterprise, free market...etc.

The evolution of the corporate system into trust organisation was the demarcation line for a new era of doing business in the petroleum industry in the USA. Early economic competition gave birth to partnerships, which were simple combinations between small dealers that combined and united their joint resources in one business to resist the attacks of their competitors. Later, other big combinations appeared including big numbers of individual shareholders called stock companies or corporations[283] that emerged as a consequence of the growing industrialisation of the USA.

By the end of the 19th century, the American economy was mainly conducted by the corporations, which grew into monopolies that had attracted such general and widespread attention and public discontent. Popular discontent against the monopolies and trusts was

[283] The word "corporation" is generally synonymous with large publicly owned companies in the United States. A company may or may not be a separate legal entity, and is often used synonymously with "firm" or "business." A company means a corporation or, less commonly, an association, partnership or union that carries on industrial enterprise. *Britannica Concise Encyclopedia*. USA: Merriam Webster's. 2003. P. 1459

seen as "hatred of wealth"[284] and hostility to capital. It was the desire of some agitators to stir up class feeling and organize a crusade against prosperity. Nevertheless, such discontent was so overwhelming that a party called the Anti-Monopoly Party was founded in 1884. It became urgent to control the monopolies, corporations and trusts since they were created by law as the Party argued. This meant that the immediate duty of government was to exercise its constitutional prerogative to regulate commerce between the states and control the corporations.

The study of corporate organisation and laws in the USA during the period of the appearance of the first trust namely the Standard Oil Trust is of great importance because it constitutes a turning point in the world of business. This chapter studies the organisation, practices and abuses of the Standard Oil Trust, dealing with the *Sherman Anti-Trust Act (1890)* [285] as the first legal action against the monopolies and trusts.

I. Trust Legal Issues in the USA that Accompanied the Emergence of the Petroleum Industry from 1872 to 1890

Historically, the United States inherited the monopolies from the English colonial administration. The latter granted some companies

[284] Charles J. Bullock. "Trust Literature: A Survey and Criticism." In: *Trusts, Pools And Corporations*, Edited By William Z. Ripley. Boston: Ginn & Company. 1905, p. 439. (PP. 428-473)

[285] *The Sherman Anti-Trust Act July 2, 1890*.ch. 647, 26 Stat. 209, 15 U.S.C

exclusive contracts to accomplish certain works as the cities grew larger and larger during the 19th century. Therefore, it was common for the municipalities to grant monopolies to certain companies for the sewage works, canal navigation, gas works, railroads transportation, coal mining, and lumber on public lands and their transportation. After the independence in 1783, it was customary for the US State Governments to grant different individuals special monopolies on different articles of industry and commerce in order to raise revenue.[286] In return, the government received a large percentage of the profits or a large sum to be paid as outright for the privilege granted.

Before the ratification of the US Constitution in 1788, the corporations had been considered illegitimate only in specific industries such as insurance and banking[287] because these two financial sectors could not be managed efficiently through partnerships. After 1788, corporations were still distrusted[288] as they were closely tied to interstate commerce and government sovereignty. During the early years of the Republic, interstate commerce was not yet regulated definitely, which would have given opportunities to the corporations the means to exploit and monopolise vast economic and industrial sectors. Corporations were

[286] Ezra Parmalee Prentice. *The Federal Power over Carriers and Corporations*. New York: the MacMillan Company. 1907, p. 96

[287] The first bank of the United States was chartered in 1791 by the US Congress to raise money for the government and create a common currency. Ibid., p. 140

[288] Ibid., p. 143

also distrusted because their money power was feared to corrupt the country's politics[289] causing prejudice to the integrity and sovereignty of government.

It is undeniable that this distrust was legitimate because the corporate system made competition sharper with different tools and practices that were used to either destroy the competitors or drive them out of business such as making secret agreements to fix prices and divide areas of interest. This competition had then been the driving force to the use of the resources of the country and to increase the production and transportation of goods.[290] Nevertheless, unbridled competition created inequality among the competitors causing great fluctuations of prices, and profits that were limited to few powerful competitors who wanted to monopolise their respective trades giving birth to the trust system. [291]

A. Corporate Legislations in the USA up to the 1870s

It is evident that in its early years, the petroleum industry was the result of the endeavour of foolhardy and intrepid individuals. The notion of establishing corporations to handle the various oil operations was introduced from the 1860s as a means to organise the

[289] Ezra Parmalee Prentice, op, cit., 143
[290] Jairus WarePerry. *A Treatise of the Law of Trusts and Trustees*. Boston: Little, Brown and Company. Fifth Edition.Vol.1. 1899, p. 1
[291] Ida. Tarbell. Vol. 1 Op. cit., p.12

industry. The need for money gave birth to the corporate system that could accumulate capital from many investors, who in return received dividends from the corporation's profits.[292] However, the corporate system, which developed the petroleum industry, gave birth to corporate abuses and cutthroat competition.

Historically, before the independence of the USA corporations had been considered unlawful without explicit authorisation a Royal Charter or an act of Parliament. Two elements were at the basis of such standpoint. The first was the world's first stock market crash in 1720 known as the *South Sea Bubble*, and Adam Smith's opinion on corporations in his book *The Wealth of Nations* (1776). [293] Adam Smith explained that it was dangerous to let directors manage other people's money, which made them more inclined to negligence and to involve in risky businesses.

After the independence of the USA, corporations were slowly introduced. The first corporation to be chartered in the USA was the Federal Bank of the United States in 1791 by the US Congress to raise money for the government and create a common currency (alongside a federal excise tax and the US Mint). The Bank had private investors and its charter was written to expire in 20 years. Henceforward, state

[292] Samuel Calvin Tate Dodd. *Combinations: Their Uses and Abuses, With a History of the Standard Oil Trust.* New York: George F. Nesbitt & Co. 1888. P. 6

[293] Richard Dale. *The First Crash: Lessons from the South Sea Bubble*. London: Princeton University Press, 2004. p. 40

governments could incorporate corporations through special legislation. New York was the first state to have a simple public registration procedure in 1811 with the purpose to start corporations for manufacturing business. More and more states provided simple registration procedures that allowed free incorporation of many small and democratically organized corporations under a corporate constitution or charter.

There are five basic legal characteristics[294] of business corporations: legal personality, limited liability, transferable shares, delegated management under a board structure, and investor ownership. Corporations are treated as 'legal persons' with separate legal personality from its shareholders, directors or employees. They are the subject of legal rights and duties, which means that they could make contracts, hold property or commission torts, sue or be sued. They have the same legal rights and obligations as actual humans by exercising human rights against real individuals and the state, and they may be responsible for human rights violations and convicted of criminal offences.

The corporate system allows investors to have limited liability, which could be considered as a shield to protect the investors or shareholders. In case the corporation went bankrupt, the investors would lose their investment, but would not be held responsible for

[294] John Armour, Henry Hansmann, Reinier Kraakman. *The Essential Elements of Corporate Law: What is Corporate Law?* USA: Harvard Law School. 2009, p.6

the corporation's debts.[295] The third characteristic of a corporation is transferable shares that refers to a transfer of ownership to permit the firm to conduct business uninterruptedly as the identity of its owners changes. This enables the corporation to avoid the complications of member withdrawal, which are common among partnerships, cooperatives, and mutual. The fourth characteristic stands for the board of directors or similar committee organ that the shareholders periodically elect to have authority vested by corporate law over corporate affairs, businesses, and decision-making. The fifth characteristic simply concerns the right of the shareholders to control the firm, and to receive the firm's net earnings. Almost all large corporations comprise the five above characteristics that are the basis on which corporate laws are built to regulate internal corporate affairs.

In the United States, the constitution of a newly 'born' corporation is split into two separate documents.[296] The first is the memorandum of association (or articles of incorporation), which is the primary document to regulate the company's activities with the outside world by stating the nature of the finished goods to be produced, and specifying the authorised share capital of the company. The secondary document is the articles of association (or by-laws) that generally regulate the company's internal affairs and management.

[295] John Armour, Henry Hansmann, Reinier Kraakman. Op, ciy., p. 9
[296] George Gleason Bogert. *Handbook of the Law of Trusts*. Minnesota: West Publishing Co. 1921, pp. 36-37

Only the memorandum is published into a single document, often called the charter.

As artificial persons, companies are created by operation of law that prescribes what it could and could not do. British judge, Walton J, described a company as "...*only a juristic figment of the imagination, lacking both a body to be kicked and a soul to be damned*." [297] Therefore, companies can only act through human agents who are elected by the members to deal with the company's management and business known as the board of directors, which in turn appoint the company officers. On the other hand, corporate business affairs and practices in the market are regulated by state or federal corporate legislations.

The corporate legislations, which were enacted during the second half of the 19th century, were intended to regulate a continually and incessant changing petroleum business world. The petroleum industry brought new and unprecedented ways of doing business that were out of the framework of the existing legislation. The petroleum operations, whether in drilling, extracting, transporting or refining petroleum and its market as a crude and by-products, obliged the state or federal governments to enact laws and amend

[297] Andrew Hicks and S.H. Goo. *Cases and Materials on Company Law*. Oxford University Press. 6th Edition. 2008, p. 214

others to cope with the exigencies of the new business judicial cases, technological procedures, or commercial and economic undertakings.

B. Origin and Classification of a Trust

In its common and broadest sense, the word 'trust' refers to the belief that a person or an entity will not perpetrate harmful actions. In law, the term 'trust'[298] includes a multitude of relations, duties, and responsibilities that executors and administrators, guardians of infants and lunatics, assignees in insolvency and bankruptcy, bailees, factors, agents, commission merchants, and commissioners, as well as the officers of public and private corporations, exercise to reach the objectives set by the establishment of the trust. A trust is a means of separating legal and beneficial ownership of property. The establishment of a trust implies that a person or a group of people enter into an agreement with a trustee to oversee the management of certain assets for the beneficiaries of the trust. Trusts have always been used as a method of limiting the exposure of assets to taxes and other legal claims as well as to specify the use of those assets in ways not otherwise recognized under the law.

Legally, a trust is a relationship in which one person is the holder of the title to property, subject to an equitable obligation to keep or

[298] Jairus Ware Perry. Vol. 1. Op. cit., P.2

use the property for the benefit of another.[299] The formation of a trust includes the union of different powerful corporations, but also the merger of those that display weaknesses.

Trust advocates and promoters emphasised many benefits in the establishment of a trust for both the trust founders and shareholders, and the public. A trust enables the reduction of fixed charges such as the amount paid for salaries of superintendents, foremen, bookkeepers, salesmen and others, whose services are usually required to be retained throughout the year. They legitimise the existence of the trust form of business organisation by the fact that the reduction in fixed charges means the reduction in the cost of production if the product is delivered directly to the consumer or through the trust's subsidiary companies, which is beneficial for the consumer since the prices could be reduced below his purchase power. The combination of different corporations and companies into a trust engenders a substantial saving in rent or in the amount of interest required to be charged upon capital invested by diminishing the number of establishments to be maintained.

Therefore, the cornerstone in the benefit of establishing a trust is that it decreases the cost of production. It could reduce the cost of repairs and operation by employing a smaller number of plants and avoiding the duplication of machinery, and through the managerial

[299] George Gleason Bogert. op. cit., p. 2

staff.[300] The benefit from reducing the managerial staff is that it creates a single unified management that can have a global view of all the industry operations[301] and accordingly can take decisions to avoid incidental costs. An example of this benefit can be illustrated by the good management of transportation in the distribution of the goods. The unified management is able to reduce the itinerary of its means of transport, which will reduce fuel consumption and then save a lot of money for the trust. This includes also the reduction in the expense of light, heat and power, and ventilation. From a strategic management perspective, a trust enables the distribution of orders so that the goods may be produced at the points most convenient for manufacture, transportation, and delivery.

The reduction in the cost of production from the establishment of a trust affords the procurement of raw materials in favourable prices and quantities and in the most favourable terms that enables the elimination of competition and settle a monopoly to regulate and fix prices. The elimination of domestic competition gives favourable conditions for a trust to conquer foreign markets.[302]

The trusts in the USA evolved to be classified according to the manner or purpose of their creation.[303] In terms of the manner of creation of a trust two main forms under which it could be legally

[300] George Gleason Bogert. op. cit p.4
[301] Ibid., p. 15
[302] Ibid.
[303] George Gleason Bogert. Op. cit., p. 43

classified namely: express trust, and implied trust, which can be in turn divided into resulting and constructive trust.[304] Such classification is based on the manner of creation of the trusts because it determines the rights and duties, and legal procedures between the trust parties in case of founding, organisation, liability, and termination. On the other hand, trusts that are created according to their purpose of creation take the form of *private* or *charitable* trusts.

The *express trust* is the kind of trust that comes into being because the parties concerned have formed the actual intent and expressed it in written or spoken words or otherwise, and have made the requisite property transfers.[305] On the other hand, in case one of the parties in the founding of a trust is missing or that a written document or oral expression or other acts could not be provided to show a trust founding, then such trust is known as *implied trust*. [306] The latter is created by court law inferring and implying that it was the purpose or intention of the parties to create a trust.

The second form of a trust as regards the manner of its creation is the private trust. It is distinguished by the fact that its objects or beneficiaries are identified persons. It can be a trust created by a father for the benefit of his son. Being for individuals, private trusts are limited to the life of the beneficiaries. On the other, public or charitable trusts are created with the purpose to assist or benefit the

[304] Ibid., pp. 44
[305] Jairus Ware Perry. Op. cit., p. 126
[306] Jairus Ware Perry. op. cit., p. 126

public in general or specifically a category of society (people in poverty or distress. The beneficiaries must be indefinite, and unascertained persons. The purpose and manner of the creation of trusts determine their character and objective, but their termination is in general the same.

The termination of the trust is mentioned and fixed by the trust instrument or the oral settlement. The settlor states the period for which the trust is to continue, and this period is a lawful one set in terms of years, or all along the life of the parties. A trust may be terminated because of the alienation of the interest of the cestui que trust, a breach of trust by the trustee, or the discharge of the beneficiary from all his debts. Termination of the trust can be rendered certain by the exercise of the power of termination given to the trustee, the cestui que trust, or the majority of the beneficiaries.[307] The founding and termination of trusts determine their beginning and end, which requires a study of their organization and practices to comprehend the specificities of such complex economic institutions.

[307] George Gleason Bogert. op. cit., p. 564

C. Legal Elements in the Establishment of a Trust, Limitations and Termination

As mentioned earlier, the establishment of a trust implies the existence of different parties namely: the settlor, the trustee, and the cestui que, the trust property. The settlor of a trust is the person who intentionally causes the trust to come into existence. Any person capable of conveying property may create a trust by a declaration of trust or transfer in trust. A state or a municipality, and private corporations may settle property in trust. It is also possible for infants, married women, lunatics, and aliens to be settlors in the creation of trusts in their property. In some cases, a trust may exist with only three elements because the settlor can declare himself a trustee occupying the two functions.

