Governing Energy

Drilling Moore

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The Wall Street Journal recently reported that Mark Hill, VP Sales, North America for Allegro Development (software firm) suggested that rapid reduction in the time and cost to drill and complete a well coupled with the increased volume of hydrocarbon recovered was the industry version of Moore's Law.[i]

Coined by Gordon Moore (former Intel CEO) circa 1970, it suggests that computer processing power will double every two years.[ii] It was later revamped to read, "Double every 18 months."[iii]

Not as well known, Moore's Second Law, aka Rock's Law indicates that while the cost of a unit of computing power falls, the capital cost to the semiconductor manufacturer increases exponentially. This stands to reason as these companies must invest in R&D, new facilities, workforce competencies, etc.[iv]

So if the energy industry is now subject to Moore's Law what does that mean? If the (economic) marginal cost of drilling one foot or the marginal cost of producing one barrel of oil is falling in accordance with this model, then the *capital* required to enable these price points will be substantial.

The semiconductor industry survives and thrives as their "chips" are now everywhere. SEMI (global industry association) predicts that sales of semiconductor manufacturing equipment will increase from $31.8 billion (actual) in 2013 to $43.7 billion (forecast) in 2016.[v]

One would expect that those making these levels of capital expenditures in semiconductor production are aggressively managing costs. One way the sector manages costs is through automation. For example, production is highly automated including the visual inspection process.[vi]

In 1973 and 1979, OPEC as the global swing producer caused "oil shocks" as petroleum supplies were withheld from the market.[vii] Beginning in late 2014, that same consortium, led by Saudi Arabia does not appear to be having the same success.[viii]

The Mobility revolution is dramatically changing our world. Legacy semiconductor and software sector economic actors are changing and new entrants abound. These technologies are enabling the energy sector in new ways as well.

In our 2004 Roadmap to Enterprise Optimization study, we paraphrased one senior executive's comments, "*The digital oil field is getting more digital and less oil*."[ix] A decade later, this statement is confirmed.

The semiconductor and its customer sector, hardware and software firms demand and pay high salaries for the managerial, technical and financial (among others) talent and it competes for these individuals at the global level. The energy industry is similar.

Both of these global sectors depend on talent and a high level of workforce competency. As such, traditional approaches to cyclical downturns such as massive reductions in the workforce may not be the best approach.

This is not to suggest that eliminating redundancies, reorganizing and restructuring are not appropriate tools, they are. However, investment in *Human Capital* and the tools that enable the maximum return on investment from this *capital* are also appropriate.

The demand for petroleum and derivative products is expected to grow dramatically (by volume) between today and 2040, largely driven by growth in population to approximately 9 billion people and their demands for increased standards of living. Annual growth in oil is slightly less than one percent (.8%) and natural gas 1.6%.[x] Supply growth is expected to be led by newer extraction technologies as well as deepwater, tight oil and natural gas liquids.[xi]

For the energy extraction sector, Rock's Law suggests that the capital investment necessary will be in new technologies and *Human Capital*. Moreover, it is likely that Mobility and automation will play major roles in future industry funding models.

The industry can also capitalize on knowledge other sectors have and will continue develop in Mobility and automation. This should reduce the associated costs and risks and is similar to the approach being taken in the Culture of Safety, Human Factors and High Reliability.

Inherent to all components of the Capital Expenditure Matrix is *Human Capital*. It is this investment that will have the highest return.[xii] Fundamentally, *Human Capital* is the 21st century equivalent of 20th century requirements for large industrial economies of scale.

The industry may be undergoing a structural change. Is Shale and its extraction methods the industry equivalent of the integrated circuit? One suspects it might be. If this hypothesis is correct, surviving firms will be making dramatic changes as predicted by Structural Dynamics.[xiii]

What will your organization strategy be if oil prices do not return to previous levels?

About the Author

Dr. Scott M. Shemwell has over 30 years technical and executive management experience primarily in the energy sector. He is the author of five books and has written extensively about the field of operations management. Shemwell is the Managing Director of The Rapid Response Institute, a firm that focuses on providing its customers with solutions enabling operations excellence and regulatory compliance management. He has studied cultural interactions for more than 30 years--his dissertation; *Cross Cultural Negotiations Between Japanese and American Businessmen: A Systems Analysis (Exploratory Study)* is an early peer reviewed manuscript addressing the systemic structure of social relationships.

End Notes

[i] Ridley, Matt. (2015, March 14-15). Fossil Fuels Will Save the World *(Really)*. Wall Street Journal. p. C1.

[ii] http://www.mooreslaw.org/

[iii] http://en.wikipedia.org/wiki/Moore's_law

[iv] Ibid.

[v] http://www.semi.org/node/52451

[vi] http://www.sciencedirect.com/science/article/pii/S0166361514001845

[vii] http://chenry.webhost.utexas.edu/public_html/elephants/OilShock201979-Final.pdf

[viii] https://consortiumnews.com/2015/01/13/behind-the-saudi-oil-price-gambit/

[ix] Shemwell, Scott M. & Murphy, D. Paul. (2004, September). Roadmap to Enterprise Optimization: A Guide to the Impact of Information Driven Field Operations on the Petroleum Corporation. Authors.

[x] http://cdn.exxonmobil.com/~/media/Reports/Outlook%20For%20Energy/2015/2015-Energy-Outlook-Presentation.pdf

[xi] Ibid.

[xii] Shemwell, Scott M. (2012, March 16). Millennials Arrive. Governing Energy. PennEnergy.

[xiii] _____ (2015). Structural Dynamics: Foundation of Next Generation Management Science. Houston: RRI Publications. http://www.amazon.com/Structural-Dynamics-Foundation-Generation-Management-ebook/dp/B00U0JKMT0