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Robert E. Looney

An Oil Giant From the Emerging World

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An Oil Giant From the Emerging World

Petrobras

Flavia Carvalho

Introduction

The oil industry is traditionally one of the most internationalized in terms of trade and in foreign investments flows (Goldstein, 2010), in a market historically dominated by a few giant companies from developed countries. In the last half of the 20th century, however, companies originated from developing countries, operating predominantly through state ownership, started taking an important share in the sector, in an attempt to grant access to one of the main fuels of economic development.

Oil is a unique commodity in terms of strategic importance – it is the main source of energy and an essential input to industrial production. It is also strategic because of a remarkable North–South divide: more than 80 percent of world oil production takes place in developing countries, while OECD countries consume around 54% of the total produced (Aykut and Goldstein, 2009).

Foreign investments in the oil sector are driven by the usual motivations: access to resources, markets or strategic assets. In the case of the oil industry, resource-seeking purposes have a special role on the internationalization of firms, for they have to chase the oil reserves where these are available. Oil companies from emerging markets are driven by the strong purpose of securing access to such strategic resources; technology, nevertheless, also plays a strong role in the internationalization process, though differently for each country.

This chapter presents the case of Brazilian state-owned oil company Petrobras, discussing its creation, the strategic and political motivations of setting up a strong national oil industry. More important, we discuss how the company developed and accumulated technological capabilities that enabled its placement among the leading oil and energy players in the world. We also emphasize how the company’s recent reserve discoveries and its investments in alternative energy sources are reshaping the energetic matrix in Brazil.

The chapter is divided in three sections, besides this introduction. The next section presents the trajectory of Petrobras, from its creation to the achievement of fourth largest oil company worldwide. Section 3 discusses the role of technological development and strong R and D efforts placing Petrobras in a distinguished position among the world oil industry. Section 4
considers the impact of state ownership in the trajectory of the company. Section 5 contains the concluding remarks.

The making of a national oil giant

Petrobras was established in 1954 by President Vargas under the Import Substitution Industrialization programme, which aimed to make the Brazilian economy more independent from international ups and downs. The state-owned company was granted exclusive rights over exploitation and production (E and P) in the domestic territory, a monopoly broken only in the late 1990s, when the country’s economy adopted a more liberal positioning in terms of trade and investments with the rest of the world. It is currently the largest Brazilian company in terms of assets and revenues, being also the top Brazilian exporting company (Revista Exame, 2010). In 2009 the company had around US$103bn in revenues, and net profits of over $16bn (Table 23.1). In 2009 Petrobras rose to the fourth place among the world’s largest energy companies, with a market value of US $199.2 bn (in 2008 Petrobras was ranked ninth) (PFC Energy, 2010). Petrobras is also one of the largest multinationals from Brazil, with external revenues of over US$5bn (Chevarria, 2006).

The foundation of Petrobras, along with other state-owned enterprises in basic industries (such as Vale in iron ore and CSN in steel), was one of the cornerstones of the import substitution industrialization strategy carried out in Brazil, with the aim of enabling the country to reduce its external dependence in basic industries. Oil has always been a political matter, which legitimized the need of a strong, state-controlled enterprise to manage the country’s resources. The 1970s oil crises gave new dimension to the political side of the oil question, also revealing that the Brazilian energy policy had failed until then to make the country independent from foreign oil sources. In this context Petrobras increased its strategic importance and focused on: a) the development of specific technological capabilities for prospecting oil in deep waters (owing to the particular location of most Brazilian reserves); b) the search for alternative energy sources. The international expansion started in 1972, with the creation of Braspetro. At the time oil imports accounted for 80% of domestic demand. Its international branch was, at that time, concerned primarily with assuring domestic supply. The national production in those years supplied only 17% of the internal demand, equivalent to 184,000 barrels per day (bpd) (Chevarria, 2006).

