

Constructing future capabilities via innovation strategies: oil & gas majors' profiles

This paper describes how the oil & gas majors develop innovation model. New innovation methods are incorporated into strategies and practices. The study focuses on leading oil & gas companies and describes modern approaches to innovation management. The paper shows how the companies involve external and internal groups and resources into creating new values in models, process and products. Four types of structures responsible for generating innovations are identified and presented. The paper argues that, most innovations today require new approaches to internal leadership development, new generation of innovators.

Keywords: innovation strategies, corporate strategy, innovation leadership.



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The recent economic crisis shattered traditional business paradigms. Dynamic changes in the global economy, technological advances, and the evolution in consumer and market demands, have put great competitive pressures on business throughout the world. The pace of changes has accelerated dramatically [7]. It means that the companies should be more precise in identifying the approaches to innovation perspectives. Innovation management, innovative business development is defined as the search for and implementation of the best solutions. «Innovation is an essential means by which organizations survive and thrive» [11]. By managing innovation the company administer its vision of future company's state. There are plenty of approaches to innovation concepts in academician circles. «The innovation has to involve a consistent strategic direction. There has to be a strategic vision within which you are innovating» [3]. Innovation renaissance is a renewal of new ideas that create value – nationally, internationally, and individually. It's not only essential for the world economy and the nation, but also for the leader in the competitive world» [7]. Business models, technologies, processes, products are the objects of the update. Innovations contribute centrally to economic performance, corporate competitiveness, environmental sustainability, level and nature of employment [11]. The value of the innovation is measured with the result. Innovation management performance is evaluated by developed and implemented improvements. Innovation process is extremely complex and involves an effective management of variety different activities [5]. Following to M. Porter «innovation is the only way to have a competitive advantage» [3]. And it's especially relevant to E&P majors for which economy of scale is the irrelevant paradigm.

Following «Breakthrough innovation and growth» report, PWC team revealed «a clear correlation between

innovation and success in growing revenues across industries. Over the past three years, the most innovative 20% in our study grew at a rate 16% higher than the least innovative» [9].

Innovation strategy sets out the company's approach to business investing in innovation and ensuring its success in the markets. In order to develop an innovation strategy it is to determine if a need to innovate exists, to what degree and in what areas [6].

According to P. F. Drucker there are four basic types of innovation:

- a) Incremental Innovation – doing more of the same things you have been doing with somewhat better results. The most of company's investments address small improvements.
- b) Additive Innovation – more fully exploiting already existing resources, such as product lines extensions, and can achieve good results. These opportunities should rarely be treated as high priority efforts. The risks should be small – and they should not take resources away from complementary or breakthrough opportunities.
- c) Complementary Innovation – offers something new and changes the structure of the business.
- d) Breakthrough Innovation (Radical Innovation) – changes the fundamentals of the business, creating a new industry and new avenues for extensive wealth creation.

Innovation strategy is outline on corporate, business unit level and innovation portfolio.

At corporate level innovation strategy develops business models, innovation portfolio, corporate portfolio of innovations. Innovation model is designed at corporate level as well. Today innovation process models evolutionized to interactive shape, fifth generation models – integrated, interconnected, parallel and flexible

innovation process models: integrating model, interactive, networking model, open innovator [2].

L. Keeley, H. Walters, R. Pikkal, B. Quinn identified 10 types of innovation and recommend to «analyze the patterns of innovation in the industry» [12].

At business unit level innovation strategy is a plan, roadmap of searching, analyzing and implementing inventions in products and processes in a unique way.

At portfolio level the aim is reach the balance between investment and market risk. Radical innovation needs intensive and risky innovation, low risk investments let company apply them only to day-to-day improvements.

«There are a wide variety of innovation management challenges and opportunities such that the priority for some firms may be to concentrate their investments ever more deeply on existing capabilities when they provide a source for existing advantages» [11].

