Energy Supply, Technology Development and Business Models – a Case Study from the Seismic Industry

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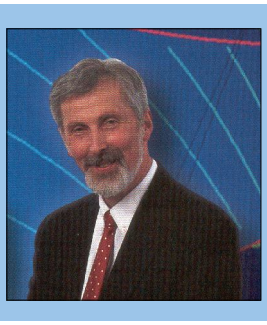

1. Introduction

During the last decades we have seen an enormous progress in the quality of seismic information coupled with a significant reduction in price (except for the last year). This technical progress combined with unorthodox business models have been some of the main factors behind the speed and quality with which the hydrocarbon resources of areas like offshore West Africa, the North Sea and the Gulf of Mexico are being exploited. In this presentation we shall discuss the combination of business models and technical development that have made this possible.

2. Key Features

Improvements in seismic efficiency and quality have been a major factor in the exploitation of new oil regions like the North Sea and offshore West Africa as well as the complicated deep traps of the Gulf of Mexico. This is well known and well documented. A factor less focused on is the effect business models have had on this development.

The seismic industry is a fiercely competitive industry. Unless your product is equal to or better than the competitors it will be difficult to get contracts. At the same time a contract, based on competitive bids typically will not give a profit above 10%. This type of profit might allow the company to do small scale research, resulting in incremental improvements, but it will generally not make it possible to do quantum leaps in technology. Looking back we can, however see that the development has consisted both of a large number of incremental improvements and of a few quantum leaps.

The oil companies know that in order to take a great risk there has to be a big upside. They drill expensive wells knowing that 6 to 8 out of 10 wells might be dry. They do it because the upside is large enough; when they find oil that will pay for the dry wells.

Contract service industry is generally not like that, the profit can only pay for incremental small scale research. This has typically represented a hinder in technology development. In order to do quantum leaps in technology large investments are required and that will not be possible without a corresponding large profit, i.e. far above 10%. One way of achieving that in the seismic industry is what is called multiclient seismic. The basic principle is that the service company decides to acquire and process data on their own initiative instead of competing for oil company tenders. They then market the data to oil companies, to other interested parties or use it themselves.

A typical example could be that one acquire 1000 km2 streamer seismic at a cost say 40 million USD. Then it is sold for 12 million USD to interested buyers, i.e. client number 4 will represent the difference between 10% loss and 20 % profit. With 8 to 10 clients, which might happen, one suddenly is into a significant profit.

This is of course a risky business, the area you have acquired might not be of interest to the market or there might be political events that give the data zero value. In sum, when this is done right one might have great profits, when done wrong one goes bust.

Given this model, the competition is no longer the classical competition; best performance relative a given oil company defined contract, instead the competition is geological and geopolitical knowledge coupled with high quality large volume seismic. With this model the service company is also to some extent competing with its customers, which of course might be a dangerous path unless one is careful.

One example here is Spinnaker Exploration Company. Spinnaker was formed by Warburg Pincus, Petroleum Geo-Services (PGS), and Roger Jarvis in December 1996. Warburg Pincus invested $60 million in Spinnaker over a two-year period and PGS contributed its expansive 3-D seismic database, estimated value around 50 million USD. This large data set gave the company a lead over other operators in developing prospects and exploration trends. The company went public in 1999 and soon raised approximately $500 million of capital in the public markets. This oil company was bought by Norsk Hydro in 2005 for 2.5 billion USD. PGS sold its share in the company in 1999 for around 200 million USD.

The background for this success was several factors. Obviously knowledgeable geoexplorers was important, but usually 4 experts would not be able to get access to such large volumes of seismic. With the large volume they got a regional understanding, could select between many different targets and could go for targets that fitted their models. They were able to obtain an industry leading position in terms of drilling success. In essence this represented a break of the monopoly of the 'big ones,' i.e. suddenly here were 4 people that had access to the same volume of data as companies like ExxonMobil , Shell and BP.

With profit from this type of projects the seismic companies can do large scale and risky investments in technology; Ramform type vessels, enormous volumes of data collection systems, sea bottom seismic to mention a few.

In sum this has been to the benefit of the industry as a whole;

- It has increased the quality of the exploration programs,
- It has increased the competition in exploration, no longer can the "big" ones be sure there are no others that can compete with them, and finally,
- It has increased the speed of the exploitation in a given region.

Today we can see a new dilemma. There exists technologies that the experts basically know will be of benefit to the industry, but the business model is not clear, therefore the investments are not made, at least not with any speed. BP has for example made tests with what is called Life of Field Seismic, i.e. permanent instruments on the field. For technology experts it is easy to argue why this is smart and generally good business. Again there is a risk, it will definitely work and help the production on some fields, but there might be fields were it is not profitable. Here is, however a case where the business model is unclear. Who shall own, install and operate the instruments? The service companies, which are the experts on this presently do not see a business model that they can use which in turn implies that the technology development is not made as fast as it could be.

It will be interesting to see how the oil companies will handle life of field seismic.

Fig. 1. One of the world's most efficient seismic data gathering machines in action. In this case it tows 16 cables with a length of 4 kilometers. The whole spread is around 1.5 kilometers wide. The air bubble from the last shot can also bee seen.

3. Conclusions

Quantum leap improvement in seismic technology has been possible thanks to the service companies breaking away from the classical tender type contracts. This has given them sometimes extremely large profits which in turn generally have been reinvested in technology or products. A side effect of these new contract types has been that it has become simpler to start oil companies, an effect we have seen both in Africa, Europe and the Americas. This has again resulted in a faster development and increased hydrocarbon production from a given geological region.

Speaker's Biography

Dr. Philos. Karl-Andreas Berteussen has been Professor of Geophysics at The Petroleum Institute (PI) since 2003. Before joining PI, he was Senior V.P. Reservoir Technology & President PGS Reservoir Consultants a.s.

From 1987 to 1995, he was Managing Director, Read Well Services a.s. and before that, Senior Manager Geophysics (Chief Geophysicist), Saga Petroleum a.s. (now part of Norsk Hydro). He has been Assistant Professor at Oslo University, and from 1985 to 2002 Adjunct Professor at the University of Tromsø, Norway. He is the author of a significant number of papers in international journals, part owner of several patents and has received several geophysical awards.