The initial expansion focused on Latin American countries, followed by Africa (Angola in 1979, where similar exploration conditions existed) and the Gulf of Mexico. Keeping pace with the technological developments of the leading oil firms in the 1970s and the development of its own technology for deep-water extraction have been the cornerstone of Petrobras’ international expansion. Nowadays, the company holds more than 100 production platforms and 16

Table 23.1 Petrobras – corporate information, 2009

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets (US millions)</td>
<td>184,197</td>
</tr>
<tr>
<td>Revenues</td>
<td>102,830</td>
</tr>
<tr>
<td>EBITDA</td>
<td>25,593</td>
</tr>
<tr>
<td><strong>Production</strong></td>
<td></td>
</tr>
<tr>
<td>Oil (bpd)</td>
<td>1,791</td>
</tr>
<tr>
<td>Biodiesel (m3)</td>
<td>326,000</td>
</tr>
<tr>
<td>Natural Gas production (m3/day), millions</td>
<td>57.6</td>
</tr>
<tr>
<td>Ethanol production (m3)</td>
<td>330,000</td>
</tr>
<tr>
<td>Oil proved reserves (BOE), billions</td>
<td>12.08</td>
</tr>
<tr>
<td>NG proved reserves (BOE), billions</td>
<td>2.11</td>
</tr>
</tbody>
</table>

*Source: elaborated by the author with data from Revista Exame, 2010; Petrobras, 2010.*
refineries (in Brazil, Argentina, the USA and Japan), being directly present in 27 countries (Petrobras, 2010). The core operations remain in Latin America, mainly Argentina, where the company invests in search for synergies (scale and scope economies) with its operations in Brazil (Chevarria, 2006; Dalla Costa and Pessali, 2007).

After a long time monitoring and limiting the operations of foreign firms in their national reserves, governments were pressed by technological and fiscal requirements to open up the sector to foreign direct investment (FDI) (Aikut and Goldstein, 2009). The same happened in Brazil under the Cardoso government (Carvalho and Goldstein, 2009). Since then, around 50 new companies have established operations in Brazil; among them, a series of small enterprises started operating in the sector, in the field of onshore exploration (Estado de Sao Paulo, 2007).

Regulatory controls regarding exploration and production licences are since then implemented by ANP (National Petroleum Agency), an institution under autarchic management. The role of Government has been reshaped, from production and promotion of the sector to regulation and surveillance. Concession rounds are now on their ninth phase, and today there are 71 concessionaires operating in Brazil (35 of which are foreign investors). Production reached 1.97m bpd, a rise of 6% compared to the previous year (Petrobras, 2010).

Figure 23.1 Petrobras: social capital composition, 2009
Source: elaborated by the author with data from Petrobras, 2010.
Today the government is the major owner of the company with 32.1% of the social capital, and 57.8% of voting shares. The company has recently made a public offering of shares, in order to capture funds for further investments in the pre-salt exploration. Over 2bn shares were put in the market and the company capitalized around US$70bn.

The recent discoveries of oil in the pre-salt layers have shifted the focus of Petrobras expansion towards a domestic challenge, to develop technology to make such reserves profitable (Economist, 2010). In these new discovered sources, Petrobras has operated long-term tests (LTDs) in consortiums with foreign oil companies, such as BG Group and Repsol in the Santos basin, BG Group and Petrogal in the Tupi basin. The LTDs have already reached an average of 20,000 barrels per day. In 2010 new pre-salt reserves were announced in the Brazilian coast.

The focus on the pre-salt exploitation, however, did not extinguish investments overseas. In 2009 the company started refining operations in Japan, where it will provide gas for a compound with 3% of ethanol to be consumed in that country. In Portugal Petrobras established an office to be run alongside its exploration activities in the Portuguese coast. In total, Petrobras invested over US$174bn in 2009, mostly in the E and P segment (Petrobras, 2010).

The next section will present the technological achievements of Petrobras over the years, and how they contributed to the expansion of its businesses to foreign markets. We also stress the technological challenges posed by biofuel production and the exploration of the recent pre-salt reserves.

Technological capabilities and international expansion – the path to the top

The reason why Petrobras achieved such remarkable position among the leading world oil producers derives from the successful development of a state-of-the-art set of techniques to explore specific features of Brazilian reserves. Thanks to intensive R and D efforts, the accumulation of technological capabilities evolved from an initial set of incremental innovations from imported technologies to the development of its own set of techniques, the result of intensive R and D efforts (Neto and Dalla Costa, 2006).

Throughout its history, Petrobras accumulated strong capabilities in deep-water extraction, for which it has received several industry awards (Dalla Costa and Pessali, 2008). Its technological accumulation derived from the fact that oil reserves in Brazil are in deep and ultra-deep waters, which from the start required special extracting expertise.

