

Skill formation in the Brazilian oil & gas sector

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Introduction

Developing skills is a crucial part of the Brazilian ‘local content’ policy for the oil & gas sector. However, to what extent do national skill and labour systems of the past pose constraints on skill development of the present? Are there certain imperatives on skills development stemming from the particular ways the capitalist system is organized in Brazil? And how innovative and forceful have the recent efforts been to reshape the skill formation system?

This paper tries to understand the Brazilian oil & gas sector by reviewing some concepts and theories about skill formation systems in combination with a Varieties of Capitalism approach. After the theoretical discussion in section I, the Brazilian varieties of skills formation systems are addressed in section II by using a historical-evolutionary approach. At present there are several dynamics operating within one economy, and the oil & gas sector is quite different from other modern industries in Brazil. The paper proceeds to presenting a case of a transnational segment (Norwegian) in the Brazilian o&g sector, suggesting there are more than one dynamic operating even within one sector of the country.

Skill formation and varieties of capitalism – a review of theories

The point of departure for a Varieties of Capitalism (VoC) approach is that skill formation systems are shaped by the power relations between the state, employers and workers. The power relations define the extent and type of coordination between the three parties. The VoC approach draws a distinction between two modes of coordination. In the first, firms coordinate their activities primarily via own *hierarchies and competitive market* arrangements, the equilibrium outcomes of firm behaviour usually being given by demand and supply conditions in competitive markets. In the other, firms depend more heavily on

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non-market relationships to coordinate their endeavours with other actors and to construct their core competences. The balance between these two types of coordination varies across welfare regimes (Saar, Ure and Desjardins, 2013).

Among the industrialized OECD countries, liberal market economies (LME) are at one end of the spectrum. The relations between firms and other actors are coordinated primarily by competitive markets. Although there are variations among them, the USA, the United Kingdom, Ireland, Canada, Australia and New Zealand belong to this group. These economies are characterized by a '*low skills equilibrium*' (Finegold and Soskice 1988). The system of industrial relations operates with a relatively high degree of autonomy. Within the context of a culture of individualism, training is the responsibility of either the employer or the individual worker. Education and training has been left a high degree of autonomy in relation to the demands of the employers. The result is that in-company training is the dominant form of skill formation outside the professions (Ashton, Brown and Lauder 2010). The coordination of the supply and demand for skills operates through the market. Government skills-related programmes are primarily targeting the unemployed

At the other end there are coordinated market economies (CME) where firms typically engage in more strategic interaction with trade unions, suppliers of finance and other actors. Germany provides a good example of a coordinated market economy. Austria, Switzerland, Belgium, the Netherlands, Denmark, Finland Sweden and Norway are also identified as belonging to this 'corporatist' type (Hall and Gingerich 2004; Hall and Thelen 2009). Their governments are heavily involved with employers and unions in regulating not only the training system but also the employment relationship and social welfare arrangements. Governments also developed a centralized system of control over the education system to ensure an adequate supply of skills for the labour market. With support from labour organizations, governments have therefore encouraged the growth of high levels of initial training, in the form of either the apprenticeship system or as strong provision of school-based vocational education. Coordination of the demand for the supply of skills is undertaken through a broader institutional framework. This model ensures that a high proportion of the labour force is provided with an intermediate level of skills.

However, many caveats have been raised against this picture:

First, there are big differences within each of these two groups. For example, Netherland and Sweden empasize state-run vocational schools rather than the German 'dual' system that includes both school training and gaining work experience at the workplace (enterprise-based apprentice training). Hence, even within the CME group the role of the state varies a lot.