Most of the academician and practitioners pay attention to the crucial role of the knowledge resource, as a part of the innovation strategies companies tends to develop intellectual assets, collaborative learning networks, crowdsourcing. Discovering and mastering new knowledge that captures these complexities and keeps pace with hyper-competitive change has become an important competence for creating value. Institutionalizing innovation and creativity within an organizational knowledge network in order to stimulate awareness and learning may be the most important competence in the future [7].

«One of the functions of an innovation strategy is choosing what type of innovations to pursue. The pursuit of sustaining innovations – making small improvements, minor adaptations, developing new uses for products, using less expensive materials or processes in manufacture, delivering higher quality faster, etc., is generally more profitable and safer in the long term than pursuing disruptive or radical innovation» [6].

In an environment of sustained low prices, high costs, and increasing complexity, the need to innovate has never been so pressing for oil and gas companies [4]. The innovation is the story of survival and what is pivotal for petrochemical industry is improving safety. There are numerous examples of industry clusters that have become the innovation centers in their fields. There're Germany, The USA, Singapore in petrochemicals, Norway in the gas exploration and production entertainment business.

«The sector has been steadily redefining production possibilities. Technological innovation has made it possible to extract fossil fuels that weren't accessible just a decade or two ago. Oil from bituminous sands, gas from shale – these are resources that were considered too difficult or expensive to access in the past, but they're now transforming the marketplace in North America» [9].

According to one estimate, in North America the typical oil and gas well has become four times more productive in just the last six years. That reflects decades of research happening across many fields [9].

Petrochemical industry is the changing periods of influenced by high and low prices. The business cycle influences on innovation cycles in the following design. When Oil & Gas Prices are Rising & High: industry R&D grows, research prioritizes novel techniques, new

people enter the field, generating fresh ideas, academic & government research driven by societal goals. When Oil & Gas Prices are Falling & Low: Industry R&D shrinks o Technology leaders of the next up-cycle shrink the least, R&D prioritizes efficiency improvements, Technology development outsourced by downsizing of risk and by outsourcing from IOC to service companies and start ups, academic & government research winds downs, professionals exit the field [1].

Vice-president of Halliburton underlined that radical new ideas drive productivity: economic environment creates challenge, industry capability driven by challenge, innovation the engine to productivity and cost [8].

Innovation in the oil and gas industry isn't only centered around increasing production. Making sure that operations run safely is another top priority. That can mean finding new ways to monitor the integrity of materials in changing environments or creating new systems for inspection, maintenance and repair. And as the industry enters more challenging environments, innovation to ensure safety is becoming more vital. Take deep-sea drilling. Anadarko's CEO has compared the techniques used to those needed to put a man on the moon. And some players in the industry are literally collaborating with NASA, for example to develop fiber optic sensing systems that will make off-shore drilling platforms safer [9].

We interviewed companies from throughout the oil and gas value chain, including both small companies and very large players, operating both upstream (including oil field services) and downstream. Around four-fifths of these oil and gas respondents say innovation is important to their business. For 39% of the oil and gas executives we interviewed innovation is already a «competitive necessity». That figure jumps to 48% looking out five years, suggesting that innovation is vital for every segment of the industry. But only about half of these oil and gas companies say they have a well defined strategy and that they are executing on it. That's a serious problem for those without a clear vision, because execution starts with a sound strategy [9].

In most of the interviews and reports there is exclamation that «innovation crosses the entire enterprise, not just the R&D function. R&D around technology and business systems and processes for upstream companies, or products and services for downstream companies, is certainly vital. But it's important to look for opportunities to grow in areas like business models and the supply chain too [9]. The oil & gas sector has been steadily redefining production possibilities. Technological innovation has made it possible to extract fossil fuels that weren't accessible just a decade or two ago. Oil from bituminous sands, gas from shale – these are resources that were considered too difficult or expensive to access in the past, but they're now transforming the marketplace in North America [9]. The increase in shale gas production is well-known, but it's not the only example. Oil recovery has been steadily increasing too. The Permian Basin, an area that covers 250 to 300 miles of west Texas and eastern New Mexico in the US, started producing oil in 1921. Ten years ago, its wells were no longer pumping. But the introduction of new drilling techniques (hydraulic

fracturing or fracking) has created a resurgence of production over the past three years. Now «the Basin» accounts for 14% of all US oil production.