Petrobras started its technological shift when it decided to focus on upstream activities specially in offshore locations. It took place in the early 1980s, when offshore exploration was at the technological frontier of the oil industry. The choice to prioritize this source of oil led the company to develop much more significant technological efforts than hither to (Furtado, 1997).

The accumulation of technological capabilities in the 1980s is an ‘innovation jump’; in fact, Petrobras jumped from the absorption and reproduction of external technologies already in use to the development of production systems in deep waters, prompted by discoveries of massive oil deposits at depths from 400 to 2000 metres (Furtado, 1997).

The company made extensive investments in R and D in order to develop its own technology in the deep-water field, and innovation was incrementally implemented through the process. It was financial restriction, rather than a simple choice, to work upon the production system already developed and employed, the floating production system (SPF in Portuguese), primarily developed to operate in marginal fields.

Such an achievement was possible due to extensive research efforts carried out in co-operation with institutes and universities in Brazil and abroad. Those foreign partnerships evolved from a
co-sponsorship to Petrobras establishing itself as leading articulator of the innovation process (Furtado and Freitas, 2000). The strategy of focusing on offshore-drilling technologies has yielded benefits: while in 1987 only 1.7% of production came from the sea, in 2000 this amounted to 55% (Bruni, 2002).

The accumulation of technological capabilities took place due to a series of research centres created by Petrobras, many of them operating in close co-operation with renowned Brazilian universities. CENPES is one of the most important ones, where the company carries out R and D activities in association with UFRJ (Federal University of Rio de Janeiro). Set up in the state of RJ in the 1960s, CENPES helped the transition of experimental technologies to industrial applicability, specially the development of the floating production system applied for increasingly deep-water extraction (Furtado, 1997; Furtado and Freitas, 2000). In 2009 the institute received US$872m. for technological development projects (Petrobras, 2010). As do most R and D projects, uncertainty in the development of appropriate technologies for deepwater prospection is diminished through joint projects with other firms, the strategy used by the company especially in the 1980s, when technologies were starting to reach a breakthrough (Furtado and Freitas, 2000).

Brazilian universities have been important providers of high quality human resources to the industry. Results from R and D projects have been quite impressive. In terms of expenditure on R and D, Petrobras is ranked as the fifth world oil company (DTI, 2006), with over US$1bn spent in R and D activities in 2009 (a 7% increase in relation to the year before) (DTI, 2009). In terms of R and D output, Petrobras is similarly impressive. It has more patent applications, and has also had more patents granted in the US Patents Office (USPTO) than any other Brazilian enterprise. Until 2005 the company also held the largest number of patents from the Brazilian Patent’s Office (INPI) (222 in the period 1990–2001). On average, Petrobras files 80 patent claims per year and the company has already reached the 1,000th patent filed.

Whereas the company’s initial expansion in foreign markets was markedly driven by the technological expertise in deep water drilling, recent movements have different objectives. The emphasis now is towards business expansion and conquering new markets; diversifying in the downstream segments is a new directive of the company’s international strategy. This goes in line with its aim to become a global, integrated company in the energy sector as a whole. The expansion of downstream investments also has the purpose of exploring and expanding the brand of Petrobras petrol throughout the world. The acquisition of refineries in the USA and Japan has this specific goal. Petrobras is searching for large profits from refining its excess capacity and operating in the downstream segment.

The rise of foreign investments from Petrobras in the 2000s reflects a new moment in the history of the company and a change in trends in the oil market in Brazil. First, the end of the monopoly in oil exploration in 1997 and the openness to foreign investors put the firm in a new, competitive market. Since then its executives face the expansion overseas as a source of growth to the firm (Chevarria, 2006). Second, the country’s achievement of self-sufficiency in oil supply, following the opening of another platform for deep water exploration in April 2006 at the Bay of Campos (Rio de Janeiro), has expanded investment strategy beyond the search for resources into establishing new markets for distribution of by-products, refining and logistics (downstream activities).

The international efforts are proving to be positive: while in 2000 there were still no refining activities abroad, in 2002 the refining capacity was of 100,000 barrels per day; in 2009, it reached 140,700 barrels per day (Petrobras, 2002; 2010). The refining capacity is concentrated in the Southern Cone of America, one of the strategic areas of action by the company.