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Second, many OECD countries do not fit into either of these two groups (LME and CME). The political economies in Southern Europe have been characterized by a high level of state-driven strategic coordination (Schmidt 2002), perhaps a path enhanced in the interwar period by state-centred corporatism (e.g. in Mussolini's Italy and Salazar's Portugal). In post-socialist (CEE) countries in Eastern Europe, the rise of a *hybrid* varieties of capitalism have been observed (Iankova 2002). During the market economy reconstruction, governments and other institutional actors in CEE countries have been presented with various powerful exogenous models (Crouch, Schröder and Volezkow 2009), meaning that the VoC (Varieties of Capitalism) approach does not capture the dynamics of the economic systems in countries undergoing transformations. The VoC approach tends to exclude several exogenous factors such as the central characteristics of the geopolitical region, the dependency on multinational firms as well as on international organizations such as the World Bank, the International Monetary Fund etc. These exogenous forces do not simply offer ideas for consideration; they impose certain policies and models on their client states. Nölke and Vliegenthart (2009) identify a special of capitalism – a dependent market economy (DME), which emerged in Hungary, Poland, the Czech Republic and the Slovak Republic. This type of capitalism has comparative advantages due to skilled but cheap labour, the transfer of technological innovations within transnational enterprises and the provision of capital via foreign, direct investments. Transnational corporations will not accept costly institutions, such as comprehensive collective agreements, because they require low labour costs. Corporations are not driven by a necessity to invest heavily in innovation and in skills relevant for innovative activities because they prefer to import technologies. The DME model differs from the CME model in the sense that in the case of DME, public vocational training occurs outside of corporate domains, i.e. little training is provided at the workplace. The DME countries are used as platforms for semi-standardized goods. For that purpose, the existing skills of employees are adequate and investments to upgrade skills would endanger these countries' cost advantages. (Saar et al, 2013).

The developmental state model represented by countries from Asia and South America is close to this DME model. In countries exhibiting the developmental state model (South Korea, Taiwan, Singapore), the need for utilising their advantage (cheap labour) in the world markets led to the initial development of low-skilled, low value-added forms of production. It is close to the neo-market model : control over the process of skill formation is shifted from internal actors (state, industry and labour) to the hands of foreign capital. Control over the education system is decentralized. The coordination of the demand for and supply of skills is left largely to market forces.

This DME model has many similarities with the HME model among Latin American countries. The hierarchical market economy (HME) model is named after the hierarchical relations that often occur in such economies. On a macro-level, these relations appear in

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top-down regulations distributed by national governments, while the micro-level relations arise within firms with powerful owners and few options of formal representation and unions for the workers (Schneider 2013: 8). The core institutions within HMEs are a) domestic business groups with a hierarchical system of subsidiaries, b) multinational corporations (MNC), c) atomized labour markets and d) low levels of education and vocational skills among the workers (Schneider 2013: 10-12). As in LMEs, the low-skill equilibrium is also a common feature in hierarchical economies, where industries that do not require a large amount of technology are often highly represented.

By way of a conclusion, the LME, DME and HME models seem to have converged during the last decades of neo-liberal globalization, The CME and other models that depend less on competitive market arrangements and more on non-market coordination of skill formation, have lost ground. Still, there are exceptions.

Brazilian varieties of skills formation systems

Then, how should we apply the variety of capitalism approach to a country like Brazil, and what is the specific Brazilian type of skills formation system? Based on Schneider (2013) one could assume that the HME and other liberal models are dominant, but are they?

As to the variety of capitalism approach, Saar, Ure and Desjardins (2013), who want to extend the approach to Eastern Europe countries, conclude that “this extension has to account for variations within contemporary societies and for connections between them”. In other words, dependency on, or close connections with, global powerful actors outside the country opens up for extensive hybridity. Furthermore, national innovation and production systems tend to be loosely coupled, allowing not only for incoherences at the national level, but also for the creation of autonomous subsystems at the sectoral or local level. These subsystems may establish their own governance structures, diverging from the national model (Crouch, Schröder and Voelzkow 2009). Still, it is possible to use some ‘ideal-types to identify the various logics operating on sub-system or sector levels. For instance, two alternative roads to competitiveness have been followed in the capitalist world the last decades: ‘low road’ based on a low-wage, low-skill, low-involvement and low-quality equilibrium, and ‘high road’ entailing high wages, high skill, high cooperation and high product quality (Soskice 1993; Berger and Dore 1996; Crouch and Streeck 1997; Regini 2000).

In the case of Brazil, our argument is the following:

1. The country is a hybrid crisscross of ‘low roads’ and ‘high roads’. There are particular divides between the oil & gas sector (‘high road’) and other sectors, and within the o&g

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sector there are different arrangements for different sub-sectors (e.g. for operating companies, the firms in activities outsourced by the operators, the supply industries etc).

2. Brazil has in its various modern phases of capitalism embraced both corporatist (or CME) models, as in the Vargas era and recently in the Lula period, and more liberal market models (LME, DME, HME), as under the military rule 1964-1985 and under Fernando Henrique Cardoso (president 1995-2002).

