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Sustainable Development in the Petroleum Industry

The human journey moved very slowly through the "hunter-gatherer" societies for 90,000 years into the agricultural societies for 9,000 years and only accelerated into the Industrial Revolution during the past two hundred years. It was indeed the availability of cheap, portable and efficient sources of energy, such as oil and gas, which fueled the engine of growth and prosperity. As the human population continues to rise and development expands into developing and under-developed nations, demand for hydrocarbon will continue to increase. The challenge for the Petroleum Industry is to continue supplying more energy with time.

The Petroleum Industry was born in a free-market capitalism environment, and continued until the "Seven Sisters" dominated the global map. They held concessions and production rights across the world. Late in the twentieth century, some National Oil Companies started to operate their own oil reserve base. Today, many integrated and independent oil and gas companies are operating on the global

landscape. The fundamental idea of capitalism, formally defined by Adam Smith in his famous book "*The Wealth of Nations*", (1776), is to free and motivate individuals to own and amass wealth and prosperity. He stated that when an individual pursues his own interest, he or she frequently promotes that of the society. Adam Smith was not clear of how to align the drive of self interest with the sympathy theory he had advocated in his previous book "*The Theory of Moral Sentiment*", (1759), where he proposes that observing other people makes people aware of the morality of their own behavior. In practice, self interests combined with economic liberty have developed over the years into free-market capitalism. While capital includes tools, lands and material, money is the only liquid capital that can be readily cashed and transferred. Driven by self interest, rich individuals created a lending environment where borrowers needing money had to pay the lenders a secure interest over time; that is a dollar now is worth a dollar plus the interest rate after one year. The abundance of money and wealth in Europe, at that time, had facilitated a surge of innovations and a business revolution. Europe and North America became the workshop of the world. The Petroleum Industry grew in this free-market capitalism environment, but can this economic model serve the industry in the future?

Despite Adam Smith's call for people to be aware of the morality of their behaviors, Western powers moved to colonize countries outside Europe looking for cheap resources and new markets for their industrial products. The situation changed in the mid-twentieth century, when Europe's supremacy retreated in favor of the two new

superpowers namely the United States of America and the Soviet Union. With the fall of the Berlin Wall, only free-market capitalism survived, which was then preached as the recipe for global growth and development. Unfortunately, capitalism could not address the serious economic inequality, where one percent of the human population, mostly in rich countries, owns forty-three per cent of world assets; while fifty percent of world population, mostly in poor countries, owns only two percent of world assets.

Many intellectuals are advocating means to align Adam Smith's sympathy theory with the drive of self interest. They are attempting to manage selfish greed which seems to have abused the economic liberty given by the capitalist model. Some are even proposing the "collective shared value" approach for all stake holders in the long term, rather than the individual's selfish greed in the short term - something along the lines of enlightened self interest. This remains a theoretical concept and awaits practical applications. Even the latest interventions involving fiscal and monetary policies by most of the developed Governments in response to the financial meltdown, have yet to show clear improvements, thus providing further proof of the shortcomings and risks of free-market capitalism. In addition to these inherent issues within the free market capitalistic model, it is also being challenged on a much wider scale. China's rapid growth and development was actually achieved by regulating market capitalism with central long term planning.

When considering any investment opportunity in a capitalistic environment, future cash flows are discounted to yield a net present value. The discount factor is a function of the interest rates, risk premiums and opportunity cost. A discount factor in the petroleum industry usually ranges between eight to fifteen per cent and indicates the minimum return that a company must earn on an existing asset to satisfy its creditors, owners, and other providers of capital. This is also used as a benchmark to value companies, prioritize projects and justify field development plans. The major issue with this model is the negligible net present value of oil and gas reserves recovered in the long term, i.e. beyond 15-20 years. Any major expenditure today, such as on enhanced oil recovery projects which attempt to recover more reserves in the longer term, may result in negative net present value. No wonder, the average industry reserve recovery factor is only thirty per cent (recoveries can range anywhere between five to sixty per cent), leaving seventy per cent of original oil in place unrecoverable. It is worth noting that recovering an additional one per cent of original oil in place worldwide is enough to meet global demand for one full year.

In the Petroleum Industry, a production-operator is sometimes a publicly-listed company which has capital and know-how and is driven by creating value for all of its shareholders. The market holds a company's board of directors and senior management responsible

for the creation of that value. Most of the time, this is a win-win endeavor for both the operating company and the host government. However, in certain circumstances, the interests of the operator, who has a production sharing contract, may not be fully aligned with the interest of the host government. The contract is normally for a limited tenure (20 to 30 years), and requires work commitment towards developing the asset. Operators aim to recover most of the proven and probable (P2) reserves within the contract tenure to maximize value for the shareholders. This might entail draining the reservoir at high production rates, thus negatively impacting the ultimate recovery. The operator may also shy away of investing in the asset towards the end of the contract, knowing that his contract may not be extended. The dilemma is how to provide a model that will help maximize value for all stake holders including government and shareholders, and avoid any negative impact on ultimate hydrocarbon recovery.

Another challenge to the industry is the short-term focus (Wall Street mentality), where industry leaders have to report results to their public shareholders quarterly (or semi-annually at best). Any major expenditure on long term projects such as research and development (R&D) can be seen as a burden and may be deferred indefinitely. This explains why R&D expenditure is considerably low in the Petroleum Industry when benchmarked against other industries.

It is clear that the DNA of the petroleum industry is long term, and thus collapsing it into short term will impact ultimate oil and gas recovery, which in turn will shorten the life of the industry. The endowment of hydrocarbon is collective in nature and should be geared to support all humanity rather than answer to a pure individual's motivations. The industry needs a new economic model that will promote the greater good for all stakeholders over the long term rather than for the selfish greed of a few in the short term. This will definitely ensure sustainable development of the Petroleum Industry towards higher ultimate recoveries and a more prosperous future for all humanity.