# Human capital and the development of a competitive and sustainable supply chain for a growing oil & gas industry

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## a. Background

Exploration of natural resources has gained new dimensions in a contemporary perspective adopted by countries in several geographies. Understanding the context of this question requires an analysis of the economic and political scenario of Oil Producing Countries (OPCs) and Oil Demanding Countries (ODCs).

In general, OPCs can be typically characterized as (i) countries with small domestic markets – dependent on exports, (ii) facing technology constraints, (iii) having a limited local industry base, (iv) dealing with constant regional conflicts and (v) envisaging political and legal instability. On the other hand, ODCs can be qualified as (i) countries that produce only a small share of its oil consumption – depending on imports, (ii) with relative small oil reserves, (iii) with large domestic markets, (iv) dominating advanced technology, (v) disposing of a large industry base and (vi) living political and legal stability.

Historically, International Oil Companies (IOCs), regardless the region they are operating, trend to bring technology, equipments & material supply and qualified workforce from its global suppliers and local business are minimally involved in their activities, mainly when the operation regions refers to an OPC. This practice occurs due to reliance on a traditional and known global supplier base but has also the influence of some countries – mainly ODCs – that have strong mechanisms to support and enhance their industrial base exports.

For changing this scenario, OPCs have been implementing public policies to transform their natural wealth in economic and social development, improving the welfare of its population. A watchful eye on this issue suggests an evolution of Public and local community expectations, over the time, in four steps. In the first instance, the start up of exploratory activities is welcomed by the local society due to (1) the expectation of increasing taxes collection. Obtained this benefit, the scheme rests on (2) local direct jobs creation associated with exploratory and complementary activities, as well as a contribution to improving the living conditions of surrounding populations. Then, third stage regards the expectation for (3) implementing and improving region's infrastructure, enhancing conditions for local economic and social development. In a more contemporary view, the expectation has been established that, besides taxes, jobs generated and contribution to improving the local infrastructure, the benefits derived from economic activities of these companies will translate into different vectors of (4) development of the entire country. This view has been the main driver of political and economic actions of local content observed in recent years, mainly in countries with important sources of natural resources, especially oil and natural gas.

Brazil has a very successful case regarding social and economic development driven by natural resources exploration. Currently, the country has a privileged position in global Energy market, joining characteristics from OPCs and ODCs. Brazil is a large oil producer –

2.5 MM boe / day (as of 2011) – with a great perspective to increase its production to more than 6.0 MM boe / day at 2020 and has a huge domestic market for oil products. Additionally, country has large proven reserves, advanced oil exploration and production technologies, diversified industry base and political and legal stability as well.

This paper will present Brazilian successful local content development program, remarking strategy developed for building human capital capability required for implementing its challenging oil & gas business plan.

## Brazilian Energy Industry Background

Oil and natural gas related activities began in Brazil in 1939 and since then, domestic supplier industry has been encouraged to meet the goods and services demands of the sector. In the following decades there were different investment cycles prioritizing certain areas of activity, especially since the creation of Petrobras, on October 3rd, 1953.

Due to the small domestic oil production in the 60's and 70's, investments were directed towards the consolidation of refining capacity for the attainment of self-sufficiency in the production of refined products. Also, in the 70's, there was a movement for strengthening shipping industry which was encouraged to build oil tankers in Brazil. Once country was an oil importer, there was a need to bring it from abroad to meet domestic market consumption. During this period, a market protection policy was implemented in Brazil. Purchases were directed to the domestic market, regardless of their level of competitiveness in comparison to world market prices and conditions. During this period it was forbidden to import items that could be produced in Brazil, as a tentative to stimulate local supplier industry development.

From the late 70's, after the discovery of oil fields in the Campos Basin, begins a new phase with high level of investments directed to the offshore exploration and production, strengthening national production of goods and services for these activities. In the mid-80s, there was a reduction in investments in oil sector, followed by a change in policy adopted by the Brazilian Government, in the early 90's, when there was an opening of the domestic market to international suppliers' competition. From this period, country adopted a political model, where competitiveness (mainly price) was main driver for acquisitions and all protection to local market was withdrawal.