The second element in the establishment of a trust is the trustee. The latter is legally considered as the person who holds the title of property for the benefit of the cestui que trust. A trustee is a "person in whom some estate, interest, or power in or affecting property of any description is vested for the benefit of another."[308] The trustee can be a natural person or legal entity capable of taking and holding the title of property. This person can be an individual or a state. Corporations, both private and municipal, may accept trusts for

[308] Jairus Ware Perry, op. cit. Vol I. p.2

purposes within their corporate powers with the condition to be incorporated. Original appointment of the trustee is vested in the powers of the settlor. By definition, the settlor is the person who selects the trustee, trust property, and beneficiary, and establishes the trust.[309]

The trustee is empowered to carry out the purposes of the trust. The powers of the trustee are called general if they are attached to the office by implication of law, and special if they are expressly granted by the trust instrument or written agreement. The most significant and feature of the trustee is that he takes the trust property into his possession and protect it against trespass, waste, and conversion. The trustee is under a duty to the cestui que trust *'to keep accurate and complete records of the trust business, to furnish the beneficiary with all necessary information regarding the trust, and to render in a court of competent jurisdiction a full account of the administration of the trust*.'[310] Therefore, the trustee has the power to sell the trust property, or to mortgage the trust property when the necessities of the trust require such action. The implied authority to lease the trust property exists in the trustee whenever such a step is a reasonably necessary in the trust management.

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[309] John Mclaren. *A Treatise on the Law of Trusts and Trust Settlements.* Edinburgh: Murray & Gibb, Printers. Vol. I. 1862. P.73

[310] Ibid., p. 3

The cestui que is the person who benefits from the trust property that is held or used by the trustee. The existence of a cestui que trust is obligatory for the establishment of a trust. Therefore, any person, natural or artificial, capable of taking and holding property may be a cestui que trust of a private trust. The right of cestui que trust against the trustee is to carry out the trust as laid down in the trust instrument (agreement) and in accordance with the rules of equity. In case the trustee does not fulfil his tasks and infringes the rights and interests of the cestui qui, the latter could enforce a bill in equity against him.[311]

The rights and duties of the trustee and cestui que raise the issue of the control of trust administration. The control of the trust administration is vested in the cestui que because he can appoint or remove a trustee, appoint a receiver, to decree an account, to direct the specific performance of the trust, and in many other ways to compel the execution of the trust according to its terms. [312]

The last party in the establishment of a trust is the trust property, which is the asset, whether real or personal, that by title belongs to the trustee and is subject to the rights of another person. These elements are defined in terms of rights, duties, and procedures in written or established by a court of equity. The subject matter of a trust concerns the property that can be of any kind recognized as

[311] Jairus Ware Perry, op. cit. Vol I. p.16
[312] George Gleason Bogert. op. cit., pp. 446-447

valuable by a court of equity. A trust is not conceivable without a property real or personal so that it may be enforceable.[313] The trust property may be land, money, a patent right, growing crops, a promissory note, a claim against a bank, a company, an equitable interest, a ship in construction, or unaccrued rents and profits… etc. The trustee holds such property for the benefit of the cestui que or the beneficiary. As a trust is established for the benefit of the parties that constitute it, it can be dissolved.

There are different reasons for any trust to be terminated. The death of a trust party ordinarily has no effect on the life of a trust. Among such reasons, we may cite the following:[314]

1. Natural expiration of the trust term as defined in the trust instrument,
2. The accomplishment of its purpose,
3. The impossibility of its execution,
4. Its destruction by the operation of the doctrine of merger,
5. The exercise of a power of revocation reserved to the settlor or another,
6. A decree of termination upon the demand of the cestui quetrust because the trust accomplished its purpose
7. The sale of the trust property upon the foreclosure of a lien - arising prior to the trust.

[313] Ibid., p. 553
[314] Ibid., p. 566

The trust form of industrial corporate organisation first appeared in the petroleum industry. The latter enabled many people to build fortunes in a short time like John D. Rockefeller who built the world's greatest individual fortune and is credited to be the first billionaire. Rockefeller's fortune came from the corporation that he established namely the Standard Oil Company of Ohio, which he and his partners organized in 1870 under the laws of Ohio. From this original company developed the giant organization known as the Standard Oil Trust (SOT) from 1882. The (SOT) controlled about 90 to 95%[315] of the refining industry through combinations that caused the disintegration of many oil companies either by extermination or by integration.

II. Establishment of the Standard Oil Trust, its Organisation, and Impact on the Petroleum Industry 1872 to 1901

The establishment of the Standard Oil Trust was enigmatic in the sense there had been no precedent in corporate laws to rely on for a thorough understanding of its nature, organisation and legal existence. Only its direct market effects could be grasped because its founders aimed at making it a means to manufacture a better quality of illuminating oil at less expense, and helped in uniting the refining business with the other related businesses. The trust founders

[315] In 1873, nearly all Cleveland petroleum refineries were acquired by S.O.C. Raymond Bacon Foss and William Allen Hamor. Op. cit., p.260

advanced that the ultimate objective was to increase the supply of oil products and lessen their price to the consumer.

The impact of the SOT on the petroleum industry in the words of J. D. Rockefeller that the SOT united the knowledge, experience and skill of all parties, as well as their various secret processes and patents, and to obtain and utilize the best scientific skill in investigating and experimenting upon the obtaining of new and useful products from petroleum. He realised one of the most perfect business organisations the world has ever seen,[316] managed with the strictest economy most of the oil business sectors. The SOT established an aggressive marketing machinery that operated in new and remote markets[317] in the USA as well as in China, Africa, South America, and Europe.

However, in its quest for such objective that benefitted the American consumer, the SOT claimed many victims in the oil business because of its cutthroat competition. The practices of the SOT became so flagrant that the States and the Federal governments initiated investigations and lawsuits first to understand what was happening in the industry, and then decide if there was prejudice to be redressed or not.

[316] Ida Tarbell. op. cit., Vol. 1. p. vii
[317] Ibid., Vol. 2. P. 125

A. Establishment of the Standard Oil Trust, Its Organisation, Functioning, and Objectives

During the early years of the petroleum industry in the USA up to 1872, crude oil was not sold as low as 25 cents per gallon.[318] Although in some occasions, it was sold at 50 cents, the refiners did not make substantial profit. It was estimated that a refiner could make reasonable profit only if he bought the crude at 7 cents per gallon.[319] Therefore, it became clear that making profit from refining oil was bound to the reduction of the price of crude, low freight charges, and to increase in consumption by expanding oil markets.

Evidently, the unfavourable business conditions of the oil business and its hazardous nature pushed towards the acquisitions of rival companies and business amalgamation to make the oil business profitable. It was clear for the oil companies that the cost of transportation and packages had been important factors in ruining oil business companies.[320] The only company that overcame such business constraints was the Standard Oil Company of Ohio, which was organized by John D. Rockefeller and associates in 1870 with a capital of $ 1 million.[321] It is worth mentioning that the Standard Oil Company bought numerous and scattered companies that were specialised in producing, transporting, and manufacturing and

[318] Samuel Calvin Tate Dodd. Op. cit., P.19
[319] Ibid., p. 21
[320] Samuel Calvin Tate Dodd. op. cit p. 22
[321] Gilbert Holland Montague. op. cit., p. 7

marketing oil.[322] Such companies consisted of oil-producing companies like the South Penn Oil Company, the Ohio Oil Company, and the Forest Oil Company. The transporting companies included the National Transit Company, the Buckeye Pipe Line Company, the Indiana Pipe Line Company, and the Eureka Pipe Line Company. Finally, the SOC owned manufacturing and marketing companies such as the Atlantic Refining Company of Pennsylvania, and the Standard Oil Companies of many states New York, Indiana, Kentucky, Ohio, Iowa, and the Anglo-American Company, which was a foreign marketing concern. The next step in perfecting the oil business organisation was to establish a petroleum trust namely the Standard Oil Trust.

The objectives of the SOT could be summarized in the following points.[323] The trust was aimed to cheapen the transportation of crude oil and its by-products by constructing and supplying cars to ship oil in bulk at less cost than in packages, and building tanks in which oil in bulk. The trust also aimed at perfecting and extending the pipeline system, and purchasing and perfecting terminal facilities for receiving, handling and re-shipping oils by purchasing or building steam tugs and lighters for harbour and river service and by building wharves, docks and warehouses for foreign shipments.

[322] Ida Tarbell. Vol. 2. op. cit., p. 265
[323] Ibid

The origin of the Standard Oil Trust goes back to the development of the combining oil corporations when Rockefeller founded the South Improvement Company (SIC) on May 1, 1871. The SIC was a contract between certain refiners of Pittsburg, Philadelphia, and Cleveland. The SIC was incorporated with 2000 shares, of which 900 shares were owned by Mr. H. M. Flagler, O. H. Payne, William Rockefeller, H. Bostwick, and J. D. Rockefeller.[324] The combination had the powers to construct and operate any public or private works "to include, increase, facilitate, or develop trade, travel, or the transportation of freight, live-stock, passengers, or any traffic by land or water, from or to any part of the United States."[325]

To strengthen his position, Rockefeller announced the establishment of a combination of refiners on March 1875. This alliance was officially called the Central Association of Refiners. It was presided by John D. Rockefeller, and Charles Pratt as secretary and treasurer. In 1872, this alliance permitted to the Standard Oil Company of Ohio to increase its capital stock to $3,500,000 [326] by combining with the Standard Oil Company of Pittsburgh, the Cleveland Standard Refinery, the Pittsburgh Refinery, the Atlantic Refining Company of Philadelphia, and Charles Pratt & Co. of New York that were considered as leading independent refiners to form the Association. The latter was at basis of the establishment of the

[324] Gilbert Holland Montague. Op. cit., p. 111
[325] Ibid., p.23
[326] Ida Tarbell. Vol. 2. Op. cit., p. 148

Standard Oil Trust 10 years later in 1882. It was considered as a union, not of corporations, but of their stockholders, which meant that the several companies continued to conduct their business as before sharing only the profits and strategic management as regards decision-making as regards the general policy of the Alliance.

The policy of the Central Association was to lease the refining companies for periods of months and in return, the refiners became stockholders in this new company. In addition, the owners were allowed to do their own manufacturing, but they gave Rockefeller's company all the rights to make all purchases of crude oil and sales of refined, to decide how much each refinery should manufacture, and to negotiate for all freight and pipe-line expenses. The business nature and policy of the Central Association provided the foundations on which the Standard Oil Trust was built.

Similar to the Central Association, the specific nature of the Standard Oil Trust lies in the fact that it was not an integration of the constituting corporations, but a merger at the level of the stockholders. The Stockholders of various corporations referred to become mutually interested in the stocks of not only the corporation in which they own shares, but also in the stocks of the other corporations. The stocks of these companies were placed in the hands of trustees instead of being distributed to the owners.[327] Under agreement, all the stocks were placed in the hands of trustees

[327] Ida Tarbell. Vol. 2. Op cit., p.166

declaring the trust founded by providing a certificate showing the amount of interest of each owner in the stocks so held in trust. The essential character of the agreement was simply a common ownership of stocks in various corporations.[328]

As the oil business increased, new corporations were formed in various States, some as trading companies, others as manufacturing companies. Rockefeller's reason for such dispatching of the corporations that composed the SOT was to direct its competitiveness towards the other corporations everywhere. He designed the organization of the SOT as a union of stockholders, and not of corporations. The constituting companies continued to conduct their business ceasing to be competitive to undersell each other in the sense that each company strove to show at the end of the year the best results in making the best products at the lowest cost.

In each state, a corporation was organized to do a local business. This enabled the business that transacted in each State to be conducted by a home corporation subject in all respects to the law of the State where it was located.[329] The standard Oil Trust was composed of the Standard Oil Company in New York, in New Jersey, in Kentucky, in Iowa, in Minnesota, the one that existed in Ohio (Rockefeller's company), and another in Pennsylvania. The result of this scheme was that each corporation transacted by a corporation

[328] Ibid
[329] Samuel Calvin Tate Dodd, op. cit., p23

organized under the laws of State where it was established and subject to its jurisdiction. [330]

B. Impact of the Standard Oil Trust on the US Petroleum Industry

At the beginning of the petroleum industry in the USA, there were small-scattered farm oil wells that supplied small refineries. The first successful organisation of the industry occurred in 1867 when John D. Rockefeller united into one corporation his Standard Oil Company with Andrews & Flagler the refineries of William Rockefeller & Co., Rockefeller & Andrews, Rockefeller & Co., S. V. Harkness, and H. M. Flagler. The reason of such unity was stated by Mr Rockefeller:

> The cause leading to the combination was the desire to unite our skill and capital, in order to carry on a business of some magnitude and importance in place of the small business that each had separately heretofore carried on'.[331]

Later, in 1870, the firm of Rockefeller, Andrews & Flagler, was converted into the Standard Oil Company of Ohio, with a capital stock of $1,000,000.[332] Rockefeller's objectives were set clearly and precisely. He wanted to get control of oil refining in cities that ha d

[330] Ibid., p. 24
[331] Gilbert Holland Montague, op. cit. p.7
[332] Ida Tarbell. op. cit., Vol 1. P. 143

great crude processing capacity such as Boston (3,500 barrels), New York (9,790 barrels), Philadelphia (2,061 barrels), Pittsburgh (6,090 barrels), and Oil Creek (9,231 barrels).[333] Thus, combining the refineries of the country had become a necessity to improve the oil trade as it was explained by H. H. Rogers, of Charles Pratt and Company, to a reporter of the *New York Tribune*:

> "There are five refining points in the country, Pittsburg, Philadelphia, Cleveland, the Oil Regions and New York City. Each of these has certain local advantages which may be briefly stated as follows: Pittsburg, cheap oil; Philadelphia, the seaboard; Cleveland, cheap barrels, and canal as well as railroad transportation; the Oil Regions, crude oil at the lowest figure; and all the products of petroleum have the best market in New York city. The supply of oil is three or four times greater than the demand. If the oil refineries were run to their full capacity, the market would be overstocked…Oil to yield a fair profit should be sold for twenty-five cents per gallon. [334]

The above quotation explains the business-operating scheme of the South Improvement Company. The latter made contracts with Pennsylvania Railroads, New York Central Railroads, and the Erie Railroads to ship 45% of its oil over the Pennsylvania Railroad, and to divide the remainder equally between the Erie and the New York Central Railroads.[335] In return, the railroads agreed to allow transport rebates to the South Improvement Company on all petroleum and its

[333] Ida Tarbell, op, cit., Vol. 2. p.146
[334] Ibid., p. 149
[335] Gilbert Holland Montague. op. cit., p. 24

by-products. The railroad companies favoured the strongest and biggest shipper in order to succeed and make more profit.[336] The following tables show the rates and rebates according to contract on crude petroleum and refined oil transport:

Cities	Gross Rate	Rebate
Cleveland	$0.80	$0.40
Pittsburgh	$0.80	$0.40
New York	$2.56	$1.06
Philadelphia	$2.41	$1.06
Baltimore	$2.41	$1.06
Boston	$2.71	$1.06

Transporting oil from any common point to the following points for a barrel of 45 gallons[337]

Cities: Departure and Arrival Points	Gross Rate	Rebate
From Pittsburgh to New York	$2.00	$0.50
From Pittsburgh to Philadelphia	$1.85	$0.50
From Cleveland to New York	$2.00	$0.50
From Cleveland to Philadelphia	$1.85	$0.50
From any point to New York	$2.92	$1.32
From any point to Philadelphia	$2.77	$1.32

Transporting oil from any common point to the following points for a barrel of 45 gallons[338]

[336] A. B. Nettleton. *Trusts or Competition?* Chicago: The Leon Publishing Company. 1900. P. 119

[337] Ida Tarbell, op, cit., Vol. 1. P.284

[338] Ibid

The oil transport rebates contracted by the SIC with the railroad companies was a very efficient arm to control the oil business by driving the competitors out of business since they could not afford selling their products at low prices as the SIC did. Nevertheless, the contract did not last for a long time because of the embargo placed on oil sales as an opposition to the South Improvement Company. On March 15, 1872, Committees in the House of Representatives at Washington were appointed to investigate the Company. The Commission concluded that the contract was to be repealed and another agreement was signed between the Company and the rail companies to give equal arrangements of transportation to all shippers, producers, and refiners, and that no rebates would be made.[339] Apparently, this breach of contract lasted just two weeks because the rail companies resumed the practice of increasing traffic by giving special rates to the large shippers.