The Brazilian oil & gas industry has been, and still is (in spite of a deep crisis), dominated by the state-owned enterprise Petrobras. This has, to a certain point, allowed the federal government to make Petrobras its main policy instrument both for national industrial development and for control of the national o & g market.² Therefore the evolution of the national oil & gas sector mirrors the changes in ideologies and strategies between the various Brazilian governments, which we here depict very briefly:

The Vargas era: nationalism, corporatism and CME

In the early 1940s, under President Vargas, the corporatist 'Sistema S' was introduced. It was a system of service organisations for the workers founded to improve professional skills and social welfare. They were run by the employers' confederations, funded by a small fee deducted from the salaries of their employees, and regulated by public law. The system survived the sequential periods of democratization and was even written into the constitution of 1988. For the oil & gas sector the most important part of 'Sistema S' is SENAI - Serviço Nacional de Aprendizagem Industrial. SENAI is still one of Brazil's main providers of schools for vocational training and technical training.

Petrobras was created in 1953, during the wave of nationalism that hit Brazil (and Latin America) in the middle of the 20th century. The creation of Petrobras, along with the introduction of state monopoly in the oil sector, was the result of a process over many years defining how the oil industry should be structured. Getúlio Vargas had assumed presidential power on the promise to monopolize the oil sector in 1951, and achieved this transformation three years into his presidential period. With the state monopoly in place, the government wanted to control both the upstream and the downstream activities, and eventually become a self-sufficient oil producer. An important step was to establish refineries and a functioning petrochemical industry (Randall 1993: 15).

From Military rule to FHC; liberal models (HME)

²² As the Operation Lava-Jato ("Car Wash") has lavishly revealed, Petrobras has become the main instrument also for criminal funding of networks protected by the national political elite.

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During the years of military rule, Brazil saw a slight loosening of the state monopoly in the oil sector. This era coincided with the discovery of offshore oil fields in the Campos basin, and with Petrobras lacking the skills to undertake explorations under sea level, these contracts were handed to international oil companies, though Petrobras would remain the sole operator of any discovered oil field (de Oliveira 2012: 528). The oil industry experienced further transitions during the 1990's under the rule of Fernando Henrique Cardoso (FHC) and his liberal doctrine. In order to improve the economic efficiency, Petrobras was partially privatized and the oil market was liberalized. The aim was to attract foreign investment, to reduce the subsidies residing in the oil market, and to intensify the oil activities, with the final goal of obtaining self-sufficiency (Amann 2002: 878; de Oliveira 2012: 535). As a way of monitoring and controlling the newly liberalized oil market, the Petroleum Law was implemented in 1997 alongside the creation of the National Petroleum Agency (Agência Nacional do Petróleo – ANP). 1997 also saw the introduction of the concession round system, with annual licensing rounds where international oil companies could bid for exploration rights.

The arrival of a free market arrangement in the Brazilian oil & gas sector changed its dynamics. From operating with a giant company holding a monopoly, the market was now open to other actors as well. Even though Petrobras held its ground, it was forced to change and become more market-oriented and competitive.

The Lula era: re-emphasizing the coordinated models (CME)

From 2003 and onwards, the Brazilian oil industry went through another transformation. This time, it was a part of the new president, Luiz Inácio Lula da Silva's, economic policy coined as state-led developmentalism, or neo-developmentalism (Bresser-Pereira 2011). In this model, the state yet again played a leading role in the national oil industry. The aim was to link together various national industries in order to create more production within the domestic market. Here, the oil industry would be a key actor in developing domestic supply chains. This was emphasized after the huge pre-salt reservoirs were known publicly in 2007. The oil & gas legislation was changed in order to secure national control by granting Petrobras the leading operator role in every pre-salt field.

One of the measures used to secure national development was the local content policy. The local content policy was first introduced in 1997 as a part of the concession rounds, but during the first years there was no fixed demands of local content, and the definition contained any goods or service coming from a Brazilian supplier (Guimaraes 2012: 8).

Lula also created the Program for the Mobilization of the National Oil and Natural gas Industry (PROMINP), which is a coordination forum designed to facilitate the cooperation

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between the government, Petrobras and industry associations in order to meet the increasing demand of the oil industry concerning industrial goods, services and skilled workers (Almeida et.al 2014: 18-19). In 2006, PROMINP established a program called the National Plan of Workers' Qualification (Plano Nacional de Qualificação Profissional), and during its first seven years, the program qualified more than 97 000 workers ranging from basic education to university level (Rappel 2011: 70; Prominp webpage). The training is done in collaboration with several institutions, from public universities to the corporatist 'Sistema S', in particular SENAI.