Both practices – protected market and a free market – applied at different times in Brazil, brought results equally unsatisfactory. In the first case, especially in 70's, there was a production capacity increase in major industrial sectors, but in a lower level of competition in comparison with international competitors, given the lack of incentives for non-direct concurrence with these competitors. At another point in the 90's, the adoption of a free market policy cause a decline in domestic industry share in the supply of goods and services and as a consequence the loss of national capacity to provide goods and services as well as a significant loss in skilled human capital.

From beginning of 2000's, oil prices reached high levels – around USD 100 / barrel – stimulating a new phase of investments in Brazilian oil and natural gas sector. A new opportunity for recovering local supplier industry capability and human capital skills resurged. For maximizing this opportunity there was an urging need to structure actions to strengthen local supply chain, which required gathering key stakeholders such as government, O&G suppliers and Oil Companies, aside of their personal and very often sometimes conflicting business interests, around a common goal: maximize local content. In this context,

PROMINP[1] – Brazilian Oil & Natural Gas Industry Mobilisation Program – was created by the Brazilian Government and officially launched by President Luiz Inácio Lula da Silva on December, 2003. Program's main objective is to maximize domestic supply of goods and services, within competitive and sustainable bases, in the implantation of O&G projects in Brazil and abroad.

For achieving its objectives, besides of Brazilian Federal Government, PROMINP also has the participation all national oil and gas industry in Brazil, such as oil companies, supplier associations, business entities etc. Thus, the governance of the program, which is coordinated by the Ministry of Mines and Energy (MME) and Petrobras, has the participation of the Ministry of Development, Industry and Foreign Trade (MDIC), National Economic and Social Development Bank (BNDES), Brazilian Institute of Oil, Gas and Bio fuels (IBP), the National Organisation of the Petroleum Industry (ONIP) and several suppliers associations that represents specific industry sectors: Brazilian Association of Engineering Consultants (ABCE), Brazilian Association of Infrastructure and Basic Industry (ABDIB), Brazilian Association of Machinery Builders (ABIMAQ), Brazilian Association of Industrial Engineering (ABEMI), Brazilian Association of Electrical and Electronics Industry (ABINEE), Brazilian Association of Pipes and Metal Appliances Industry (ABITAM), National Confederation of Industry (CNI), and National Union of Construction Industry, Shipbuilding and Offshore Repair (SINAVAL).

As stated in Decree 4.925 published on December, 19th 2003 establishing the PROMINP, its governance structure has three levels of management:

(i) **Steering Committee** – responsible for defining PROMINP management guidelines and evaluates Program's performance,
(ii) **Executive Committee** – responsible for implementing management guidelines, validate program's initiatives and results, coordinate the Sectorial / Thematic Committees, , pursue funding sources and propose / review performance indicators; and
(iii) **Sectorial / Thematic Committees**: There is a Sectorial Committee related to each oil and natural gas business area: Exploration and Production Committee (E&P), Maritime Transport (MT) Refining (REF), Natural Gas, Power and Pipeline (NGPP). They are responsible for developing projects related to their areas of expertise. There is a fifth Committee called the Oil and Natural Gas Industry (O&NG IND) that deals with common issues to all segments, including workforce qualification, funding, regulation, etc. There are also two thematic Committees – Environment (MA) and Technology (TEC) responsible for developing projects related to themes of particular relevance for the entire oil and gas.

Sectorial and Thematic Committees are composed by representatives of all entities comprising the PROMINP. Participants provide the elements necessary for the preparation of each project, collaborating with their expertise and knowledge in the critical analysis of industry issues and proposed solutions. Thus, all PROMINP projects are created in Sectorial or Thematic Committees.