Up to 1874, none of the small refiners would sell or lease to the Central Association. Among the companies that hesitated alliance with the central Association there was the Citizens' Oil Refining Company of Pittsburgh, the Harkness Refinery in Philadelphia and others. By 1878, all but two of the refineries of Titusville had retired from the business. Such resistance did not last long since the little refineries were either sold out, dismantled, or shut down leaving the

[339] Gilbert Holland Montague. Op. cit., p. 27

business to the Acme of Titusville and the Imperial of Oil City, both of them under the SOC's management. Similarly in Pittsburgh, the Standard Oil Company of Pittsburgh was founded to absorb the other refining plants presided by Charles Lockhart, with as its directors William Frew, David Bushnell, H. M. Flagler, and W. G. Warden, who were members of the Standard Oil Company.

In the summer of 1874, J. D. Rockefeller, Flagler, and associates namely W. G. Warden, the leader of the South Improvement Company of Philadelphia, and Charles Lockhart, of Pittsburgh, met in Saratoga to discuss the issue of oil business. Based on the experience of combining the Cleveland refineries that resulted in $1 million[340] profit between 1872 and 1873, Rockefeller suggested enlarging the refining business to other cities. He aimed at creating a secret and strong association, which may ask for more freight rates. He expressed his view saying*: "Let us who see what a combination strictly carried out will effect unite secretly to accomplish it. Let us become the nucleus of a private company which gradually shall acquire control of all refineries everywhere, become the only shippers, and consequently the master of the railroads in the matter of freight rates."*[341] *The* participants agreed on the issue of transferring their refineries to the Standard Oil Company as stockholders and that this union had to remain secret.

[340] Gilbert Holland Montague. Op. cit., p. 27
[341]Ida Tarbell, op. cit., Vol. 1. p.147

Similarly, and within the same vision, Rockefeller purchased secretly Charles Pratt and Company, of New York City on October 15, 1874. These purchases gave him allies in each of the three greatest refining centres of the country outside of Cleveland. The purpose of such combinations was to give Rockefeller power to get special rates.[342] For example, in April 1874, he had made a contract with the Erie by which he was to ship fifty per cent of his refined oil over that road at a rate as low as any competing line gave any shipper and he was to have a lease of the Weehawken oil terminal. This contract remained in force until March 1, 1875, when a new one was made with the Erie guaranteeing the road the same percentage of freight and giving the Standard a ten-per-cent rebate on whatever open tariff should be fixed.[343]

Further development of monopolies in the USA occurred when the first trusts were organised from 1882. The existing monopolies and combinations that formed trusts sought to control the market horizontally and vertically. Horizontal control of the market would happen by fixing the prices of manufactured products under specific agreements, which created combinations of corporations that did not necessarily produce the same products. On the other hand, the trusts sought to control their respective industries and markets vertically by

[342] Ida Tarbell, op, cit.,
[343] Ibid

combining the different sectors that composed the industry into one corporation managed under a 'trust agreement.' [344]

When the SOC partners further concentrated their holdings under the Standard Oil Trust, they included the entire stock of fourteen companies and a majority interest in twenty-six additional concerns. They controlled the pipeline business and the refining and retail of petroleum and its by-products in 1882. The capitalisation of the SOT amounted to $70 million, and the appraised valuation of its property was over $55 million. The nine trustees of the SOT owned together more than $46 million out of the $70 million of the issued trust certificates in 1882.[345] The success of the SOT encouraged other industries to establish their own trusts such as the American Tobacco Trust, the Bell Telephone Trust, the US Steel Corporation, and others.

The influence of the trusts was not just economic, but also political. The authorities became under the mercy of giant and powerful corporations. In several cases the authorities tried to break such monopolies but without great success. The industrialisation of the USA created a privileged class of big businesses that fully benefitted from a situation where the authorities could provide only a minimal checking over their activities. It is important to stress the fact that such situation was created by the rapid pace of the development of the economy that the existing administrations at the city, state, and

[344] Ida Tarbell, op, cit., p.151
[345] Ida Tarbell, op, cit., p. 151

federal levels could not cope with. The result was that the citizens, mainly the lower class, had to pay the price of the incompetency of the authorities to protect them from the exploitation of the big businesses.

The intense competition in the petroleum industry brought about the introduction of the freight system on certain goods, certain localities and certain individuals.[346] Consequently, the freight rebates were neither a novelty nor a restriction to the Standard Oil Trust, but rather a common feature in the railroad companies.[347] In the meantime, combinations between the refiners had become a necessity to be granted these advantages. The trust issue in the petroleum industry became an issue that arose opposition whether within the government or the public. For the government, the opposition to the trust organisation lied in the fact that it killed competition. The latter is considered as a sine qua non condition for the development of the country's industry and economy by providing stability in the market and cheap prices. For the public, the trusts were dangerous for the country's politics since they could have an adverse influence government decisions and politics in general.

[346]Gilbert Holland Montague. op. cit., p.15
[347]Samuel Calvin Tate Dodd. op. cit., p.22

C. Investigations and Early Lawsuits Against the SOT to 1890

It was evident that the success of the Standard Oil Trust raised contempt from competing companies because of its practices. Suits were filed against the SOT by companies and state governments. The reproach directed to the SOT was the secrecy with which it conducted its operations. A good example to illustrate this practice was the South Improvement Company plan, which was known to only those that signed the agreement of keeping all the transactions secret. Another significant secret practice, which was at the origin of the founding of the SOT, was Standard Oil Company's purchase of *Lockhart, Frew and Company of Pittsburg* of Warden, *Frew and Company* of Philadelphia, and of *Charles Pratt and Company* of New York in 1874 and 1875. The purchase was concealed and J.D. Rockefeller never confirmed its existence even after its abundance five years after it occurred.

The chief grievances that the oilmen had against the Standard Oil Company were registered in Ohio since 1872 because it secured rebates on their own shipments[348] that caused them serious prejudice. Proof of what the oilmen had always claimed that the Standard Oil Company was a conspiracy, gave impetus to the State Legislature to launch investigation on the practices of both the Standard Oil

[348] Ida Tarbell. Vol. 2. Op. cit., p. 111

Company and the Standard Oil Trust. In the meantime, the SOC of Ohio used all its resources to delay the investigation and to negotiate with the oil operators to establish agreements,[349] which dissipated the energy of its opponents in these various suits and investigations. In 1880, the suits were withdrawn.

However, this did not end the suits against the Standard Oil Company and mainly the Standard Oil Trust. The Standard Oil Trust was subject of investigation of the Ohio State Senate in 1876. This investigation was the reason for the passing of a bill to regulate interstate commerce, but without success since the SOT defeated the Bill and evaded any form of sanction. The Pennsylvania Legislature also attempted to pass a bill "to punish the corporations"[350] in 1887to bring down the SOT's hegemony.[351] The bill was introduced as the *Billingsley Bill*,[352] named after its instigator. This Bill was seen by the oilmen as a means to punish Rockefeller and associates because of the price rates they fixed to 10 cents a barrel for gathering and delivering oil to storing points, while the current rate was 20 cents.[353] However, the Billingsley Bill was declared unconstitutional because the fixing of prices for services was nearly in all business cases and was less than

[349] Margaret E. Hirst. *The Story of Trusts*. London: Collins-Clear-Type-Press. 1913, p. 94

[350] Ida Tarbell. Vol. 2. Op. cit., p. 121

[351] From 1887 onwards, the name Standard Oil Trust was generally used to designate Rockefeller's oil empire instead of Standard Oil Company.

[352] Legislature of Pennsylvania. File of the House of Representatives. *Number 104, Session of 1887.*

[353] Ibid. *Section 1.*

the cost of production, which meant that the oil operators made profits but at different amounts. Therefore, the Bill was amended to suit the Ohio State Constitution in the claim against the SOT. The latter entrusted the mission to defeat the Bill to their biggest lawyer Samuel Calvin Tate Dodd, which he did perfectly.

The subject under debate in Congress was on the Interstate Commerce Bill that was passed in 1887 to regulate against the monopolies involved in interstate commerce. The Bill expressed the concern of the country about the danger of the mysterious organisations that enabled immense fortunes to be accumulated and excessive power obtained through unfair economic and commercial practices. The passing of the *Interstate Commerce Act of 1887*[354] announced new trials and investigations federal legislation against the trusts especially the Standard Oil Trust.[355]

The Senate of New York directed the first important investigation against the SOT in February 1888. The Committee established to investigate the SOT concluded that: "*Its success has been the incentive to the formation of all other trusts or combinations. It is the type of a system which has spread like a disease through the commercial system of this country*."[356] What is significant in this investigation is the total

[354] *Interstate Commerce Act*, Entitled "An Act to Regulate Commerce." [Approved Feb. 4, 1887. In Effect April 5, 1887.] [U. S. Stat. At L. Vol. 24, P. 879.]

[355] Merle Raymond Thompson. *Trust Dissolution*. Boston: Richard G. Badger, the Gorham Press. 1919. P.16

[356] Ida Tarbell, Vol. 2, op., cit., p.131

ignorance of the State Legislature and the public of the nature character and operational mode of the SOT. The questions of the Committee members to Rockefeller had only one purpose to understand the organisation of the SOT. The new trust form was different from what was known as partnership, corporation, company, in which businessmen united to do business under state or federal laws. The agreement adopted in 1882 in the establishment of the Standard Oil Trust was so simple that nobody knew its nature, where it was kept, by what authority it lived.[357]

For six years, the trust had succeeded in hiding the agreement of some fifty persons holding and controlling interests in corporations, joint stock associations, and partnerships in different states, placing all their stock in the hands of nine trustees to receive in return trust certificates. These nine trustees[358] themselves owned a majority of the stock and had complete control of all the property. The ingenuity of the SOT's agreement was that the trustees ran the entire combination of thirty-nine corporations, each of them having a legal existence, obliged by the laws of the state. The concerned 40 corporations had turned over their affairs to an organisation of trustees that had no legal existence, independent of all authority, able to do anything it

[357] Ibid., p. 136

[358] The New York State Court of Appeals declared this trustee device illegal in 1890 revoking the charter of the concerned companies. Merle Raymond Thompson. Op. cit., p.65

wanted anywhere, in shelter of any liability. [359] However, the Committee could not reach a verdict against the SOT, but issued a warning for future judicial prosecutions.

The next investigation on the Standard Oil Trust occurred in the same year, 1888, and was launched by the Committee of Manufactures of the House of Representatives. [360] The report of the Committee provided a complete history of the Standard Oil Company up to 1888. The main point of investigation was to clarify the organisation of the SOT concluding that the agreement under which the trust operated was a device to evade responsibility. [361] The final report of the Committee reported that the aim of the relationship of the Standard Oil Companies with the South Improvement Company had been to regulate the output of refined oil so as to fix the price. However, this finding did not apply to the Standard Oil Trust it was investigating.[362] On these findings ended the investigations of 1888.

The failure of investigations against the Standard Oil Trust, provoked deep frustration within the oilmen and the population, and entrenched the certitude that the SOT was untouchable. However, Ohio Attorney General David K. Watson filed a lawsuit against the SOT on May 8, 1890. The petition that he filed in the Supreme Court of Ohio averred that the Standard Oil Company had entered into an

[359] Ibid
[360] Ida Tarbell. Vol. 2. Op. cit., p.137
[361] Ibid., p. 141
[362] Ibid., p.140

agreement by which it had transferred 34,993 shares out of 35,000[363] to the trustees of the Standard Oil Trust, most of whom were non-residents of the state. The concerned trustees chose the board of directors of the Standard Oil Company of Ohio, and directed its policy, which was a violation of law that stipulates that the directors of company were obliged to be state residents. Therefore, the company should be "adjudged to have forfeited and surrendered its corporate rights, privileges, powers and franchises, and that it be ousted and excluded there from, and that it be dissolved."[364]

The difference in Watson's suit against the SOT was that it was an application of recognised laws to admitted facts. It brought the Standard Oil Company face to face with several legal propositions it violated in the Ohio State. The essential point of the defendant's answer was that the Standard Oil Company of Ohio admitted the agreement, but it denied that it was a party to it. In addition, the agreement was signed by the individual stockholders of the Standard Oil Company, not by the company in its corporate capacity. Therefore, the Standard Oil Company of Ohio had nothing to do with the Standard Oil Trust. In the end, the court concluded that the trust agreement specified an effectual indirect control of the Standard Oil Company of Ohio by the Standard Oil Trust established in New York, which was contrary to the policy Ohio State's laws.

[363] Ida Tarbell, op, cit., p.142
[364] Ibid

Based on such findings, the court decided that the Standard Oil Company of Ohio deserved punishment, but without revoking its charter. Almost two years after the filing of the petition, the judgment of the court was rendered on March 2, 1892, obliging the Standard Oil Company of Ohio to dissolve its trust agreement with the Standard Oil Trust. The difficulty of the task obliged the Supreme Court headed by Chief Justice Spear to grant the SOC more time to apply the Court's decision.[365] This took 2 years, which gave the SOT's board of trustees enough time to find a way to evade the decision to dissolve the agreement.[366] It was a task of the trust's lawyer Dodd to find a way out, which he successfully conducted.

Dodd's scheme to avoid any adverse effect on the Standard Oil Trust lied in the dissolution article that he had provided in the trust agreement. According to this article, in case SOT was to be dissolved, the trustees continued to exit to manage the capital of the initial 40 constituting companies that reached $70 million by reducing their number to 20 companies with a capital of $102,233,700.[367] The dissolution article provided for the division of property and for the transfer of the trust certificates back to the corporations to which they belonged.

Dodd's dissolution scheme was devised to assure that the interests of the stockholders were safeguarded by this procedure, and

[365] Ida Tarbell, op, cit., p.148
[366] Ibid
[367] Ibid., p. 153

that the various corporations will continue to do the same business as before with the same earnings proportion. That is what happened since the dissolution of the SOT arrived at a dead end. The SOT continued doing its business without the intention to dissolve it. It was evidently the dissolution of the SOT by the courts was in vain. Something more powerful than the courts like the Federal Government should be solicited.

III. The Sherman Anti-Trust Act 1890 and the Early Attempts to Control the Monopolies and Trusts

It was evident that neither Senate committees nor the courts of justice could put an end to the Standard Oil Trust, although there was a Supreme Court decision to dissolve it. The opponents to the trust system became aware that effective measures against the trusts had to be endorsed by the Federal Government. The opposition to the SOT came essentially from the oilmen, who suffered from the unfair practices of the SOT, journalists nicknamed Muckrakers, and politicians and reformers that considered themselves as Progressives. The attacks against the SOT brought the Federal Government's attention to the trust problem as a danger to the country's economy. Therefore, the US Congress passed the Sherman Antitrust Act in 1890 to bring down the monopolies and trusts, and even labour combinations.

A. The Rise of Muckraking Journalism and the Campaign against the Trusts up to 1900

The development of the means of communication in the USA from the 1890s onwards helped greatly in the widespread of ideas and ideals. Newspapers and magazines became a force of great importance that shaped American life in this period. *McClure's* and *Collier's Weekly* were two of the most important magazines that served as a medium to inform and enlighten the public of what was going on in the country. The industrialisation of the country, which affected adversely the socio-economic and political life, gave birth to a new brand of journalists, who were nicknamed by Theodore Roosevelt as "muckrakers,"[368] including Ida Tarbell, Jacob Riis, Upton Sinclair, and Lincoln Steffens, who wrote books and articles exposing the flaws of United States' capitalist society. This new trend in journalism was at the origin of what we know today as investigative journalism.[369]

[368] "Muckraker" Encyclopædia Britannica Ultimate Reference Suite CD. Op. cit.