Recently, Petrobras is aiming to increase its production capacity in ethanol and biodiesel, making vigorous efforts in research of alternative energy sources. Ethanol production and
exports had its kick start in December 2009 with the acquisition of 40% shares in a sugarcane powerplant in the state of Minas Gerais (Petrobras, 2010). A big challenge lies ahead for Brazil to conquer technological supremacy and establish itself as a major producer of this biofuel in the global market. The company aims to expand its capacity in ethanol production by 45.5% a year, reaching exports of 4,759,000 cubic feet by 2012.

The efforts in ethanol production are part of a new strategy followed by the company to become a major energy player. As oil reserves have a deadline, conflicts among producers are always a threat, and environmental pressures demand urgent search for alternative energy sources, Petrobras is now redefining its business. Nowadays the company has operations in hydroelectrical energy and biodiesel, besides its traditional business in oil, natural gas and diesel (Petrobras, 2010).

Technological prowess has rendered the company a valuable brand both domestically and internationally. It is among the top 10 most valuable brands in Brazil, and is the only Brazilian brand to show in the Millward Brown Optimor report of most prominent brand names of the world (Economist, 2010a).

Petrobras is an exemplar emerging company that has established its international position owing to the accumulation of technological capabilities. Such technological capabilities evolved through what became the strategic plan of the company. As Dantas and Bell (2006) stress, “[the company’s capabilities] evolved from those of an imitative technology-user to those of a leading player at the international innovation frontier” (2006: 9). Moreover, a change in the Brazilian regulatory scenario for oil investments has fostered a further internationalization strategy, in order to strengthen its competitive position. The accumulation of technological capabilities by Petrobras was the factor enabling the company’s international expansion. The move towards the Gulf of Mexico (where the company owns more than 170 deepwater blocs) and the western shore of Africa are evidence of the exploration of offshore technologies, since these sites are at the frontier of deep shore exploration in the world (Chevarria, 2006).

The national relevance of Petrobras has taken a new dimension since the announcement that the country became self-sufficient in oil supply in 2006, after the inauguration of deepwater exploration in the Campos basin. Since then, and added to the discoveries of pre-salt reserves in the Brazilian coast, the country is building potential to become a major oil producer. Whereas the Tupi field discovered in 2007 will add between 5 and 7bn barrels of crude oil and natural gas production (Carvalho and Goldstein, 2009), the pre-salt reserves might add over 1m. barrels per day by 2017 (Petrobras, 2010).

Today the biggest challenge for Petrobras is the development of groundbreaking technology for the exploration of the pre-salt reserves. Making the activity profitable will also take extra innovative efforts, and demand great numbers of highly skilled workers; it will also be imperative to prove that the accomplishments in the new reserves are environmentally sustainable (Economist, 2010b). So far, the company’s directors and the Brazilian government have been optimistic with the promises of abundant sources for the future. Several partnerships with universities, research institutes and other companies in related industries are under way, looking for solutions in drilling wells, storage and transportation – a CENPES initiative denominates Prosal (Technological Programme of the pre-salt) (Gouveia, 2010; Petrobras, 2010). Investments related to the pre-salt discovery are projected to be of around US$28bn per year, at least until 2014 (Época Negócios, 2010).

The visible hand: the role of policies and state ownership in oil companies

The oil sector is not neutral to government decision-making, for the very reason that oil is a key, strategic asset, upon which the economic prosperity of most nations depend. The national ownership of oil firms, mostly observed in developing and emerging economies, has also shaped
their influence in the national economy. In this section we will approach the role of the government in the performance of Petrobras, both as an energy company and as a Brazilian multinational. Such a role is rooted in the import substitution regime, which earmarked basic industries as the drivers of economic growth and kept them safely in the hands of the state. Technological capabilities were developed in accordance with this strategic valuing of the industry, and were central to the establishment of the company as a global energy player.

The prominence of Brazilian firms, and of Petrobras specifically, in the energy sector worldwide is partly a result of an increasing process of internationalization that took off in the 2000s, with important acquisitions of firms from developed countries. In the specific case of Petrobras, another side of this matter relies on the redesign of policies in the energy sectors (Sennes and Narciso, 2009). Since the 1990s, Brazil has moved from a self-sufficiency policy towards an integrated, energy security approach as its central strategy, which took shape through the government’s designs for Petrobras. In line with this changing perspective, internationalization, verticalization and investments in finding better energy sources have come to the heart of the company’s strategic plans.