Companies focus on a balanced innovation portfolio, by finding the smart mix of investments in incremental, breakthrough and radical innovation across the whole range of innovation areas. The right mix for oil and gas companies will depend on where they are in the value chain. The good news: oil and gas executives are already expecting between 32 and 47% of their innovations to be major advances in every area we looked at with the exception of products, where innovation primarily applies to companies operating downstream. These levels of breakthrough and radical innovation are a major departure from historic portfolios that generally contained 10-20% breakthrough and radical innovations. This shift to higher levels of breakthrough and radical innovation is one of the important signals of the innovation transformation that is already underway across industries [9].

Deloitte, Canada overviewed ten oil and gas companies (all integrated upstream players), representing about 67% of the production in Canada. Most of them see innovation as the key to survival – both as a way to become globally competitive in terms of costs and as a means of shifting the public perception of the oil and gas sector, and particularly of the oil sands, into a safe, sustainable, and economically feasible option [4].

To proactively embrace the innovation imperative into the company field an executive or thought leader needs to:

- understand the competitive dynamics of your industry and society;
- anticipate future disruptions, scenarios and paradigm shifts;
- reduce risk and uncertainty in your environment;
- rethink future possibilities that can be possibilities for innovation.

Innovation search is implemented in perspectives on innovation in an age of rising costs, multiplying risks, increasing environmental concerns, escalating activism and shrinking margins.

Innovation is complex, to be sure, but it's not always complicated. Moreover, it can also occupy one of three «ambition levels», which define its purpose or result: Core innovations optimize existing products for existing customers. Adjacent or incremental innovations expand existing business into «new to the company» business. Transformational or new innovations are breakthroughs and inventions for markets that don't yet exist [4].

Innovation almost never fails due to a lack of creativity. It's almost always because of a lack of discipline [12]. Innovation strategy is concentrated not only in R&D department, following current approach it should be cross-functionally and cross-activity integrated in all the departments of the company. It means that the company integrates innovative activity across the whole value chain and to reach complementary effects.

Consider Statoil's strategy. Its success is based on a whole series of integrated activities. So for rivals to match Statoil, it would have to match a lot of what Statoil does.

Howard Rasheed invented a role of innovation strategist with unique creative leadership skills. By implementing seven transformational strategists the leader can use unique approach to innovation and become a renaissance person in a competitive arena.

Some of the biggest challenges for oil and gas companies lie in finding the right talent, pursuing the right partners, and getting the right metrics in place to measure their innovation progress [9]. Industry is capturing innovators able to facilitate a collaborative, open and ongoing innovation process. Obviously changing long-established structures, practices and attitudes is an enormous task. The companies top leaders have to play a major role [10].

As for PWC research: «nearly every company we spoke with found some aspects of innovation challenging. For the oil and gas sector, three are at the top of the list: measurement, talent, and finding the right partners». (Gateway to growth: innovation in the oil and gas industry [9].