[369] Journalists and historians like Charles Beard considered Julius Chambers as the father of muckraking journalism because he was the first to undertake a journalistic investigation of Bloomingdale Asylum in 1872. His articles and accounts led to the release of twelve patients who were not mentally ill, a reorganization of the staff and administration of the institution and, eventually, to a change in the lunacy laws. His works were later compiled in a book entitled *A Mad World and Its People* in 1876. www.britannica.com/biography/Julius-Chambers

Investigating journalism provided detailed and accurate accounts of the political and economic corruption and social hardships caused by big businesses. The name muckraker was pejorative as used by President Theodore Roosevelt in his speech of April 14, 1906, when he borrowed a passage from John Bunyan's *Pilgrim's Progress*, which referred to "the Man with the Muckrake . . . who could look no way but downward."[370] However, the word "muckraker" gained favourable connotations of social concern and courageous journalistic exposition of the evils that plagued the country.

The writings of the muckrakers were very influential at all levels because they revealed the true nature of big corporations that exploited the country and its people by exposing fraud, waste, corruption and other evils in government and business.[371] The main subjects that muckrakers focused on were of different domains including child labour, public health and safety, prostitution, alcohol, bossism, profiteering, and almost every aspect of public and even private life. They achieved some spectacular successes at almost every level, from supporting child labour laws across the country to constitutional amendments such as the direct election of Senators,

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[370] George E. Mowry. *The Era of Theodore Roosevelt 1911-1912*. New York. Harper & Brothers Publishers. 1958. PP. 178-179.

[371] The revelations of these journalists and writers increased the circulation of the newspapers and magazines where they were published. However, the managers of the newspapers and magazines, who were motivated by competition for profits from the sensational findings of their reporters, contributed to the emergence of what we know today as tabloids or '*yellow journalism*. www.britannica.com/Investigating-Journalism

women's suffrage, prohibition of alcohol, and antitrust laws that dissolved monopolies and trusts.

As regards the trusts and monopolies, the most spectacular success of muckraking journalism in fighting the industrial monopolies was realised by Ida Tarbell's [372] in her accounts on John D. Rockefeller's Standard Oil Company (SOC). She sought interviews with leaders of the SOC who assumed that she would write a favourable account on the company. They gave her free access to their activities and records. The result was a series of articles that were later published as a book in two volumes in 1904 entitled T*he History of the Standard Oil Company.* Tarbell's account was a devastating one since it revealed the ruthless illegal practices of Rockefeller and his associates in monopolising the petroleum industry from the well to the consumer. Her accounts helped greatly in the breakup of the company in 1911 under the antitrust laws.

[372] After graduating from Allegheny College in biology, where she was the only woman in her class of 1880, Ida Tarbell became a teacher, but soon turned to her life's work, writing. While doing graduate work in Paris, where she wrote biographies of historic figures, she was hired as editor for McClure's. www.britannica.com/biography/Ida-Tarbell

B. The Sherman Act and Government Measures against the Trusts

The main victory against the trusts was the enactment of the Sherman *Anti-trust Act in 1890*[373]to restrain the power of big businesses by outlawing any practice that restrained inter-state commerce. The *Sherman Anti-trust Act (1890)* prohibited among others industrial monopolies, combinations, and trusts. This Act was passed in the Senate on April 8, 1890 by a vote of 51-1, and on June 20 with a vote of 242-0 in the House of Representatives. It was named after its author Senator John Sherman, who was a Republican Senator of Ohio and the Chairman of the Senate Finance Committee. The Sherman Act was the first Federal statute to limit cartels and monopolies, and it still forms the basis for most antitrust litigations by the United States Federal Government.

The Sherman Act addressed the industrial trusts like the Standard Oil Trust by regulating inter-state commerce to prevent big businesses to monopolise the markets. It mentions the word 'person' or 'persons' to include individuals as well as corporations, and associations created by law.[374] In its provisions, the Sherman Act intended to protect competition, and to protect the public from the failure of the market and not the competitors from the market fluctuations and

[373] *The Sherman Anti-Trust Act July 2, 1890. Section 1.C*h. 647, 26 Stat.209, 15 U.S.C

[374] Ibid. §-7

risks.[375] The law was issued against any conduct unfairly tended to destroy competition because in its *Section 1* it was made illegal: "*Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations*."[376] Section 1 was enforced by Section 2 entitled: *Monopolising Trade a Felony, Penalty*. [377] It stipulates that every person who was convicted of monopolising or attempted to monopolise trade between the States or with foreign countries would be punished by a fine not exceeding $ 5,000, or by imprisonment not exceeding one year, or by both stated punishments under consideration of the court.

However, the Sherman Act presented rule deficiencies because it was the first attempt to regulate against the Trusts and monopolies. It failed to specify the definition of very important terms such as combination, trust conspiracy and monopoly to avoid any interpretation that would help in the evasion from the law's enforcements.[378] The first failure of the application of the Sherman Act happened in 1895, in the case *United States v. E. C. Knight Company (1895),*[379] in which the court ruled for the E.C. Knight Company that it did not violate the law even though the company controlled about 98% of all sugar refining in the United States. The Court developed its

[375]Everett N. Curtis. *Manual of the Sherman Law, a Digest of the Law under the Federal Anti-Trust Acts*. New York: Baker, Voorhis & Co. 1915. P.53
[376] *The Sherman Anti-Trust Act July 2, 1890*. Op. cit., §1
[377] Ibid., §-2
[378]Everett N. Curtis. op. cit., p. 161.
[379]*United States v. E. C. Knight Company (1895).*156 US 1, 15 S. Ct. 249, 39 L. Ed. 325, 1895.

reasoning on the basis that the company's control of the sugar manufacture did not constitute a kind of control over inter-state trade.[380]

Prior to the Sherman Act, the Federal Government had had no power to prevent predatory business activities. Therefore, the states themselves began an ineffective attack on the trusts in state courts. In 1887, Louisiana State prosecuted the Cotton Oil Trust, California prosecuted the Sugar Trust in 1889, and Nebraska prosecuted the Whiskey Trust in 1890. In 1888, the Attorney General of Ohio sought to repeal the charter of the Standard Oil Company of Ohio in court. Therefore, in 1892, the supreme court of Ohio ordered the local oil company to sever its connections with the Standard Oil Trust. The order was never effectively enforced. However, these state attacks on it made the device so risky that corporate organizations looked for some other form of combination that could not be prosecuted under state law. In 1889, New Jersey provided the model, by amending its incorporation statute to permit one corporation to own the stock of another in any State.[381] The interested corporations had to comply with few simple formalities, the payment of a small fee and annual tax, the maintenance of a head office in New Jersey, and the publication of an annual report. Accordingly, the Standard Oil Company of New Jersey was reincorporated on June 14, 1899, under

[380] Ibid. *Section 9*
[381] Margaret E. Hirst. Op. cit., p. 66

the laws of New Jersey, which allowed SOT to purchase the stocks of various companies formerly held by the liquidating trustees of the Standard Oil Trust, and thus increasing the capital stock of the Trust from $10,000,000 to $100,000,000.[382]

In July 1888, John Sherman, Senator from Ohio, introduced the resolution that led to the passage of the Sherman Act. He had been Secretary of the Treasury under President Hayes and was known as an expert in finance and taxation. He was a big business-minded and an ardent advocate of high tariffs.[383] Contrary to what would be expected from his position vis-à-vis the big corporations, he opposed those who demanded antimonopoly legislation. His resolution reconciled that contradiction clearly because it asked the Finance Committee to report on a bill that would tend to:

> preserve freedom of trade and production, the natural competition of increasing production, the lowering of prices by such competition, and the full benefit designed by and hitherto conferred by the policy of the government to protect and encourage American industries by levying duties on imported goods.[384]

In other words, Senator Sherman based his conception on the market forces of supply and demand that permitted to balance the

[382] Raymond Bacon Foss and Willian Allen Hamor. Op. cit., p. 261
[383] Everett N. Curtis. Op. cit., p. 162
[384] Ibid

increased production by local industry, which was protected by tariffs, with the decreasing of the prices, only if domestic competition was free and unrestrained.[385] The Sherman Act was passed by the Senate and signed by President Harrison on July 2, 1890. Therefore, in compliance with the Sherman Act, the supreme court of Ohio ordered in 1892 the local oil company to sever its connections with the Standard Oil Trust.

As stated earlier, the order was never effectively enforced, but obliged SOT's management to look for some other form of combination that could not be prosecuted under state law. In fact, the Sherman Act was intended to encourage competition in the United States and leave it to the federal judiciary to determine, case by case, just what action constituted a restraint on competition.[386] It was remarkably unusual and extreme that this law could be passed by a conservative Republican Congress whose most influential leaders were closely associated with big business. For example, Senator Nelson W. Aldrich, who was known as J. P. Morgan's floor broker in the Senate, voted for it. It was argued that the Act was a hypocritical piece of legislation and that no one expected it to be of any consequence[387] since the fine for a misdemeanour was just $5,000 for corporations and individuals or by imprisonment not exceeding one years, or by both said punishments, in the discretion of the court.

[385] Everett N. Curtis. Op. cit., p. 162
[386] Ibid., p.163
[387] Everett N. Curtis. Op. cit., p.162

The first Supreme Court decision that further undermined the Sherman Act 1890 was in the case of *United States v. E. C. Knight & Co*.[388] The Supreme Court held that the Sugar Trust affected interstate commerce only indirectly when acquiring a monopoly over sugar manufacturing, but it did not violate the Sherman Act. Because of this decision, the government became powerless to prevent the formation of a monopoly through the device of a holding company. The Sherman Act was definitely on the shelf during the administrations of Presidents Harrison, Cleveland, and McKinley.

C. Effects of Combinations and the Sherman Act on Labour

The Secession War (1860-1865) gave a boost to the country's industry. New factories were created to provide the army with its needs. The development of the transport sector was one of the causes that shifted the American market from being local to become a national one. This development facilitated contact between the workers who felt the urgent need to organise themselves into a national trade union.[389] The late 1860's and the early 1870's witnessed the revival of unionist activities after the depression caused by the end of the Civil War in 1865. The introduction of the factory system gave birth to a category of rich factory owners that did their best to

[388] *United States v. E. C. Knight Company (1895).* 156 US 1, 15 S. Ct. 249, 39 L. Ed. 325, 1895

[389] J. Mayers and H. W. Laidler. Op. cit., p. 15

fight the emerging workers' unions.[390] On the other hand, the employers also founded their associations to form a united front against their employees' endless demands.

Employers' associations struggled against the workers' strikes, which paralysed some industries, through campaigns for state laws to prevent them. States enacted anti-labour laws like the *La Salle Black Laws*[391] enacted in Illinois, which declared any person guilty of crime if he threatened, intimidated, or prevented another person from working. This law intended to incriminate the unions that tried to use strikes as a weapon to threaten the employers or prevent the workers, who were brought by the employers as strike breakers, from working. The employers tried to destroy to crush down the local unions by using black-lists, lock-outs, and the *yellow-dog* contracts.[392] When these tactics failed, the employers turned to the States' legislatures for aid based on the common law of criminal conspiracy. This was the case in most industries except in the petroleum industry.

In fact, records of strikes in the petroleum industry especially within Standard Oil Company could not be found. When Standard Oil Trust was formed in 1882, Rockefeller often paid above-average wages to his employees, but he strongly opposed any attempt by

[390] Nelson Daniel. *Frederick W. Taylor and the Rise of Scientific Management*. Madison: University of Wisconsin Press, 1980, p. 9

[391] Joseph Rayback. *A History of American Labour*. New York: The Free Press. 1966, p. 108

[392] It is an agreement in which the employee agrees not to join a trade union. *The New Encyclopædia Britannica*, op. cit., vol. 12, p. 831.

them to join labour unions. In his management, he gave credit and bonuses for good work to the employees he picked and chose carefully. This policy was adopted to avoid future strikes and develop loyalty in the employees of the SOT. The later was rarely hurt by strikes or labour unrest.

Rockefeller's policy emanated from his belief that the SOT was not just a business enterprise, but also a "Standard Oil family." [393] The efficiency of Rockefeller's policy to avoid labour unrest was to urge the employees to take stocks of the Standard Oil Trust, and those who did not have funds to become stockholders could get loans from their respective corporations on easy terms. A great number of the SOT's employees became owners of stock that they bought at $80 and received from 30 % to 48%[394] a year as stock dividends. Therefore, the SOT secured a remarkably loyal and interested working force.

John D. Archbold certified in his testimony to the US Industrial Commission[395] that the oil business was practically without strikes and that the workers in the Standard Oil Companies were well paid and contented in every department. In return of the favourable working conditions and good remuneration that the Standard Oil Trust provided, the vast army of about 35,000 employees[396] showed

[393] Ida Tarbell. Op. cit., p. 268
[394] Ibid., p. 253
[395] US Industrial Commission. *An Inside View of Trusts, Testimony of Members of the Standard Oil Company Taken by the Industrial Commission.* New York: Federal Printing Co. 1899. p. 133
[396] Ibid., p. 383

great loyalty, zeal and intelligence towards their employers. The assertion that the SOT allocation most of its gains from foreign operation that culmination in 1899 to $50 million[397] is a proof that it endeavoured for the equitable remuneration and welfare of its employees.

[397] Ibid.

Chapter Four

Anti-Trust Policies and Measures during the Progressive[398] Era, and their Impact on the Petroleum Industry up to 1914

From its inception in the 1890s, different opinions were made concerning the nature and meaning of the progressivism in the history of the USA. Those who adhered to the progressive ideology considered that their country had to be reformed politically, economically, and socially to eradicate corruption, mismanagement, the monopolisation of the country's economy by business magnates, and ameliorate the social conditions of the Americans. The fact that the Progressives were of different backgrounds gave the movement the faculty to represent a large portion of the American society. They were young men that sought to make America a place where good living, fair working conditions, and justice could prevail. One of the main battles that they fought rigorously was against the trusts and monopolies that resorted to illegal practises to control the national industrial sectors and then the national economy.

[398] George E. Mowry. Op. cit., pp. 178-179

From a free market standpoint, the practices of the Standard Oil Trust were legal and beneficial for the consumer that received good quality products with cheap prices. However, each of the succeeding Presidents during the progressive Era between 1901 and 1921 adopted a different anti-trust strategy to defeat the monopolies and trust or at least their growing power. This chapter exposes the policy of each President in dealing with the trusts and monopolies in order to analyse the varied effects that such policies had on the US petroleum industry.

I. Abuses of the Standard Oil Trust to Control Oil Transportation and Prices and the Formation of the Producers' Protective Association

The beginning of the 20th century announced a new era in which the trusts and monopolies were attacked politically to bring them down. The Standard Oil Trust brought the oil transportation industry under its control monopolising the industry horizontally. The monopolisation of oil transport provoked vivid opposition whether within the public opinion, competition, or the political spheres.