The creation of PROMINP arguably defines another turning point in the internal structure of the oil sector. The role of PROMINP as a coordinating forum between various actors in the oil industry shows a shift away from the free market as a sole coordinator towards introducing non-market mechanisms to "control" the market, such as networks and collaborative forums.

Petrobras: a state within the state.

However, one can also find evidence of hierarchical structures in the oil sector. Petrobras is by far the leading company of the industry, and hence is placed high on the hierarchical ladder. Petrobras has a different dynamic than the rest of the industry.

The Brazilian government provided Petrobras with financial incentives (tax reliefs, exemption of import duties) in order to push the company's development forward (de Oliveira 2012: 523). In spite of these initiatives, Brazil was not ready for a development project of this size. The country lacked the necessary skilled labour to manage Petrobras' activities. Petrobras therefore started to train its own work force (Randall 1993: 16). The courses reflected the company's project and ranged from vocational training to university level engineering. Courses in oil geology did not exist in Brazilian universities, which left Petrobras with the option of either hiring foreign teaching staff or sending their students abroad. The various training courses provided a close link between theory and the following work practice, as Petrobras trained their workers with specific jobs in mind. The Petrobras school/university differs from the rest of the oil industry, where the links between education/vocational training and working life are not that strong.

Petrobras opened a research center, CENPES, in 1963 with the goal of improving their own research and development. The basic engineering group of CENPES started to develop offshore equipment in 1983, and from 1984 CENPES was also in charge of the technical training for Petrobras (Randall 1993: 245-248).

The technical prowess of Petrobras increased gradually along with discoveries of oil fields further and further below sea level. The fact that all of Brazil's offshore wealth was not

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obtainable at once may have saved the country from being trapped into the “resource curse” (Brooks and Kurtz 2014: 31). The development within the research and technology department can also arguably be a reason as to why Petrobras survived the 1990’s transition into a free market economy. By then, they were able to compete with the international oil companies arriving in Brazil.

The oil industry as a “high road”

The careful and gradual development of the Brazilian oil industry, enhanced by Petrobras’ focus on R&D, makes it different from other Brazilian industries, where technology is not a distinguishing factor. The inherent characteristics of the offshore industry are compatible with those of a “high road” economy, where the percentages of skilled workers and R&D are high.

The wages in the industry are high as well, which might have a negative effect on the other Brazilian industries. The high wages combined with a high demand for skilled workers have drawn in engineers, technicians, electricians etc from the other sectors, and thus drained them of having a sufficiently large skilled work force.

The offshore industry can be seen as an example of the ‘high road’, and therefore does not fit Schneider’s HME model containing the low skill equilibrium, even though traces of the HME can be found within the industry. Hence, this can further be taken as evidence for the claim that there can exist more than one particular dynamic within one economy.

Cases of foreign (Norwegian) segments in the Brazilian o&g sector

Norway has institutionalized the German ‘dual’ system that includes both school training and gaining work experience at the workplace. In many ways the oil & gas industry has, since the ‘Norwegianization’ of the industry started in the 1970s, been at the forefront of renewing this system. The first foreign companies operating in the Norwegian off-shore were North American with entirely company- and market skill formation. At that time, Norway was a kind of ‘dedicated follower’ of Sweden with an increasingly state-based vocational training system serving the medium- and large scale enterprises. The process to adapt the public vocational and technical educational institutions to the needs of the petroleum industry was supported by national government incentives and a decentralized public school system for secondary and tertiary education. This facilitated speedy introduction of mutually adaptive collaboration between educational institutions and the petroleum industry particularly in the Stavanger region (the county of Rogaland), where the state-owned enterprise Statoil and the other operating companies had their

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headquarters. Statoil was particularly important in the 'Norwegianization' of manpower, skills, and research & development activities of the petroleum industry.

With this background one could expect that Norwegian-owned companies participating in the Brazilian oil & gas sector were well endowed to adapt efficiently to the local content policy, both in general and in relation to skill formation. Conversely, if there were problems among the Norwegian companies to be active partners of the local content policy, one should expect even larger problems for foreign companies from other countries, perhaps also for Brazilian companies which were not well integrated in the Brazilian version of the coordinated model (CME).

*"Team Norway"*³

The Norwegian authorities have also established a network in Brazil⁴. Team Norway is a formalized network containing the Norwegian embassy and general consulate, Innovation Norway, the Norwegian-Brazilian Chamber of Commerce, Abran, Intsok, the Norwegian Seafood Council and Sjømannskirken (Norwegian Church abroad). Team Norway cooperates in order to promote Norway and Norwegian goods and services. Though their activities are not exclusively related to the oil industry, a lot of their work is centered here, due to the high concentration of Norwegian companies.