### b. Aims

Opportunity for country development has been increasing fostered by growing investments levels since Brazilian local content policy implementation and PROMINP creation. In 2003,

[1] In Portuguese, PROMINP means "Programa de Mobilização da Indústria nacional de Petróleo & Gás Natural" which translation for English is "Brazilian Oil & Natural Gas Industry Mobilization Program"

Petrobras was planning to invest USD 29 B in period 2003 – 2007 and the current expectation is that Petrobras (not taking into account other IOCs investments in Brazil) will invest around USD 212 B in the next five year period (2011 till 2015), which represents a challenge more than seven times bigger than 2003 scenario.

Program's main motivation was to stimulate local supply industry development to fulfil goods and services demands generated by these expressive investments on new assets planned for oil and gas sector in Brazil. This is a multiple connected initiatives Program that joins Government, Oil Companies and suppliers focused on guiding the increase of local supply, as much, as possible, generating sustainable wealth, jobs and income for the country.

These initiatives have distinctive natures mainly oriented by three pillars: (i) aspects related to industry's internal capabilities, such as industrial capacity (production capacity, technology capability and skilled workforce); (ii) aspects related to industry's external factors – called structural and systemic – that includes sector regulation, tax policy, financing schemes and development of small and micro enterprises (SME); and (iii) aspects related to demand sustainability, including health, safety and environmental issues.

Main characteristic of PROMINP is structuring initiatives based on real demands of goods and services required to implement Brazilian oil & natural gas investment plan, considering regions in country where these investments will occur. Thus, starting from a comprehensive diagnosis of critical resources required by capital projects implementation, along the time, PROMINP identifies gaps related to skilled human capital, physical infra-structure and supply of materials and equipments. This information has provided guidelines for setting an expressive portfolio of initiatives focused on closing identified gaps.

Along its almost eight years on the road, PROMINP has accumulated important results regarding employment generation and strengthening local supply industry competitiveness, which means developing human capital and suppliers for meeting high level quality requisites imposed by oil & natural gas sector as well as facing international world class suppliers. Some achievements that can be remarked are:

- Structuring a National Professional Qualification Plan aiming to develop human capital through training 286,000 people in period 2006 to 2015. This plan comprises 185 professional categories, reaching 17 States and 56 Cities in Brazil, consuming a USD 450 MM budget.

- Development of a business case for implementing a new industrial infra-structure for large oil vessels and offshore production unit construction. Based on this study, Petrobras with private sector built a new dry-dock in South region of Brazil using Brazilian technology which represents a USD 240 MM investment.

- Enlargement and modernization of Brazilian Navy Merchant Official Graduation Centres allowing them to increase in 91% the number of officials graduated by year, representing an investment of USD 42 MM.

- Development and inclusion of 4.000 SME in oil & natural gas supply chain in 14 States, allowing these new players to generate a potential of USD 1.2 B in additional revenues.

- Development of new Brazilian suppliers to provide equipments and materials that could only be acquired from international suppliers, representing an investment of USD 30 MM.

- Development of a Brazilian supply industry competitiveness assessment comprising 25 sectors. This study identified competitive and non-competitive sectors as well as sectors

that do not have significant local production of goods and services. Based on this study, a five route strategy has been implemented to encourage production capacity adequacy and technology update.

- Execution of international missions at important worldwide suppliers of goods and services centres that have strategic importance to the oil and natural gas industry. The aim is to stimulate the association between Brazilian and foreign companies seeking business partnerships for investments in Brazil. Countries visited: Japan and Italy in 2008, South Korea, Singapore, UK and Canada in 2009, China and Norway in 2010.

- Structuring an Industrial Technology Development Plan aiming to support local suppliers to develop new products and assimilate international best in class production and management technologies. Until end of 2011, this Plan has approved more than USD 70 MM to develop 58 pioneer technology projects proposed by suppliers.