A. Standard Oil Trust's Abuses in Controlling Oil Railroad Transportation up to the 1910s

Standard Oil Trust's monopolistic activities and abuses continued without being disturbed by the beginning of the 20th century. It was

on May 2, 1906, that the extent of SOT's monopoly was revealed in the report of the Commissioner of Corporations issued on the Transportation of Petroleum, and a second report issued on May 20, 1907, of nearly 1400 pages related to the Petroleum Industry, most of it referred to the Standard Oil Trust. The report concluded that the SOT refined over 84% of crude oil that arrived at the refineries and produced more than 86% of the country's total output of illuminating oil, and exported nearly the same proportion of it.[399] It also secured over 88% of the sales of illuminating oil to retail dealers throughout the country, and obtained in certain large sections as high as 99% of such sales.[400] It also controlled practically similar proportions of the production and marketing of gasoline and lubricating oil. At this stage, the SOT realised the vertical monopolisation of the petroleum industry, which meant that much work had to be done to monopolise the industry horizontally. Therefore, the SOT engaged in the monopolization of oil transport and the fixing of its price whether crude or by-products.

Since the transportation of oil was conducted through pipelines, it became easy for the SOT to invest in it in order to achieve a horizontal monopolisation of the petroleum industry in the USA. By 1904, it transported through pipelines nearly nine-tenths of the crude oil of

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[399] *Report of the Commissioner of Corporations on the Transportation of Petroleum*. Washington: Department of Commerce and Labor, Government Printing Office. Part I, May 2, 1906.pp. xv-xx.
[400] Ibid.

the older fields and 98% of the crude of the mid-continent, or Kansas-Territory field.[401] Such monopolisation of oil transportation was justified by the fact that the oil consumption of all competitors of the SOT was less than one of its 75 small refineries.[402] It was estimated that over 15 of the competitors were dependent on SOT for the supply of their crude oil needs.[403] The SOT controlled not less than 10 refining companies, 4 oil-lubricating companies, 3 crude-oil producing companies, 13 pipeline and transportation companies, 6 marketing companies, 16 natural gas companies, and 15 foreign concerns among a considerable number of others.[404] In fact, the power of the SOT rested in its monopolisation of the transportation of oil facilities, price discrimination, oil by-products sale through unfair competitive methods, and the elimination of threatening competition. These facts of SOT's monopolisation of the oil industry in the USA were clearly demonstrated in the report of the Commissioner on the Transportation of Petroleum issued in May 1906.

The Commissioner on the Transportation of Petroleum was assigned by President Theodore Roosevelt with the task to investigate

[401] Frank A. Fetter, *Source Book in Economics*. New York: The Century Company. 1912. p. 255
[402] Ibid., p. 256
[403] Ibid.
[404] Ibid., p.259

the oil industry transportation. The investigation was conducted to cover the following points:[405]

1. The crude oil production in the United States and its relation to the world's supply; the prices and methods of purchase.
2. The use, development, and control of pipelines.
3. Refining of oil; the control of refineries; the cost of refining and marketing; the prices of petroleum products.
4. The organization, ownership, and relation of the companies engaged in the production, manufacture, and distribution of oil.
5. The competitive methods used in the production and sale of oil.
6. Transportation and freight rates.
7. Foreign trade and conditions and their relation to the domestic industry and set forth a report.

The final report of the investigation of petroleum transportation by the Bureau of Corporations was basically conducted on the tariffs and records of the a large number of leading railway companies in the USA with the objective of discovering the existence of any discrimination as regards oil transportation. The investigation concluded that the railroads practiced flagrant discrimination in favour of Standard Oil Trust[406] and its affiliated corporations in almost every section of the country over its competitors. This discrimination took the following forms:[407]

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[405]*Report of the Commissioner of Corporations on the Transportation of Petroleum*. op. cit., p. xix

[406] *Report of the Commissioner of Corporations on the Transportation of Petroleum*. op. cit., p. xix

[407] Ibid.

1. Secret and semi-secret rates.
2. Discriminations in the open arrangement of rates.
3. Discriminations in classification and rules of shipment.
4. Discriminations in treatment of private tank cars.

The report emphasised that the freight discrimination concerned mainly the secret and the semi-secret rebates contracted by the railroad companies with Standard Oil Company. Such rebates concerned only oil transportation within the states avoiding inter-State commerce because of the Inter-State Commerce Act of 1887, which forbade any practices in the form of discrimination that would affect fair competition, and shipping points where SOT was the only shipper. The advantage of the SOT over its competitors from these secret rates amounted from "*4 to 20 cents per hundred pounds, or from one-fourth to 1¼ cents per gallon.*"[408] Although the SOT resorted to secret arrangement of rates in order to monopolise the oil industry, it obtained similar results using open discriminations in rates. The SOT contracted relatively lower rates from the shipping points with the objective to conquer new markets, and made them high to keep its competitors out of markets.

On the other hand, there were unreasonable rules that benefitted SOT that concerned the discrimination in classification and rules of oil shipment. The differences between the rates on oil charges in different

[408] *Report of the Commissioner of Corporations on the Transportation of Petroleum*. op. cit., p. 2

kinds of containers (car tanks or carloads) were the main cause of this discrimination.[409] There were rates specific to the transport of oil whether crude or by-product and weight, which were applied against independent refiners, and for Standard Oil Trust.

Finally, discrimination in treatment of private tank cars was practised by some of the transcontinental railroad systems traversing the North-western States. This discrimination favoured the Standard Oil Trust as regards the mileage allowance three-fourths ¾ of a cent per mile for the shipment of oil.[410] Refiners that operated using their own tank cars received equal treatment in respect to the mileage allowance since the railroad companies provided only traction or haulage. However, in California, the Southern Pacific Company, which was the leading railroad company, put a condition to haul private tank cars unless the owners allowed the Company to use them for its general traffic. This meant that the tank car owners surrendered all control of their properties to the Southern Pacific Company. This condition was not accepted by the Union Tank Line Company, one of Standard Oil Company's affiliates.[411] The compromise between the two companies was reached was beneficial for both of them but on the expense of private oil operators in California.

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[409] *Report of the Commissioner of Corporations on the Transportation of Petroleum*. op. cit., p. 26
[410] Ibid., p.492
[411] Ibid., p. 27

In this compromise, the Southern Pacific Company allowed to retain the tank cars for six months, during which it might provide a supply of its own, and at the same time allowing the Union Tank Line Company the exclusive control of certain other cars. Simply, the Tank Line Company allowed the Southern Pacific Company under a lease to operate a number of its tank cars and subject to its own control to be used by any oil shipper. [412] This meant that any oil shipper was under the mercy the SOC. In return, the Tank Line Company used the rest of the tank cars for its own operations. Whether intentionally planned or not, this compromise was the corner stone for SOC's monopolisation of California oil market. In 1901, it happened that the Southern Pacific Company was operating on 300 tank cars owned by the Tank Line Company.[413] The latter demanded the withdrawal of its tank cars but only after six months from the date of filing the request as stipulated by the lease. This withdrawal did not harm the Tank Line Company since its was allowed to operate using its own tank cars, but had a great prejudice on the California oil operators since they were deprived of transporting their oil.

The withdrawal of Union Tank Line cars almost coincided with Standard Oil Company's recent purchase of controlling interest in the Pacific Coast Oil Company and first purchase of California crude oil

[412] *Report of the Commissioner of Corporations on the Transportation of Petroleum*. op. cit., p. 28
[413] *Report of the Commissioner of Corporations on the Transportation of Petroleum*. op. cit., p. 28

on an extensive scale. This might be interpreted as a deliberate scheme to control California's oil market because it was impossible for the Southern Pacific Company to supply sufficient tank cars to meet transport facilities for rapidly increasing oil business. The result of this withdrawal was devastating for the independent producers of crude oil that depended on Union Tank Line cars since they abandoned their contracts with the oil consumers.[414] This withdrawal also had the effect of depressing the price of crude oil, which was very lucrative for the SOT since it secured the lost contracts by buying crude oil at low prices and delivering it at market price.

The railroad freight systems enabled the SOT to monopolise the petroleum industry thorough secret and semi-secret price rebates and other unfair practises through which it could eliminate potential competitors and corner new oil markets. The evolution of the pipeline oil transport system further whet the appetite of the SOT to monopolise this new means of transportation.

B. Standard Oil Trust's Abuses to Control the Oil Pipeline System and Market Prices

The monopolisation of railroad oil transporting through discriminations enabled the Standard Oil Trust to control the commercial undertakings between the refinery and the consumer. The

[414] Ibid.

control of the business between the oil producers and the refineries was achieved when the SOT controlled the pipeline oil transporting systems. By 1901, the SOT had a pipe-line system of more than 40,000 miles,[415] covering completely the Appalachian, Lima-Indiana, Illinois, and mid-continent fields. Its pipelines run to the seaboard and to the markets and distributing centres to supply its largest refineries. The SOT played a successful role in defeating any attempt to construct competing pipelines by means of litigation and refusing right of way to across its railroad lines or those of railroad companies through secret compromises. Practically, it was able to prevent the rise of any efficient competitor in the pipeline business from the older fields to the Atlantic seaboard. In other cases, it destroyed or absorbed its rivals.

The monopolisation of the pipelines enabled the SOT to raise oil pipeline transporting rates as high as those of railroad rates.[416] This monopolisation of the pipelines had different results on the petroleum industry. The economy of pipeline oil transportation was cheaper than that of railroads, which enabled the SOT to realise significant profits over its competitors. It also shattered the hopes of the refiners that depended on the railroads and pipelines to grow and play an important role in the industry. Therefore, most of the refiners were obliged to plant their refineries near the oil fields to avoid the troubles of transport, restricting most of their oil by-product sales to

[415] Frank A. Fetter. op. cit., p.258
[416] Ibid

neighbouring small markets.[417] On the other hand, the Standard Oil Trust's pipeline system gave it the opportunity to occupy strategic positions for its refineries near the largest distributing and exporting centres of the country.

It is clear from the considerations discussed above that the Standard Oil Trust was advantaged over any of its competitors in the oil market by adopting an aggressive policy in which it attacked its competitors keeping competition strictly local and scattered, and thus easily controlled. It could make huge profits on its total business while reducing the profits of its competitors to a small amount, or even forcing them to sell at a loss. It was all about controlling the prices of transportation to control the prices of the crude oil and its by-products.

In addition to controlling the oil transportation prices, the Standard Oil trust had significant control of the market prices of the crude and its by-products. The prices displayed the SOT defied any competition. It resorted to low prices when there was competition and high prices when competition was eliminated. For instance, a very small amount per gallon constituted a fair margin of profit for the SOT on its investment in the refining and marketing of illuminating oil and the other principal petroleum products. It was estimated that the average investment of SOT oil refining per gallon of product annually did not probably exceed 2 ½ cents, so that a return of 10 % on the investment

[417] Frank A. Fetter. op. cit., p. 259

in refining could be secured on the basis of a margin of profit of only about 2½ cents per gallon for all products combined.[418] The investment of the SOT in facilities for marketing illuminating oil and gasoline averaged about 4 cents per gallon of product marketed annually. A return of 10 % on the marketing investment can therefore be secured from a profit margin of only about 4 cents per gallon.[419]

As mentioned earlier, the policy of Standard Oil Trust was to bring down any potential competition through the manipulation of the prices of crude oil and its by-products. It became a rule that wherever there was a low price there existed some kind of competition that the SOT tried to eliminate. For example, the SOT found serious competition from independent producers in Baltimore in April 1904, which brought down the price of 150° oil from tank-wagons to 9 cents.[420] In Seaford, Delaware, the same oil sold at 8 cents under competition. On the other hand, it sold the same oil in Washington at 10½ cents and in Annapolis at 11 cents because of the absence of competition. [421] The freight rates were practically the same to all these points. Therefore, those who could stand a loss won the 'Oil War', a game in which the SOT excelled.

[418] Frank A. Fetter. op. cit., p. 261
[419] Ibid., p.262
[420] Ida Tarbell. Vol. 2. op. cit., p. 223
[421] Ibid

C. The Formation of Producers' Protective Association to Counteract SOT's Abuses up to 1910

The abuses of the Standard Oil trust did not leave the other oil operators and the States indifferent since they reacted against the unfair practices of the SOT mainly through lawsuits. The independent oil producers formed an independent Producers' Protective Association (P.P.A) to safeguard the rights of oil producers from the aggressive attacks of the SOT.

The PPA was formed out of the bitterness among oil independent producers when the Billingsley Bill was defeated in 1887, which intended to bridle the hegemony of the SOT over the petroleum industry. Since then, the oil regions began to organize with concerted action to revolt against the tyranny of the SOT to reestablish fair competition in the oil business. On April 28, 1887, the oilmen, who gathered in Harrisburg to support the Bill, called for a meeting in Oil City to organize an association of oil producers that they named Producers' Protective Association with Thomas W. Phillips as its president. The latter was at that time the largest individual producer in the oil country, whose production averaged not less than 6,000 barrels a day. Shortly afterwards, more than 2000 oil men enrolled in

the PPA with the establishment of 36 local assemblies holding regular meetings.[422] The PPA was founded on the following principles:

1. It was a secret order.
2. Its membership was composed entirely of persons outside of and opposed to the Standard Oil Trust, one of its by-laws reading: "No person connected with the Standard Oil Company or any of its allies, as partners, stockholders, or employees, and friendly thereto, shall be elected to membership ; and members becoming such shall be liable to expulsion."
3. It proposed "to defend the industry against the aggregations of monopolistic transporters, refiners, buyers and sellers" by handling its own oil.[423]

It did not take long for the SOT to react to the founding of the PPA. John D. Rockefeller called for a meeting with Thomas W. Phillips to discuss business matters. The reason for this meeting was to discuss the general shut-down of oil production that some PPA members called for to decrease the oil stocks. Phillips was aware that such measure was very beneficial for the SOT since it owned 30 million oil barrels above ground, and any shut-down of oil production would raise the prices in favour of the SOT. Therefore, he refused to join the shut-down movement unless the SOT went into it. The meeting between the PPA and the SOT officials resulted in an agreement on the following points:

[422] Frank A. Fetter. op. cit., p.257
[423]Ibid., p. 258

1. The producers agreed to limit their production by 17,500 barrels a day.
2. No fresh drilling was undertaken for a year.
3. In return, the SOT agreed to sell the PPA 5 million barrels of oil at 62 cents, and let them carry it at the usual rates as long as they wanted to.
4. The surplus in price from the shutdown movement was to be shared by the participating oil producers according to the amount each shut in their production.
5. Workingmen who would be thrown out of employment by the shut-down were allocated for their benefit 1million barrels of the oil bought from the Standard, and that the Standard set aside another million.
6. All the profits above sixty-two cents and the carrying charges on the 2 million barrels were to go to the dismissed workingmen. [424]

However, the relation between the SOT and the independent oil producers began to change from 1884. The Standard Pipe Line made a pooling arrangement with the Pennsylvania Railroad to raise the rates in the Oil Region to 52 cents a barrel that constituted an advance of 17 cents more than the rates they had been paying.[425] In return, the Standard Pipe Line gave the Pennsylvania Railroad 26%[426] of all oil transported eastwards, which put the independent oil producers in great disadvantage.

[424] Ida Tarbell. Vol. 2. Op. cit., p. 162
[425] Ibid., p. 166
[426] Ibid

The ‘war’ continued in September 1888, when rates on oil in barrels were raised to 66 cents.[427] The refiners took their grievances to the Interstate Commerce Commission (ICC) in May 1889. The ICC did not take immediate action, which pushed the refiners to combine with the Producers' Oil Company that had proposed to form a league with the independent refiners.