Strong leadership and a healthy risk tolerance are top priorities Innovation culture starts with «tone from the top» – and that's clearly an area where the sector is strong. Nearly three-quarters of oil and gas executives (74%) say that senior executive participation in innovation projects is important (see fig. 1). And speeches by oil and gas executives frequently reference innovation and R&D. But a strong innovation culture goes well beyond just the C-suite. It means giving employees, not just senior managers, the opportunity to participate in high profile projects. Strong innovators recognize and reward their peoples' efforts. Here, too, most oil and gas executives are already convinced. But the most important element of fostering an innovative culture? For oil and gas executives, it's developing a healthy tolerance for risk and failure. That's not always easy in an industry with huge capital investments raising the stakes. But «failures» – experiments that don't provide the expected results – are a natural part of the innovation process. Sometimes unexpected results can help show the way to bigger and better outcomes. Taking risks is especially important when it comes to ideas that may lead to breakthrough or radical change. In the oil and gas industry, taking risks and expecting some failures is just a part of everyday business. Every time a company drills a new well, there is a risk that the well will be dry [9].

For most of our clients, innovation is a core part of their internal culture and their company mission [9].

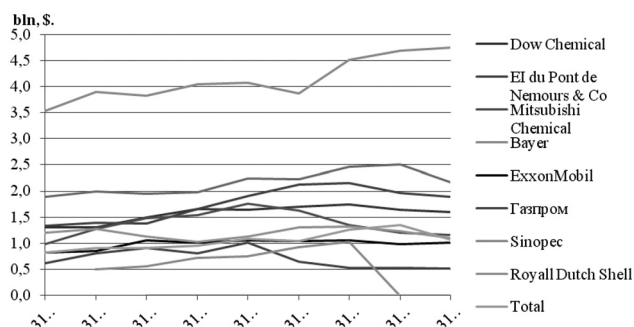


Fig. 1. R&D expenses

Innovation initiative must be executed by a partnership between a dedicated team and the performance engine, the unit responsible for sustaining excellence in ongoing operations. It can be adapted to initiatives that span many innovation categories — sustaining and disruptive; incremental and radical; competence enhancing and competence destroying; new processes, new products, new businesses and high-risk new ventures [10].

The costs in innovation are immediate, while the return can be long-term. Changes occur over time: today's incremental innovations may be based on yesterday's radical innovation, and these can occur quickly [11].

Conclusion

Oil & gas companies distribute their activities along the value chain from exploration to consumer products, focusing on the following strategic focus:

- consumer products markets;
- «exit» to consumer is available through direct sales of gas, power generation, heating generation, motor fuel, olefins, aromatics, plastics. Access to consumer markets provides the greatest profitability and contributes to the stabilization of income in market volatility;
- innovation leadership along the technological value chain.

Strategic innovation priorities: innovation excellence provides leadership and stability of the company in the region/product segment, «opens the door» via partnerships. Innovation advances in certain domains are determined by the strategic vision, technological and economic feasibility, resource security, scale of operations, geographic location, the configuration of the existing process chain, technological infrastructure, supply of innovation, global technology updates, as well as national regulations. A company may concentrate its innovation efforts on one or more areas, borrowing innovations on the other stages of our competitors, suppliers, independent research centers and universities through licensing, purchase of patents, as well as various forms of cooperation. Companies Bayer, BASF, DowDuPont is the undisputed leader in the innovation sector investment (fig. 2), thus forming its presence in the first echelon of the innovation at most stages of the technological chain.

Internal innovation production in scientific and technical complexes, scientific, technical, developmental, research centers and institutions, corporate universities

(C1 fig. 2). Original innovations can have such a high potential, which is suitable not only for internal implementation, but also for sale (patents) and technology rentals (licensing) for partners and competitors.

There is a tendency, when corporations are formed by strong innovative team, which go beyond the organizational frame and form so-called spinoffs. The parent company keeps ownership and the right of first redemption pioneering innovations (C3 in fig. 2).

Co-operation is reflected in the establishment of joint research centers, joint ventures and technology partnerships. This model can be partnership of equal, when combined two strong innovators, or complementary, when it's a combination a weak and a strong. (C2 fig. 2).

Finally, the new comers hunt is rural for the industry (C4 fig. 2).

Innovation development structures (venture funds, spin-offs, innovative leadership culture, licensing, patenting, crowdsourcing).