Knowing the right people in the Brazilian system is important. One company representative emphasizes networking and learning from other success stories as one of the most important requisites to succeed in the Brazilian oil industry, along with working closely with Brazilian partners.

"Dream Learn Work" was established in 2006 as a way for the Norwegian companies to show CSR, but at the same time it can be a method of recruiting technicians and other staff from lower education. Dream Learn Work recruits youth from local social projects and provides them with a technical education from SENAI. The program is sponsored by the Norwegian companies involved, and they also have the opportunity to hire the students after graduation.

Hence, at the semi-public level it looks as if the Norwegian sub-segment has adapted well to the Brazilian collaborative system. But what are the experiences at the company level?

³ This sub-section is based on Melby (2015)

⁴ This is not exclusively in Brazil. "Team Norway"s exist in most countries with a bigger Norwegian presence.

*The maritime sub-sector*⁵

ABRAN⁶ is a formalized coalition of all the Norwegian companies operating in the maritime sub-sector of the Brazilian oil industry. The coalition is based on, and also a part of, the Norwegian Shipowner Association (Rederiforbundet). The companies of ABRAN work together as a united front in order to change Brazilian policy on issues important for their operations. For instance, they have been lobbying Brazilian authorities to increase the number of students at the two navy schools that had the privilege (monopoly) to provide the industry with cadets/seafarers. “We have been explaining the challenges of the situation that was threatening the development of the whole industry. We proposed that the local content requirements should be balanced with the supply of work force, that it does not make sense to have these rules while the industry is lacking work force. The reaction has been positive, and they have increased the number of cadets a lot. In year 2000, the number of graduating cadets was 90. In 2012 there were almost one thousand graduates” (ABRAN representative).

Many of the companies try to obtain closer links with education/vocational training arenas, where students are seen as potential workers. Especially in the maritime sub-sector, the companies see it as necessary to have good relations with the two navy schools that educate seafarers (CIABA and CIAGA). Still, collaborations such as apprenticeships and trainee programs are quite common across all the sub-sectors. The labour market has been particularly unstable in the maritime sub-sector, where sailors and seafarers are in demand. As this education is only provided by two navy-controlled academies in all of Brazil, the lack of skilled, tenured seafarers has been noticeable.

Norwegian companies in need of employees with higher education try to cooperate with certain universities in order to make themselves attractive as an employer, and thus recruit employees straight after graduation. The recruitment process can also evolve through internships and trainee positions.

Among the Norwegian firms interviewed, there is a certain reluctance to the apprenticeship program *Jovem Aprendiz*, implemented by the Brazilian government. One representative expressed that this is a policy that is “forced upon them”, and thus limits their ability to offer other trainee programs.

⁵ This sub-section is based on Melby (2015) if other reference is not mentioned

⁶ Associação Brasileira dos Armadores Noruegueses (The Brazilian Association of Norwegian Shipowners)

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*An example of innovation in the maritime sub-sector: simulator training*⁷

In Brazil, captains and experienced seafarers are in high demand as the offshore market has grown very fast. However, the training process from naval academy cadet to a vessel captain takes around 10 years. The maritime industry realized that this post-academy training had to become much more time-efficient in order to overcome one of the major bottlenecks in the development of a local petroleum industry. Moreover, there were constantly new technologies and new requirements from the petroleum operators which underlined the needs for frequent and intensive skill upgrading of existing vessel officers.

In response to these needs, numerous training centers offering simulator training have in the recent years opened in the Rio de Janeiro area. This includes Maersk and Kongsberg Training Center in 2013 and Rolls Royce Training Center in 2014. The training centers use modern equipment - inside the simulators with a 360-degree view the experience feels very realistic. Simulator training has become an efficient tool to nurture the learning process and speed up the development of relevant skills among the Brazilian workforce.