The agreement was to build a pipeline from the producers’ oil tanks to Oil City market in Titusville. In return, the Producers' Oil Company received a toll at 15 cents a barrel for five years i.e., five cents less than the SOT’s charges.[428] The arrangement gave birth the creation of a company to be called the Producers' and Refiners' Company, with a capital of $250,000, of which the Producers' Oil Company held $160,000.[429] A pipeline from the fields in which the producers were interested had been legally secured in secrecy before the SOT had notice of the plan, and then laid to the refineries at Oil City and Titusville. On January 8, 1893, the first oil was run to join the oil producers and the refiners through a pipeline that they owned. This does not mean that the SOT stood as spectator to what was going on the industry. It resorted to pressing down the price of oil to bankrupt the independent oil producers, but it was too expensive. The independent oil producers held firm obliging the SOT to change

[427] Ida Tarbell. Vol. 2. Op. cit., p. 281
[428] Ibid., p. 165
[429] Ibid

its policy by concentrating its attacks on oil export market and not its transport.[430]

II. President Roosevelt's Trust-Busting Policy and Anti-Trust Measures from 1901 to 1909

The Gilded Age[431] in the history of the USA was a period between 1870 and 1900 in which the country witnessed unprecedented technological, industrial, and economic progress. Great opportunities to build great fortunes were created during this period. Captains of industry also called 'Robber Barons' such as Andrew Carnegie, John D. Rockefeller, J. P. Morgan, Cornelius Vanderbilt, and Jay Gould revolutionised business and modernised corporate economy in the form of giant trusts that contributed greatly in making the USA one of the leading industrial countries.

However, not all people had their share in the country's progress, a fact that pushed the Administration of President Theodore

[430] Ida Tarbell. Vol. 2. Op. cit., p. 213

[431] The name Gilded Age came from the title of Mark Twain and Charles Dudley Warner's book *The Gilded Age: A Tale of Today* (1873). The word gilded is given to something that is not made of gold but covered with it on the outside. This suggests that although this period was characterised by economic growth and prosperity, it was a period of disparity between the rich and the poor and disinterestedness in society in general. Christopher M. Nichols, Nancy C. Unger. *A Companion to the Gilded Age and Progressive Era*. New York: John Wiley & Sons. 2017, p. 7

Roosevelt to intervene to eliminate the previous practices that destroyed free-market economy, and to restore fair market practices and fair competition. President T. Roosevelt's battlefront was against the trusts mainly the Standard Oil Trust.

A. Progressivism and the Struggle against the Trusts to 1900

Progressivism was the response of various individuals and social and political groups to problems created by the country's rapid industrialization and urbanisation after the Civil War (1861-1865). These problems included the spread of slums and poverty, the exploitation of labour, the breakdown of democratic government in the cities and states caused by the emergence of political organisations allied with business interests, and a rapid movement toward financial and industrial concentration. In addition to large combinations of economic and political powers endeavoured to corrupt politics and destroy free economic opportunity for all. Therefore, progressivism emerged from a general feeling that the country as a whole was not functioning well since the country was getting so powerful and rich, but not for all the American citizens.

The American businessmen were animated by *Social Darwinism*[432] philosophy to justify their conducts of greed, cut throat competition, immoral and unethical practices.[433] Inspired by Charles Darwin's book *The Origin of Species*, the concept of Social Darwinism suggested that those who could not survive in a rigorous competitive social environment should be allowed to fall by the waysides. Therefore, the weaker members of society were to be eliminated, which would ultimately strengthen the entire group. Social Darwinists held the belief that the life of humans in society was a continuous struggle for existence ruled by "survival of the fittest," a phrase expounded by the British philosopher and scientist Herbert Spencer. On the other hand, the progressive ideology emerged to contradict the ideology of Social Darwinism that life in a society is not just for the fit, but also for all citizens of the one country.

Progressivism emerged from political parties, various social and reform associations, and even business formations. The development of progressivism in the Republican Party started when the first battles were engaged against the trusts and monopolies with the enactment of the *Sherman Anti-trust Act (1890)*. It was then understood that any effective reforms were to be endorsed by the government. Therefore,

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[432] Geoffrey M. Hodgson. "Social Darwinism in Anglophone Academic Journals: A Contribution to the History of the Term." In: *Journal of Historical Sociology*. Vol. 17, No. 4. December 2004. P.31 (PP. 31-39)

[433] Gabriel Kolko. *The Triumph of Conservatism, a Reinterpretation of American History 1900-1916*. Chicago: Quadrangle Paperbacks. 1963, p.56

the condition to win the battle against the trusts was to push the government, in the person of the President, to take reform measures.

The success of the Progressive Movement in the USA was the result of the successful actions of the Federal Government because it had the power and the means to cause things to change. The strong will of the Progressive Presidents (T. Roosevelt, H. Taft, and W. Wilson) to reform is noticed in their willingness to remove all the illogic, unfair, and spoiling privileges and practices of the big businesses.

B. President Roosevelt's Anti-Trusts Policy from 1901 to 1909

After the assassination of McKinley in 1901, Theodore Roosevelt received the Presidency in the middle of industrial disputes in which he intervened because they caused prejudice to the public. The greatest challenge for the new President was to control the businesses and regulate the national economy in a way that would eventually benefit the ordinary American citizen. He directed his Attorney General Knox to use the *Sherman Act of (1890)* in pursuit of monopolistic practices. Since the Sherman Act was not sufficiently enforced, it became urgent to pass additional laws to strengthen government's authority.

Form a political perspective, President Roosevelt incriminated the Trusts as long as they infringed the constitutional rights of the people. His policy was based on his view that they were a necessary evil[434] that had to be checked when they transgressed the provisions of the *Sherman Antitrust Act (1890)*. Therefore, it was not necessary to dismantle the trusts if they were found guilty of employing illegal practices. The objective of prosecution was to bring the delinquent back on truck by imposing a heavy fine and issuing a warning. Under various progressive federal and state pieces of legislation, businesses were required to follow equal pricing policies, with no under-the-table deals for favoured customers. It was evident that strong regulation was the key to reduce Trusts' hegemony over the country's economy, with better wages and job protection for the workers.

In his Annual Message of December 1901, Roosevelt clearly announced that he gave the trust issue the first place in his list of recommendations. He created the Department of Commerce and Labour that comprised the Bureau of Corporations (BC). The BC had the task to collect and publicise information about interstate commerce and industry to facilitate and accelerate antitrust prosecutions. The Republicans that controlled Congress succeeded in passing *the Elkins Act*[435] on February 19, 1903, with a House vote of 251 to 10 to empower the Sherman Act and to bare the granting of

[434]Theodore Roosevelt. *Theodore Roosevelt, an Autobiography*. New York: Charles Scribner's Sons. 1922. p. 424

[435]*The Elkins Act 1903*. 57th Congress, Sess. 2, ch. 708, 32 Stat. 847

rebates on freight shipments. The main criticism to the *Elkins Act* was that it provided only monetary fines for violations of the law and avoided the imposition of criminal penalties. This fact gave reason to the suspicion that it was enacted by Congress on behalf of some railroad companies to allow them to continue in their practice of providing rebates to their customers mainly the Standard Oil Trust, and realise huge benefits. The information collected by the BC was at the basis of Attorney General Philander Knox's prosecution against the trusts. Among the major trust suits there were those initiated against Northern Securities Company (NSC) and the Standard Oil Trust.

The first antitrust suit the Attorney General initiated was against the NSC in 1902 because it was formed by the union of practically the entire railway system of the Northwest. The merger of the Northern Pacific and Great Northern Railroads companies owned respectively by J. Pierpont Morgan and James J. Hill made them undisputedly the kings of both the financial and railway sectors. The Attorney General filed a bill in equity against the NSC in the United States Circuit Court at St. Paul, Minnesota on March 10, 1902.[436] The Court rendered a decision in favour of the Government on April 9, which was appealed to the Supreme Court of the United States. The latter rendered a majority decision that the merger was in violation of the Sherman Act.

[436] *Washington v. Northern Securities Co.* 185 US. 254. (1902)

The victory over the NSC established the power of the Government to exercise control over combinations. It should be noted that President Roosevelt was not in favour of dismantling the NSC, but against the merger of the two railway companies that created the trust. The decision in favour of the Government by the St. Paul Circuit Court gave the Attorney General impetus to begin proceedings on May 10, 1902 against the other Trusts.

C. Impact of President T. Roosevelt's Antitrust Measures on the Standard Oil Trust up to 1909

Elected in 1904 for a second mandate, President Roosevelt continued his progressive trust-busting programme. His Justice Department initiated 44 lawsuits against major corporations for violating federal antitrust laws, more than any previous President and earning Roosevelt the nickname of "trustbuster." Roosevelt's most prominent lawsuits were against the Northern Securities, a holding company that had merged two major railroads, and the Standard Oil Trust, but with different suit outcomes.

In 1906, Congress passed the *Hepburn Act (1906)*[437] to strengthen the Interstate Commerce Commission of 1887, which coincided with the launching of the most important suit that the Government filed against the Standard Oil Trust. The attacks on the SOT and on John D.

[437] *Hepburn Act June 29, 1906.* ch. 3591, 34 Stat. 584. 59th Congress, Sess. 1

Rockefeller, were justified by the writings of Ida Tarbell in a series of articles in *McClure's* that she compiled in a book in 1904 entitled *The History of the Standard Oil Company*. Ida Tarbell's findings revealed devastating account of the ruthless economic and commercial practices of J. D. Rockefeller and his subordinates.

The reason for the suit was that the SOT was accused of being a monopoly because it refined in 1904 over 84% of the crude oil run through refineries, produced more than 86 % of the country's total output of illuminating oil, [438] and maintained a similar proportion of the export trade in illuminating oil. It transported through pipe lines nearly nine-tenths of the crude oil of the old fields of Pennsylvania, and 98 % of the crude of the mid-continent, or Kansas territory oil field, and secured over 88 % of the sales of illuminating oil to retail dealers throughout the country. The SOT obtained in certain large sections as high as 99 % of such sales.[439] It controlled similar proportions of the production and the marketing of gasoline and lubricating oil. The SOT also handled a much smaller proportion of the oil, both crude and refined, in the Gulf of Mexico and California fields. These facts gave the Government the basis on which it built its prosecution of the SOT for violating the *Sherman Antitrust Act (1890*).

[438] Circuit Court of the United States For the Eastern Division of the Eastern District of Missouri. *United States of America Vs. Standard Oil Company and Others.* Brief of the Law on behalf of the defendants of Standard Oil Company and others by John G. Johnson and John G. Milburn, of Counsel. New York. p. 96.

[439] Ibid

In this case, Herbert Knox Smith Commissioner of Corporations elaborated two reports on May 2, 1906, and on May 20, 1907. While the first focused on the transportation of petroleum, the second was issued as an analysis of the petroleum industry, most of it related to the Standard Oil Trust.

Petition in equity was filed on November 15, 1906, in U. S. District Court for the Northern District of Missouri against the Standard Oil Co. and others, in which it was alleged that they maintained a combination in restraint of trade in the manufacture and sale of petroleum.[440] The court passed an unanimous decision in favour of Government on November 20, 1909.[441] Based on these investigations Standard Oil Company of Indiana was fined $29 million.[442]

President Roosevelt did not have the intention to dismantle the SOT because he found it more politically skilful to please both the Progressives that wanted to keep the monopolies under check, and the businesses by avoiding the dismantling of the trusts. He wanted to reach a balance of power between the Government and the Progressives on one scale and the powerful businesses on the other. 'Control' was the keyword in President T. Roosevelt's antitrust policy.

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[440]United States V. Standard Oil Company Of N. J. Ct Al. (United States Circuit Court En, Mo., 173 Fed., 177.) (United States Supreme Court, 221 U. S., I.)

[441]The SOT appealed to the Supreme Court, which affirmed the judgment on May 15, 1911, and the case was remanded and the combination dissolved.

[442] Henry H. Klein. *Standard Oil or the People, the End of Corporate Control in America*. New York : Published by the Author. 1914. p. 94

It is evident that business leaders always seek closer ties to government through lobbying and more manipulation through corruption. Therefore, the Trust prosecutions protected the people from big business manipulations. T. Roosevelt believed that the antitrust campaign weakened the ability of the entrepreneurs to resort to illegal practices. However, business leaders believed the most antitrust cases had more adverse effects on small business owners than the big and strong corporations because Court verdicts against the trusts affected their entire business sectors. For example, in 1890, John D. Rockefeller ignored an Ohio Supreme Court decision upholding the state's right to dissolve the Standard Oil Trust by simply picking up his corporate formalities and moved to New Jersey leaving an industrial sector in disarray.

Although President Roosevelt aimed at protecting the consumers from high prices, the anti-trust laws protected, in fact, high-cost producers from being driven out of business by lower cost producers. Historians like Gabriel Kolko observed that the dominant market aspect was a growing competition that the big businesses and financial interests did not tolerate. That is why the 1910s witnessed a movement towards the merger of big corporations and the formation of new trusts in order to bring the growing competition under control.[443]

[443] Gabriel Kolko., op. cit., p. 4

In short, President Roosevelt preferred regulating the trusts rather than dismantling them staying in middle course between the Progressive reformers and the Republican conservatives that advocated the 'laissez faire' approach.[444] In his book *American Problems* (1910), he argued that: "*The better distribution of property is desirable, but it is not to be brought about by the anarchic form of Socialism which would destroy all private capital and tend to destroy all private wealth.*"[445] His trust-busting policy was different from that of his successor not in the objective but in the means to reach it.

III. President H. Taft Dissolution of the Standard Oil Trust, and the Impact of President Wilson's Clayton Act 1914

Economically, President William Howard Taft was faithful to T. Roosevelt as regards the Trusts but in a way that revealed his position as a man of law and not of politics. It was no more question of using the law as instrument to control the monopolies but to dissolve them, which meant that the lawsuits that the President filed against the Trusts were aggressively conducted. It is undeniable that such suits were among the main reasons for his loss in the presidential elections of 1912.

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[444] "The better distribution of property is desirable, but it is not to be brought about by the anarchic form of Socialism which would destroy all private capital and tend to destroy all private wealth." Theodore Roosevelt. *American Problems*. New York: The Outlook Company. 1910. p. 52.

[445] Ibid

A. **President Taft's Antitrust Policy from 1909 to 1913**

President Taft's antitrust measures were more aggressive than those of Roosevelt since he prosecuted more trusts and signed the *Mann-Elkins Act (1910)*,[446] which empowered the Interstate Commerce Committee. He preferred to dismantle the trusts because they were illegal. He instructed his Attorney General to launch lawsuits against what was identified as harmful business combinations. In all, President Taft filed about 90 suits among which there were those brought against the biggest trusts.

President Taft's position vis-à-vis the trusts emanated from his educational and professional backgrounds. He served as Solicitor General of the United States, a Federal Judge, Governor-General of the Philippines, and Secretary of War before being nominated for the Presidency by the 1908 Republican National Convention with the decisive backing of Theodore Roosevelt, his mentor and close friend. Unlike Roosevelt, President Taft considered himself a "progressive" because of his deep belief in law to solve society's problems. President Taft fought for the prosecution of trusts that further strengthened the Interstate Commerce Commission. He also gave three conclusions as to the construction of the Sherman Act in his antitrust policy:

[446]*Mann-Elkins Act June 18, 1910*. ch. 309, 36 Stat. 539

1. The Sherman Act should be used to infer that the evil aimed at was not the mere bigness of the enterprise but it was the aggregation of capital and plants, with the expressed or implied intent to restrain interstate or foreign trade or to monopolise it in whole or in part;
2. A combination that only incidentally, and not inevitably or directly, restrained trade did not fall within the Act.
3. The Sherman Act was not to interfere with a great volume of capital concentrated under one organization, which reduced the cost of production and made its profits thereby, and took no advantage of its size to stifle competition. [447]

Based on these recommendations, President Taft set his views in a message to Congress concerning the trusts. He urged Congress to pass a federal incorporation law that would bring all corporations doing interstate commerce under the control and supervision of the federal government regarding their issues of securities, reports, and interholding of stock. He worked for the passing of this law, but a conservative Congress never passed it because it gave the federal government unprecendented power to check and control the business and intervene in the economy of the country to restrain free entrpreneurship in a free market.