- Development of "*Business Opportunities for Oil & Natural Gas Supply Chain Portal*". This tool provides information of expected demand for materials, equipment and components required for implementation of sector's investment plan as well as allows the connection between the thousands of companies registered in the Portal and thousands of professionals trained by PROMINP courses.

This paper focus mainly on how PROMINP has been contributing for building human capital required from oil & natural gas sector in Brazil. It presents the multiple issues related to identifying main skilled workforce gaps, engaging several stakeholders required to change this scenario, building up a custom training program to meet sector's requirements and the challenges to implement and operate this program. Results achieved, successful factors and lessons learned are also included in this publication.

### c. Methods

The availability of skilled professionals is one of the key elements that determine the competitiveness of the national industry. Thus, one of the first initiatives developed by PROMINP was structuring the Professional Qualification Plan (PQP), which aims to qualify local workforce to be employed in different companies of the oil and gas supply chain, in order to enable the implementation of the projects in Brazil with the largest local job creation possible.

PQP is a very audacious and complex plan as the implementation of O&G projects is labour-intensive involving a wide range of required expertise and because these projects take place in several different Brazilian states.

The plan is periodically reviewed using as input the demands coming from the projects in the O&G companies Business Plan such as construction of pipelines, power plants, fertilizer plants, refineries, platforms, ships, supply vessels etc.. For each of these projects, PROMINP conducts a process of decomposition of the required professional categories demands, according to the implementation schedule. Thereby it is possible to identify the amount by location and time of the demand for each job category. In addition, parallel surveys are conducted to diagnose the availability of qualified professionals within the local industry. With both information of demand and qualified professional offer in hands, PROMINP identifies the gaps and structure qualification plans to eliminate these bottlenecks.

PQP in its concise plan intends to qualify over 286,000 people in 185 different professions, through courses ranging from basic graduation, technicians, until MBA courses. These

courses have been applied in 17 states, 34 different cities, with the direct participation of more than 80 learning institutions in the country. The courses are free of charge and the students are selected through national public selection concourse. Unemployed students are offered scholarships aid amounting US$ 170 per month for basic level, US$ 340 per month for technicians and US$ 500 per month for MBA students during the period of their courses. The plan involves investments of around US$ 450 million in its eight years horizon.

The experience acquired in deploying PQP indicated that a successful implementation of a massive qualification plan necessarily requires that a certain set of conditions should be addressed in order to qualify the amount of professional required on the curriculum that the market needs at the time these demands occur. This paper will discuss some of the lessons learned throughout implementation journey of the plan.

## Structuring of the Professional Qualification Plan

For the successful structuring and deployment of PQP some aspects were critical and key for the development of this initiative, where such initial conditions can be called *drivers* of the plan.

## Success factors in implementing a plan qualification

There are two main groups of requirements for a successful implementation of a plan qualification. From one side, the *drivers* of the plan, and essential aspects of the initial motivation for its development:

(i) Objective and clear demand of professionals required for the implementation and operation of the projects;
(ii) Availability of financial resources to fund the plan.

And on the other hand, there are those called as *critical success factors*:

(iii) Structuring of qualification courses to ensure quality standards. It should preferably must be done prior the start of the courses and centralized in one learning institution, especially for the courses that will occur in more than one region. This would bring standardized courses with same quality.
(iv) Availability of adequate educational infrastructure (classrooms, laboratories and teachers) in the regions where the courses are planned. The infrastructure must meet the basic requirements for the implementation of these courses;
(v) Availability, in the same region, of candidates who meet the prerequisites of the courses (entry level conditions) in the amount needed to fulfil the classes offered.

A closer look at these items reveals important issues to be analyzed in order to pursue the expected results, among others:

## Drivers of a professional qualification plan (Drivers)

1) Objective demand of skilled professionals

It is considered as an objective demand for qualified professionals the identification of (i) critical professional categories, including aspects of (ii) level of education and professional skills required (professional profile), (iii) amount of qualified professionals needed, (iv) period

of time that such demand will occur and (v) local (state / city) where the demand will take place.