The role of the government in the development of the Petrobras of today has several facets. To begin with, the choice of oil and energy as a key driver of the country’s economic industrialization, during the import substitution industrialization process carried out in the 1950s was crucial for the pursuit of technological development required in order to access the domestic oil reserves. In this sense, it is hard to detach the presence of the government from the impressive technological trajectory of the company, which was also developed through consistent partnerships with public universities and research institutes.

The internationalization of Petrobras was also a strategic political decision, which aimed to keep the country safe from the economic imbalances originating from international oil crises. In terms of internationalization, the role of the government is restricted to the strategic search for oil sources at the early global expansion of Petrobras. Policies to foster internationalization of Brazilian firms have only recently entered the government’s agenda, as part of a strong policy aimed at boosting export performance and improving competitiveness through investment in R and D towards new strategic sectors (Almeida, 2009). Until then, in Brazil the predominant vision among the government was that foreign investments by domestic companies represented a crowding out of capital, investments and employment, and therefore were very harmful to the domestic economy. This view has been subverted by evidence, not only in Brazil but also throughout the world, that internationalized firms perform better and possess better technologies and human resources, and their exports achieve a better profitability (De Negri et al., 2005).

In summary, Petrobras became a national global player owing to its reliance on a strong competitive asset: its deepwater exploration technologies, which have been developed from the specific circumstances present in the Brazilian oil reserves. The role of the government in the process was in picking the oil sector as strategic for industrial development and providing means for the building of a scientific and technological network to enable the development of the required capabilities. There were no direct incentives in internationalization apart from the strategic and political purposes of reaching key oil sources.

It is useful to counterbalance the case of Petrobras with that of the state oil companies of China. In the latter case, the government had a major role in creating big global companies from the start, since the country lacked both oil reserves in sufficient amounts for its demand and the technological capacity necessary to explore the sources that they own (Carvalho and Goldstein, 2009). In this sense, Petrobras’ international expansion is highly technology-driven by nature, whereas the Chinese expansion has a strong technology-seeking purpose.
Petrobras is of crucial importance in the Brazilian political scenario and is often the reason for political distress. With a budget bigger than most ministries, the company accounts for a third of all investments foreseen by the Growth Acceleration Plan (PAC), an equivalent of over US$80bn (Revista Exame, 2010b). For that reason, every little movement in the company’s administration is followed, and investment plans, governance structure and indebtedness levels are subject to public scrutiny.

Concluding remarks

This chapter presented the trajectory of a Brazilian state-owned company, and also one of the largest multinationals originated from an emerging country. It has achieved a remarkable technological trajectory, becoming a world leader in the field of deepwater oil extraction. Such a feat is by no means ordinary, let alone for a firm in a developing country where financial and technological resources are scarce by nature.

The oil industry has a series of specific features that are not easily shared by many other sectors; the fact that Petrobras is a state-owned company from an emerging country adds some idiosyncrasies to its trajectory. We tried to highlight the role of the government in providing the company with the assets it holds today and that enabled it to become a major oil producer and a technological reference for deepwater drilling. In our view, the government played one major role: choosing oil as a strategic industry to be developed and controlled by the state, given its crucial role for the consolidation of an industrial basis within the country. This one decision has given rise to and shaped the opportunities for technological development and also for international expansion (a feature common in the oil industry trajectory).

State ownership has granted Petrobras the resources necessary to foster technological excellence, and here once more the strategic choice for keeping the sector in state command was crucial for the achievements that the company accomplished over its history.

Pressures from the market have driven changes in the legislation regarding oil concessions in the national territory, and nowadays several other oil companies explore oil fields in Brazil. Petrobras’ expertise in offshore, deepwater exploration makes it a partner for those companies, rather than a regular competitor.

It is therefore because of its technological development that Petrobras became one of the most important oil companies in the world, and also one of the most important Brazilian businesses both domestically and overseas. Much of the prosperity expected for the Brazilian economy in the forthcoming years lies with the success of Petrobras. The future of alternative energy sources and the possibility of the country becoming a world leader in ethanol production and exports is also in the company’s hands.

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Part V

Key Issues for the Future