*Problems with Brazilian firm culture and a skill driven labour market in the o&g sector*⁸

All the companies view the oil sector as containing a highly atomized labour market. But the structures behind it are different from the atomized labour market in Schneider's HME. Here, the qualified workers have been in demand for several years (up until the oil crisis of 2014/2015), and can in many cases choose their own position and salary. This leads to a high turnover, where the employees often do not stay in the same firm for more than six months before they find another position with slightly better terms and conditions. According to some Norwegian firms, the high turnover is a consequence of a feature among Brazilian workers to never settle down, and to always be searching for something better. "Getting access to newly educated work force is easy, and it's easy to mold them into your company structure. But after a couple of years, they start to believe they are seniors and entitled to higher wages. And if you give them a promotion, it often goes to their head, and they can become quite bossy, which is bad for the company culture. They also start to claim higher wages with the promotion, and some have even asked for a salary higher than the CEO in Norway" (Norwegian firm representative interviewed in Rio de Janeiro).

Norwegian firms do usually not have a hierarchic structure within the company. The Norwegian firm culture, with a relatively small distance between the manager and the employees, is more egalitarian than the Brazilian,. It might be that some Brazilian workers,

⁷ This sub-section is based on Hoff (2015)

⁸ This sub-section is based on Melby (2015)

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not being familiar with this culture, have too high expectations of a quick uplift in the Norwegian firm.

This trend has augmented during the last years, but it is reasonable to believe that the high turnover will decline in the uncertain times that the industry is facing now. With the low petroleum prices and the Petrobras crisis, the activity in the Brazilian oil sector has slowed down considerably. And with the halt in activity, the demand for skilled workers will gradually disappear. The declining demand for workers will arguably lead to a stabilization of the labour market, with a newfound equilibrium between supply and demand of work force. However, this equilibrium will not be a low-skill one; most likely it will be no equilibrium at all. Nevertheless, the ups and downs of the sector, along with the continued presence of foreign companies with different firm cultures and routines, may bode for several dynamics of skills formation even within one sector (the o&g).

“The lack of qualified workers within the oil and gas industry has been a hindrance to Brazilian economic growth, with the need to use nearly qualified workers to do the same job. This has made the costs high compared to the quality of the work” (Norwegian firm representative).

Concluding remarks

The experiences of Norwegian companies operating in the Brazilian oil & gas sector suggest that the local content policy in the area of skill formation has been loyally and even innovatively supported by the companies. Arrangements of collaboration between public and private institutions, and between market and non-market mechanisms, have produced a significant development and qualificational upgrading of the Brazilian labour force. However, there has been a tendency that the public school system has not expanded quickly enough to meet the demand for skilled manpower, symbolized by two naval academies maintaining a monopoly of the education of cadets. Petrobras has set a certain example by training and educating their employees by in-house arrangements, in a hierarchical way of a ‘planned’ economy. Other predominantly private sub-sectors have met the needs for skilled workers by entering into market-based arrangements or by informal non-market cooperation with public training and educational institutions, in a relatively improvised way. A dynamic and unitary training system offered to all industries branches within the o&g sector has been absent.

The main problem at the national level, however, seems to have been the extremely fast expansion of the o&g sector after the discovery of the pre-salt reserves. With simultaneous restrictions on the oil & gas industry to use foreign labour, already skilled and experienced for the tasks, the foreign companies complain that the Brazilian skilled labour has become

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very expensive both to develop and to employ. Brazil started to face a 'labour aristocracy' problem. The only 'solution' to these structural – and some would add cultural/attitudinal - problems on the labour market is to put the brakes on the fast expanding the petroleum industry. The combination of falling world market prices on petroleum and internal political-legal crisis in the Brazilian oil industry seem to have 'solved' the problem on the short term.

In terms of skill formation, Brazil is a hybrid crisscross of low-skill and high-skill sub-systems, or 'low roads' and 'high roads'. There are particular divides between the oil and petroleum sector ('high road') and other sectors. However, even within the oil & gas sector there are different dynamics and logics operating. This is partly due to the foreign origins of some companies, but probably even more due to contradictory impulses from Brazil's national development. Brazil has in its various modern phases of capitalism embraced both corporatist (or Coordinated Market Economy) models, as in the Vargas era and recently in the Lula period, and the liberal market model (LME), as under the military rule 1964-1985 and under Fernando Henrique Cardoso (president 1995-2003). Therefore, skill formation in the present Brazilian oil&gas sector witness hierarchic arrangements of Petrobras and other large companies, but we also see arrangements strongly shaped by market competition, including labour market competition. Last but not least, arrangements based on non-market relationships and cooperation between the state, education institutions and business associations are significant but not dominant

This shows that a static and schematic appearance of the Variation of Capitalism approach needs to be re-examined. The articulation of multiple dynamics within the country and even within its various economic sectors need to be grasped and further conceptualized.

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