Therefore, President Taft's Attorney General resorted to the application of the Sherman Act (1890) in full lenghth stating that this

[447] William Howard Taft. *Presidential Addresses and State Papers of William Howard Taft*. New York: Doubleday, Page & Company. Volume One. 1910. P. 188.

policy was a continuation of president Roosevelt's antitrust policy. In his annual report of 1911, he declared that the Government's dissolution policy was to create new conditions in which no company would have the possibility to do one kind of business that enabled it to accomplish monopoly. During President Taft's Administration, Wickersham instituted forty-six (46) bills of equity, forty-three (43) indictments, and one (1) contempt proceeding.[448] In short, President Taft's antitrust policy upheld the view that the evil in the trusts was not their bigness but in the use of their big enterprise to restrain trade and create monopoly.

President Taft developed his antitrust policy from the previous lawsuits against the trust that he witnessed during the presidency of T. Roosevelt. Form a legal standpoint, he considered the previous dissolutions of the Trusts like the Northern Securities Trust as merely legal separations of the combining corporations, regardless of the resulting distribution of the business.[449] This means that there was reduction in the size of the business unit but not in the extent of the monopoly because the trust interests still owned a large part of the stocks and securities of the new companies merged or combined to take over portions of the business controlled by the trust.[450]

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[448]Merle Raymond Thompson. Op. cit., P. 23

[449] William Howard Taft. *The Anti-Trust Act and the Supreme Court*. New York: Harper & Brothers Publishers. 1914. P.86-87

[450] Merle Raymond Thompson, op. cit., p.291

In other words, the dissolutions were farcical since they concerned the companies and the stocks they hold. For example, the Supreme Court of New Jersey decided the dissolution of the Standard Oil Company of New Jersey. It is worth mentioning that it was not until 1906 that the Government filed a bill to dissolve the Standard Oil of New Jersey under the general charge of being combination and conspiracy in restraint of trade in the production and sale of petroleum. The prosecution, which began in September 1907, was largely aided by the elaborate investigations of the Bureau of Corporations. The taking of testimony continued into 1909, with detailed facts that covered a period of about forty years and filled 12,000 printed pages.[451] The Circuit Court rendered a decree of dissolution in 1909.[452]

In 1906, the dissolution of the Union Pacific Railroad and Coal Company concerned only the merging companies and did not separate the stocks[453] since the Union Pacific completely owned all the stocks of the coal company. The Court decision separated the companies but did not eliminate the two companies' monopolisation of the coal and transport industries. Therefore, the policy of Taft was to render the dissolution of the trusts more effective. The lawsuit for the dissolution of the Standard Oil Trust started in 1909 initiated by

[451] William Howard Taft. *The Anti-Trust Act and the Supreme Court*. Op. cit., p. 85
[452] Merle Raymond Thompson, op. cit., p. 90
[453] *United States v. Union Pacific Coal Company et al*., 173 Fed. 737

President Taft's Attorney General Wickersham, but with different result from that of the Standard Oil Company of New Jersey.

B. **Standard Oil Trust's Lawsuit and Dissolution Proceedings in 1911**

The US Department of Justice sued the Standard Oil Trust, under the *Sherman Antitrust Act of 1890* for being a monopoly that restrained interstate commerce in 1909. Attorney General George W. Wickerham's submission to the court identified four illegal practices that the SOT resorted to in order to control the oil market. These practices were:[454]

1. Secret and semi-secret railroad rates.
2. Discriminations in the open arrangement of rates.
3. Discriminations in classification and rules of shipment.
4. Discriminations in the treatment of private tank cars.

The Attorney general sustained that the SOT lowered the prices to eliminate competitors by using independent companies it already controlled. The SOT also restrained and monopolised the pipelines through unfair practices making it impossible for the other pipeline

[454]Merle Raymond Thompson. Op. cit., p. 287

companies to compete[455] by establishing contracts with competitors to cut local prices of oil by-products to suppress competition. The Attorney general also indicted the SOT of espionage activities against its business competitors and the payment of rebates on oil.[456]

The final judgment of the US Supreme Court was to upheld the Lower Court judgment[457] and declared the SOT to be an 'unreasonable' monopoly under the *Sherman Antitrust Act(1890)*. The suit against the SOT started in 1902, but after nearly 9 years of litigation, the Supreme Court could find the Standard Oil Trust in violation of the Sherman Antitrust Act on May 15, 1911. The jury of the Chicago court where the trial was carried needed only two hours to deliver a verdict of guilty against the Standard Oil Company. The latter was found guilty with sending oil from Whiting, Indiana to East St. Louis at a freight rate of 6 cents a hundred, whereas the legal rate was 18 cents.[458] The rebate was favourable to the SOC and caused prejudice to its competitors. For each offense, the court decided to impose a fine that totalised $29,260,000.[459] In addition, the court ordered the Standard Oil Trust to execute the dissolution decree in a

[455] Rockefeller himself said: "The entire oil business is dependent upon this pipe-line system. Without it every well would shut down, and every foreign market would be closed to us." Ida Tarbell. Op. cit., Vol. 2. P. 208.

[456] Merle Raymond Thompson. op. cit.,274

[457] *Standard Oil Co of New Jersey v. United States*. 221, US 95. 1910. Decided May 15, 1911

[458] James Roscoe Day. *The Raid on Prosperity*. New York: D. Appleton & Company. 1908. PP. 197

[459] James Roscoe Day, op, cit., p. 198

period of six months, after which it was to be dismantled into 33 small companies.[460]

However, the decision to dissolve the SOT was received with varied appreciations.[461] While the Administration of President Taft considered it a triumph against the monopolies, the businessmen were worried that the '*rule of reason*'[462] doctrine under which the SOT were indicted and ordered to dissolve. This gave the courts much freedom to read the law in a way that would be harmful for the country's businesses. On the other hand, progressive politicians feared that this decision would give the conservatives in Congress the motive to repeal the Sherman Anti-Trust Act (1890) or at least amend it in a way that would render it unenforced. These standpoints did not restrain President Taft from prosecuting the trusts since the next target of his Attorney General was the USST and the International Harvester Company (IHC) in 1910, which T. Roosevelt had both spared from being sued.

Contrary to what it was expected, President Taft's attitude towards the big businesses brought him more enemies than friends. In December 1911, he sent a special message to Congress in which he made three progressive proposals that should appeal to Wall Street, and should find favour in the political spheres. He proposed that:

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[460] *Standard Oil Co of New Jersey v. United States*. Op. cit.
[461] James Roscoe Day. Op. cit., p.202
[462] Howard Taft. *The Anti-Trust Act and the Supreme Court*. Op. cit., p. 87

1. The Sherman Act was not to be amended.
2. A supplemental law should be enacted "which shall describe and denounce methods of competition which are unfair and badges of the unlawful purpose denounced in the Anti-trust law."
3. The government control of trusts was to be strengthened by federal incorporation and by the creation of a "special bureau of commission" in the Department of Commerce and Labour.[463]

These proposals were not passed by the first regular session of the Sixty-Second (62nd) Congress that met in December 1911 because it did not sit until the eve of the National Conventions of the major parties for the Presidential Election of 1912. Moreover, Taft himself did not expect that the strong Democratic majority in the House[464] would allow the passing of the measures that he introduced. The Democrats amended those patent laws that supported monopoly and hindered the enforcement of the Sherman Act. This event broke the Republican Party into two rival factions those who supported Taft and those who sided with Theodore Roosevelt.

President Taft adopted a different attitude from T. Roosevelt vis-à-vis the trusts. He saw the problem of monopolies from a jurist view

[463] Henry Clay Hansbrough. *The Wreck, an Historical and a Critical Study of the Administrations of Theodore Roosevelt and of William Howard Taft*. New York: The Neale Publishing. 1913. p. 196.

[464] The Democrats controlled the House of Representatives with 291 seats and the Republicans got 127 seats. The remaining seven seats were occupied by the other formations.

and not from a political one.[465] He considered any offence of the law by the trusts was punishable by the law. For Taft, the Court ordered the dismantling of the trusts because they were found guilty of violating the provisions of the Sherman Antitrust Act, which was judicially legitimate. However, for the politicians like T. Roosevelt this action was a political suicide. President Taft might have thought of realising a political gain by proving to the Progressive insurgents in his Party like Robert La Follette[466] that he was still a Progressive. In fact, the dismantling of the trusts not only displeased some influential Progressives,[467] but also ruined Taft's reputation within the business world.

President Taft would not have succeeded in dismantling the Standard Oil Trust in 1911 without appropriate Supreme Court appointments that endorsed his standpoint in the antitrust lawsuits. In two years, he appointed five Justices to the Supreme Court of the United States namely Horace Harmon Lurton in 1910, Charles Evans Hughes, Edward Douglass White as Chief Justice In 1910, and Willis Van Devanterand and

[465] William Howard Taft. *The Anti-Trust Act and the Supreme Court*. Op. cit., pp.47-48

[466] Robert La Follette (1855-1925) was a US leader of the Progressive Movement. He was Governor of Wisconsin (1901–06) and US senator (1906–25). He was noted for his support of reform legislation. He believed that politics was a never-ending struggle between "the people," all men and women in their common roles as consumers and taxpayers, and the "selfish interests" for the control of government. La Follette, Robert Marion. *Britannica Concise Encyclopædia*. www.britannica.com/biography/Robert-M-La-Follette

[467] Henry Clay Hansbrough. Op. cit., p.198

Joseph Rucker Lamar in 1911. Therefore, the US Attorney General filed his final submissions against the SOT recommending that:

1. The combination to be held illegal
2. The transfer of stock of the various corporations to the Standard Oil Company of New Jersey be held illegal to avoid in any manner its control over the subsidiary corporations.
3. That the acts specifically charged by the Supreme Court were grouped under the following heads:
    a) Rebates, preferences and other discriminatory practices in favour of the combination by railroad companies
    b) Restraint and monopolization of control of pipe lines, and unfair practices against competing pipe lines
    c) Contracts with competitors in restraint of trade; unfair methods of competition, such as local price cutting at the points where necessary to suppress competition
    d) Espionage of the business of competitors, the operation of bogus independent companies, and payment of rebates on oil, with the like intent
    e) The division of the United States into districts and the limiting of the operations of the various subsidiary corporations as to such districts so that competition in the sale of petroleum products between such corporations had been entirely eliminated and destroyed
    f) Finally, reference was made to what was alleged to be the ‘‘enormous and unreasonable profits."[468]

On May 15, 1911, the US Supreme Court upheld the lower court judgment and declared the Standard Oil group to be an "unreasonable" monopoly under the Sherman Antitrust Act, Section

[468] US Supreme Court.221 U. S. PP. 43-44.

II. It ordered Standard to break up into 33 independent companies with different boards of directors. The biggest two of the companies were Standard Oil of New Jersey that became Exxon, and Standard Oil of New York, which became Mobil.

The Federal Trade Commission (FTC) that was recently empowered by the Trade Commission Act had the task of investigating the manner of dissolution and the application of the courts' decrees. The FTC made full investigation of the dissolution and issued a report in 1915 mainly on the price of gasoline, which was the chief refined oil by-product. The report was entitled *Report on the Price of Gasoline in 1915,* and concluded[469] that the dissolution brought little if not no competition between the separated companies of the Standard Oil Company of New Jersey concerning the price of gasoline. The eleven companies constituting the dissolved Standard Oil Trust (Standard Oil Company of New York, New Jersey, Kentucky, Ohio, Indiana, Nebraska, California, and Louisiana, the Atlantic Refining company, the Continental Oil Company, and the Magnolia Petroleum Company) maintained an entire control of the sale and price of gasoline since they supplied and occupied distinct territories of the national market conformed to state lines. The reason for such division was to avoid encroachment and disputes although uneconomical in terms of the cost of gasoline production. For example, the SOC of Ohio was situated in the North of the State and

[469]Eliot Jones. *The Trust Problem*. New York: The Macmillan Co. 1921. p. 447

supplied the southern regions although the SOC of New Jersey had a refinery in Parkesburg in West Virginia just across the border.

The companies controlled the price by making sales in high price territories to redress those in the low price territories to eliminate all differences in price.[470] The Standard companies controlled nearly 65% of the gasoline business in the USA. The independent oil operators controlled about 35%, and thus they were obliged to follow fixed prices set by the standard companies.

The monopoly of the gasoline market was generated by the fact that the Standard companies even after the dissolution of the SOT formed a 'Community of Interest' including oil producers, pipeline companies, refining and marketing companies, and board directors and company officials that had common stockholding. This created a situation where a company could not undertake measures that would harm the other companies because it was causing prejudice to itself. For example, the president of the Standard Oil Company of New Jersey owned in his company 6000 shares worth $3,258,000, 4,575 shares worth $1,029,375 in the SOC of New York, 1,858 shares worth $1,012,610 in the SOC of Indiana, 1,100 shares worth $480,150 in the Prairie Oil and Gas Company, and 300 shares worth $207,000 in the Atlantic Refining Company.[471] This example illustrates the manner of controlling the market through common stockholding that enables the

[470] Ida Tarbell. Vol. 2. Op. cit., p. 189
[471] Eliot Jones. Op. cit., p. 450

concerned companies to work jointly for their mutual benefit and restrain competition.

Based on the these findings, the U.S. Supreme Court ruled in 1911[472] that antitrust law required the Standard Oil Trust to be broken into smaller and independent companies. The successor companies from Standard Oil's breakup form the core of today's US oil industry. The dissolution gave birth to the first seven Standard companies known as the *Seven Sisters* that dominated the industry worldwide for much of the 20th century. The independent companies created from the dissolution of the SOT include:

1. Standard Oil of New Jersey (SONJ) - or Esso (S.O.), or Jersey Standard that merged with Humble Oil to form Exxon. Standard Trust companies such as Carter Oil, Imperial Oil (Canada), and Standard of Louisiana were kept as part of Standard Oil of New Jersey after the breakup.
2. Standard Oil of New York (Socony), merged with Vacuum to be renamed Mobil.
3. Standard Oil of California (Socal), renamed Chevron and then became ChevronTexaco.
4. Standard Oil of Indiana (Stanolind), later renamed Amoco (American Oil Co.)
5. Standard's companies of Atlantic and Richfield merged to form the Atlantic Richfield Company or ARCO.
6. Standard Oil of Kentucky (Kyso) was acquired by Standard Oil of California, currently Chevron.

[472] *Standard Oil Co of New Jersey v. United States*. Op. cit.

7. The Standard Oil Company of Ohio (Sohio), the original Standard Oil corporate entity. The Ohio Oil Co., or The Ohio, marketed gasoline under the name of Marathon.

Economic historians such as Merle Raymond Thompson and Eliot Jones argued that the dissolution of the SOT brought nothing new to the country's economy in 1911. The lawsuit was legitimate in 1880 because the SOT controlled about 90% of the country's refining capacity; however, its monopoly at the time of its breakup shrunk to between 60 and 65 % due to the national and foreign competitors' expansion in refining capacity.[473] In addition, the increasing demand for petroleum products made it difficult for the Standard oil trust to satisfy, which created opportunities for other oil companies to emerge.