The organizational forms of innovation, used by oil and gas, and chemical companies. Venture financing: In order to support the latter form uses a form of venture capital financing (for example BASF Venture Capital). Innovation centers: Open Innovation & PostDoc Center Asia Pacific NAO.

Business-model transformation (new resources source and application, cost reduction).

Modern trends in designing innovation models are: Innovative factory — innovation producer and distributor (BASF), and strategically focused on main business process.

Innovation models are in progress and «not related to the models of previous generations (<https://www.hse.ru/pubs/share/direct/document/81281293>). Clusteral national innovation system influences on the design of NOC innovation models. Companies admit the crucial role of the innovation implementation «most respondents indicated they presently do not have the resources, capabilities or leadership commitment to innovate to the degree they know they should» [4]. Successful implementation will demand different skills sets, new modes of collaboration and different teaming structures than can commonly be found within oil and gas companies today.

Innovation management process is continually progressing, getting knowledge about today practice is important.

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The article was prepared in the framework of research project organized by St. Petersburg State University of Economics (St. Petersburg State University of Economics Academic Council Statement No. 12 on October 28, 2016).

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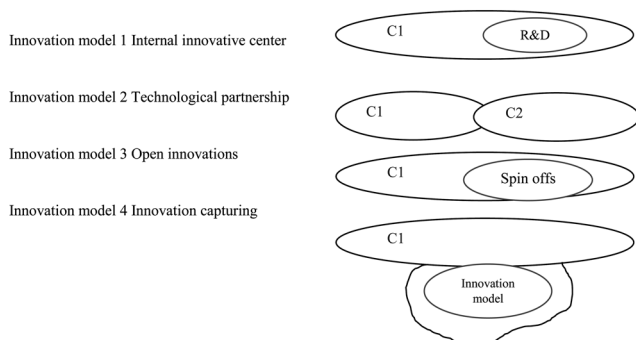


Fig. 2. Innovation models

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Развитие новых возможностей через инновационные стратегии: профиль нефтегазовых компаний

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В статье рассматриваются инновационные модели нефтегазовых компаний. Сравниваются подходы к вовлечению внутренних и внешних участников к созданию инноваций. Автор обращает внимание на потребность нефтегазовых компаний в развитии новых лидерских компетенций инноваторов.

Ключевые слова: инновационные стратегии, корпоративная стратегия, инновационное лидерство.

Научно-практическая конференция «Рынки – продукция – технологии»

12 июля 2017 года в рамках установочной сессии состоялось открытие Научно-практической конференции «Рынки – продукция – технологии», которая будет проводиться с июля по ноябрь 2017 года в инновационном территориальном кластере «Зеленоград».

Организатор конференции – КП «Корпорация развития Зеленограда».

Конференция носит стратегический характер и призвана выработать и согласовать участниками кластера вектор технологического развития с горизонтом планирования до 2035 года с учетом рыночных перспектив продукции и технологий, а также возможностей взаимодействия с крупными потенциальными заказчиками и потребителями продукции кластера.

Внимание участников конференции будет сфокусировано на рыночных тенденциях мировой науки и экономики, технологических вызовах и барьерах, важнейших приоритетах государственной политики России, таких как национальная технологическая инициатива и цифровая экономика.

На конференции предлагается обсудить возможности по участию предприятий и организаций кластера «Зеленоград» по освоению новых высокотехнологичных рынков, формируемых в рамках Национальной технологической инициативы (НТИ) России. На сегодняшний день на уровне Правительства РФ утверждены дорожные карты по освоению шести новых рынков НТИ, на стадии согласования еще три. Объем каждого из рынков прогнозируется к 2035 г. не менее \$100 млрд.

Приглашенные Участники:

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- Агентство стратегических инициатив (АСИ).
- Российская венчурная компания (РВК).
- Фонд развития интернет-инициатив (ФРИИ).
- Более 180 организаций-участников ИТК Зеленограда и Троицка.

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