The breakup of the Standard Oil Trust is still a matter of controversy. While some see it as a victory over the monopolies and big businesses, others see it as government's vain attempt to control the economy since the SOT was not really a monopoly. They argue that the intense free market competition resulted in cheaper oil prices and more diverse petroleum products, which was beneficial for the consumers that did not suffer from any prejudice, although the practice of lowering the prices destroyed legitimate competition bankrupted many legitimate businesses.

[473] Eliot Jones. Op. cit., p. 461.

It is clear that neither President Taft's administration nor the justices predicted the consequences of the dissolution of the SOT on the petroleum industry. It was unforeseeable that John D. Rockefeller, who was retired from SOT' management at the time of the dissolution, would make huge profits from the dissolution as he owned a quarter of the shares of the new companies, and those share values mostly doubled. Rockefeller emerged from the dissolution as the richest man in the world. Such irregularities in the application of the Sherman Antitrust Act proved that the problem of monopolies and trusts could not be solved by lawsuits, but by regulating the economic and commercial practices. This perspective in dealing with this issue was the basis of President Woodrow Wilson's antitrust policy.

C. **President Wilson's Antitrust Measures and their Impact on the Petroleum Industry in 1914**

Anti-trust policy was one of the central points of debate in the Presidential Election of 1912 that each candidate exposed in accordance with the political platform of their respective parties. Wilson elaborated an anti-trust policy in his 'New Freedom' program that was different in some details from those of his predecessors.

Woodrow Wilson's electoral campaign was based on a plan known as the attack on the 'Triple Wall of Privilege,' which was a

plan consisting of three actions: the reform of the tariff, the reform of the banks, and the control of the trusts.[474] Contrary to Roosevelt, Wilson believed that economic 'bigness' in the form of the present trusts was not natural because it originated from the combinations of bankers and businesses that infringed the rights and freedom of the businesses and the individuals. For Wilson centralisation weakened society, and the excessive power of big business was corruptive since it offered more power to men than they could handle, and eventually transformed them into tyrants.[475] He wanted to eliminate monopolies created by unregulated market competition. His antitrust actions differed from that of William H. Taft because he adopted the policy of regulating competition instead of pure and simple dissolution of the trusts. He believed that dissolution was resorted to only when necessary.

The new President had a different standpoint vis-à-vis the trusts as demonstrated in the *Clayton Act* [476] passed in 1914. Although he preferred big businesses and condemned the trusts, he believed that the latter should be dismantled through court suits only if they were found guilty of violating antitrust legislation. Unlike Roosevelt, Wilson did not distinguish between 'good trusts' and 'bad trusts,' but

[474]Woodrow Wilson. *The New Freedom, A call for the Emancipation of the Generous Energies of a People.* New York: Doubleday, Page & Company. 1913. p. 20

[475] Ibid., p. 21

[476]*The Clayton Act*, ch. 38 Stat. 730. October, 15, 1914. Codified at 15 US.C. §§ 12–27, 29 U.S.C. §§ 52–53).

considered any trust by virtue of its large size as bad. He expressed his opposition to the trusts arguing that a trust is created by an arrangement to eliminate competition. On the other hand, a business or corporation becomes big because it has survived competition and laboured for the conquest of the market by intelligence, hard work, and economy.

President Wilson expressed his admiration of businessmen that use their brains to make products cheaper and increasing their value a quality. He addressed such businessmen saying: "…you are the man who can build up the United States, and I wish there were more of you."[477] Therefore, he signed the *Clayton Act* into law *in 1914*, as the cornerstone in the regulation of the trusts and monopolies.

The *Clayton Act (1914)* was aimed to help clarify the language of the Sherman Act (1890), which, as mentioned earlier, created legal irregularities and deficiencies in the fight against the trusts and monopolies. The deficiencies in the antitrust laws allowed the maintaining of the monopolies in different forms tolerated by the judicial instances. The originality in the anti-trust program of Wilson's Administration was that it was based on the anti-trust Bill introduced by Representative Henry De Lamar Clayton of Alabama on April 14, 1914. The novelty in the *Clayton Act (1914)* was that it attempted to outlaw all known methods and practices used to restrain competition

[477]Woodrow Wilson, op., cit, pp. 50-51

with the purpose of monopolising the industry and market. While the *Clayton Act* was passed in the House of Representatives on June 5, 1914 with a vote of 277 to 54, it was passed in the Senate on September 2, 1914, by a vote of 46 to 16. On October 15, 1914, President Wilson signed it into law.

In its final version, the *Clayton Act 1914* set four principles of economic trade and business namely price discrimination, exclusive dealings, mergers and acquisitions, and management of two or more corporations by one director. The Act stipulated that it was considered as a felony when the prices were set at a level to lessen competition or intended to create a monopoly in any line of commerce.[478] The principle of exclusive dealings is explained in *Section 3*[479] to make it illegal to grant exclusive dealings between a seller and a purchaser under which the seller put a condition on the purchaser not to buy from his competitors. This practice was considered as an act punishable by law only when it was proved that such act restrained trade and lessened competition. The third principle[480] in this Act dealt with the abolition of the mergers and acquisitions of corporations that effected and lessened competition. Finally the fourth principle[481] made it illegal for any person from being a director of two or more competing corporations, if it was

[478]*Clayton Act 1914.* op. cit., Section 2, codified at 15 U.S.C. § 13
[479] Ibid., Section 3, codified at 15 U.S.C. § 14
[480] Ibid., Section 7, codified at 15 U.S.C. § 18
[481]Ibid., Section 8, codified at 15 U.S.C. § 19

proved that those corporations would violate the anti-trust provisions by merging or managed separately by one executive staff.

Contrary to what was expected, small businessmen opposed the Clayton Act claiming that the it provided jail terms for their day-to-day practices. Since it was impossible to legislate against every conceivable restraint of trade, President Wilson proposed to take up a measure known as the Stevens Bill. This Bill outlawed all unfair competition and established the FTC to investigate alleged unfair trade practices. The novelty in the prerogatives of the FTC was that it was empowered to issue *'cease and desist'* orders, which would have the force of court injunctions against unfair competitors. President Wilson agreed on the Stevens Bill and urged the House of Representatives to adopt it on June 12, 1914. He considered the signing of the *Federal Trade Commission Act (FTCA)*[482]on September 26, 1914, and the *Clayton Act* on October 15, 1914, as the climax of his policy to reconstruct the American economy.

The Federal Trade Commission[483] was created as an independent agency to replace the Bureau of Corporations with the objective to enforce the Clayton Act and to foster consumer protection. It conducted investigations on companies to detect unfair trade

[482] The FTCA passed the Senate by a vote of 43 to 5 on September 8, 1914, and passed the House on the 10th of the same month without tally of Yeas and Nays.

[483] The FTC is still active today, and is responsible for the United States National Do Not Call Registry, and investigating gasoline price gouging, i.e. to force someone to pay an unfairly high price for something or simply to raise prices unfairly.

practices as stipulated in *Section 5*, which reads as follows: '*The commission is hereby empowered and directed to prevent persons, partnerships, or corporations, except banks, and common carriers subject to the Acts to regulate commerce, from using unfair methods of competition in commerce*.'[484] The objective of President Wilson in creating the FTC was not to dissolve big businesses but to prevent them from eliminating business competition through unfair practices.

Therefore, the FTC was empowered to summon any business that would violate the provisions of the antitrust acts to '*Cease and Desist*' (C&D), which is an order or request to halt an activity (cease) and not to take it up again (desist).[485] The *Cease and Desist* notion was intended to be used as an emergency measure that took the form of immediate and temporary injunction to prevent irreparable harm without waiting for a court injunctions that would take a long time. The FTCA provided the President with the right to choose the members of the FTC to serve a seven-year term, but only three of the five members could belong to the same party. President Wilson took advantage of this prerogative when he chose three democrats and two Republicans as the first five members of the FTC namely Democrats Joseph E. Davies as Chairman, Edward N. Hurley, William Harris, and Republicans Will H. Parry, and George Rublee. However, the war effort during the First World War obliged President Wilson to

[484]*The Federal Trade Commission Act*. 15 U.S.C §§ 41-58. Section 5.
[485]*Clayton Act 1914.* Op. cit., Section 11.

suspend the provisions of both the Sherman Act and the Clayton Act.[486]

Despite the trust-busting activities of both Roosevelt and Taft Administrations under the Sherman Act, big businesses continued to grow and expand their control and hegemony over the national economy. The situation was alarming since the financial resources of the country were in the hands of a very small group of rich and powerful businessmen, who could at any time plunge the country in an economic and financial crisis. The gravity of the situation pushed Congress to pass President Wilson's Clayton Act in 1914 with the hope to redress the situation.

The Sherman Act declared monopolies as illegal, but the Clayton Act defined as illegal certain business practices (anti-competitive - abusive, exclusionary, or predatory) that were conducive to the formation of monopolies or that result from them. Earlier legislative

[486] During the First World War, President Wilson was obliged to suspend the provisions of the Clayton Antitrust Act by passing the *Webb-Pomerene Act of 1918* (Apr. 10, 1918, ch. 50, 40 Stat. 516 (15 U.S.C. 61 et seq.). This Act exempted certain exporters' associations from certain anti-trust regulations. It was sponsored by Republican Edwin Y. Webb of North Carolina and Democrat Senator Atlee Pomerene of Ohio. It granted immunity to companies that formed combinations to operate the export trade of goods, wares, or merchandise that were essential to the War efforts. However, this did not apply to anticompetitive conducts that had adverse effect on domestic competitors. Therefore, businesses that sought exemption under the *Webb-Pomerene Act* had to file their articles of agreement and annual reports with the Inter-State Commerce Committee. The exemptions in this Act lasted until the 1920s as the Federal Trade Commission granted stays of investigation for those companies that initially qualified for exemption under its provisions.

measures had simply restricted horizontal mergers i.e., those involving firms that produced the same type of goods. On the other hand, the Clayton Act rounded specify practices and behaviours that were illegal under the law. Particularly, the Clayton Act prohibited action that would restrain competition or tend to create a monopoly.

The succeeding progressive American Governments between 1901 and 1921 headed successively by Theodore Roosevelt, Howard Taft, and Woodrow Wilson did not see the practice of lowering the prices by the SOT as beneficial for the country's economy. Therefore, they did not aim at protecting the consumers because they already benefitted from the low prices of oil by-products, but protected the high-cost producers from bankruptcy by applying and enforcing the anti-trust laws. The three progressive presidents adopted different anti-trust policies to bring down the trusts. While President Theodore Roosevelt opted for controlling the trusts without dissolving them, President Howard Taft policy was based on jurist standpoint through which he saw the trusts as illegal economic institutions that must be eliminated by law. During his Presidency, the Standard Oil trust was dissolved among others. On the other hand, President Woodrow Wilson's anti-trust was based on intellectual considerations since he considered that the existence of big corporations in the form of trusts was not illegal or harmful if such corporations were created by the endeavours and efforts of their founders. What he considered as illegal was the practises of such corporations and trusts that harmed

the national economy. In 1914, President Wilson proposed the *Clayton Act*, which Congress passed, to define precisely the language of the *Sherman Anti-trust Act 1890*.

The breakup of the Standard Oil Trust did not end up its hegemony over the petroleum industry in the USA, but created smaller trusts that still controlled the industry. In other words, the dissolution ended the bond between the corporations that composed the SOT, but did not cease the secret agreements that enabled them to monopolise the industry.

Conclusion

The 19th century was a tumultuous period in the history of the USA. The country after its independence witnessed revolutions, wars, and an unprecedented social, economic, and political changes caused by its industrialization. The latter uprooted an agrarian society in a short period just to challenge all the inherited norms, and political and economic practices. The US economy was shaped once for all when the industrial corporations, mainly the petroleum industry, started to combine into giant trusts to control their industries vertically and horizontally. This situation was not caused by the natural development of the industries, but by the Governments' tariff policies that were set high to protect the national companies and corporations from foreign competition.

The Standard Oil Trust, which was founded by John D. Rockefeller in 1882, was the first trust was the first target of the oilmen, the government, journalists and reformers, and the public because it controlled about 95% of the petroleum industry. It was very dangerous to let the fate of the country in the hands of few people namely the nine trustees of the SOT and the oil by-products became essential part in the country's energy policy, and people's lives. After

several investigation and lawsuits, it was decided by court to dissolve the Standard Oil Trust in 1911.

The apparent ambiguity in this attitude of the government vis-à-vis the Standard Oil Trust lies in its protective policy of the national corporation and providing the suitable economic and political environment for their development. Although, the SOT became the cornerstone of the petroleum industry, the decision to dissolve was not taken by a politician namely President Theodore Roosevelt but President Howard Taft, who was a judge by profession. Manifold opinions and conclusions can be drawn from the study of the petroleum industry in the USA from its emergence in 1859 to the dissolution of the Standard Oil Trust in 1911.

The Government's antitrust campaign to eliminate any monopoly was to encourage competition as a sine qua non condition for the development of the country's economy and prosperity. It is a fact that monopolies kill competition, which cause the economy to stagnate because nothing pushes the monopolies to invent and produce better quality items to beat their competitors. Therefore, the government sacrificed the giant trusts to promote competition between the operators in each industry. This policy was successful since the USA became a more powerful country as regards its industrial development and economic prosperity.

Progressives reformers were aware of the dangerous problems that the country suffered from and urged the government to intervene to solve them. The Progressive Presidents proved that the government could not be corrupted when it was question national security, judicial integrity, and the safeguard of the citizens' interests. The role of the government was to regulate the national economy to bring 'delinquents' back to track. However, the existing legislation had to cope with the galloping development of the country's industrial and economic sectors, which can be illustrated by the amendment of the Sherman Act 1890 by the Clayton Act 1914. While the Sherman Act only declared monopoly illegal, the Clayton Act defined as illegal certain business practices that are conducive to the formation of monopolies or that result from them.

President Theodore Roosevelt developed a political standpoint vis-à-vis the trusts since he tolerated their existence but installed judicial and government apparatus to check the wrongdoers and redress and perpetrated illegal and unfair practices. For President Roosevelt, the trust became so essential to the country's economy that removing them was very dangerous. He proposed controlling the trusts through court lawsuits but without dismantling them. In other words, he tried to find a reasonable balance between *laissez-faire* capitalism and outright socialism.

On the Other hand, President Howard Taft dealt with the trust issue from a judicial perspective. He did not the 'benefit of doubt' for the wrongdoers, which meant that by law all trusts and monopolies were illegal and had to be dissolved. Therefore, his presidential mandate was the one that witnessed most of the lawsuits against the trusts and their dissolving.

Unlike his predecessors, President Woodrow Wilson introduced a different antitrust policy from that adopted by his predecessors. He advanced that the antitrust laws had to be enacted to prevent illegal practices from the part of the corporations. He was not against the development of big and large corporations through their efforts, ingenuity, and fair practices, but he was against the corporations that merge to become big with the intention to control the market and kill competition. He was also aware of the danger of dismantling the trusts that is why he designed the Clayton Act 1914 with two objectives. The first was to clarify the Sherman Act of 1890 as regards its language to avoid misunderstanding and interpretations. The second objective was to establish a preventive demarcation line that separated from legal and illegal economic practices.

This research is to be considered as a launching pad for future researches related to the petroleum industry and its impact on international, political, economic, and social events until today. Among the themes that could be debated we may cite the role of petroleum in the break out of the First and second World Wars, the

role of oil by-products such as kerosene, benzene, and gasoil in the two Wars' outcomes. Petroleum can also be as the key to understand international geostrategic relationships as well as the alliances and conflicts. It is undeniable that what happened and is happening has a direct or indirect relationship with petroleum.

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