Information related to the critical professional categories and the skills required are obtained mainly with the supplier companies of this market as these firms will absorb such professionals, like EPC contractors and engineering companies. This step is very important because it will ensure the fit of skills and competencies of these professionals that will attend the course to the market needs and therefore enhance their employability. On the other hand, the project team responsible for the project implementation and operation provides the information related to the amount of professionals, period and the place where the demand will occur.

2) Availability of financial resources

Once the demand necessary is identified - necessary critical professional categories, quantity, time frame and location - it is possible to structure a financial plan for implementing the qualification plan. Based on the benchmark costs of running the courses, obtained from its previous structuring phase, it's possible to determine the total cost of implementing the plan. With this estimate of financial resources needed, several actions can be developed to search for the funding resources with the stakeholders.

The financial resources are used to hire reference learning entities (responsible for the structuring of courses), to prepare and produce the learning materials, to hire execution learning entities (responsible for the mobilization and provision of all resources needed to conduct the courses, except for teaching material that is provided by PROMINP) and to grant scholarship aids for unemployed students.

Another possible application of financial resources - in addition to the direct hiring of execution learning institutions - is the adequacy, when it's necessary, of their learning infrastructure required to execute the courses planned for the locations. However, in PQP, any necessary investments for the adequacy of learning infrastructure are made by the educational entity and the costs are incorporated in the tuition cost.

## Critical factors for successful implementation of a plan

Common sense might suggest that if there is demand for professional qualification and availability of financial resources for the courses, the process will flow naturally without major issues.

However, the identification of the demand for qualified professionals in each region, and enabling the necessary financial resources are fundamental and necessary for the successful implementation of a professional qualification plan, but are insufficient to ensure success on the expected results. Therefore other aspects must be addressed. These points are considered the "critical success factors of implementation" of the plan:

1) Structuring of professional qualification courses

Based on the pre-requisites for each course (entry profile) and the skills and competencies expected of the student upon completion of the course (output profile) it is possible to structure the professional qualification courses, which must be made by a learning entity with recognized expertise that in PROMINP it is called the "reference entity".

This prior and centralized structuring phase has a special role when the plan covers various regions. Besides the gain of scale to develop the courses, it will ensure the minimum program quality standard - in the various regions where they are executed by different learning entities - ensuring the uniformity and replicability of process results.

The structuring of professional qualification courses should include the following activities:

- Define the entry profile of the course, i.e., the prerequisites to be met by candidates, which generally is a combination of two factors: education and previous professional experience;
- Set the output profile of students, i.e., the set of skills and competencies that students should have after graduation;
- Structuring the curriculum of the course, theory and practice, to raise the level of professional qualification of the student who meets the prerequisites of the course, and provide them the skills and competencies expected;
- Preparation of learning materials that supports the didactic and pedagogical activities of the courses, which allows its prior centralized production, with quality assurance, standardization, and economy of scale;
- Definition of the educational infrastructure required for the proper execution of the course, including the physical infrastructure (classrooms, laboratories, workshops, supplies, etc.) and human resources (teachers, instructors, etc.).

In the PQP case, 185 required courses were previously structured by some references entity (of recognized competence in their area of knowledge), whose scope of work included the above mentioned.

2) Availability of educational infrastructure

The availability of an adequate educational infrastructure that meets the basic requirements is a key factor that determines the ability to conduct professional qualification courses in a particular region and therefore it's a constrain that has to be considered in the process of determining the number of training courses that will be offered at each location.

Thus, professional education programs can enable long-term deployment of an entire educational infrastructure necessary or a revamp in the current facilities. On this direction it is critical to have a long-term vision of the process, through a plan that includes a clear indication of the objective demand over the period considered, the courses and quantitative set of people to be qualified.

Among the items of educational infrastructure that should be considered are: (i) facilities for classrooms, (ii) plant and equipment, machinery and consumables for laboratories and workshops, (iii) learning materials and safety equipment for students and (iv) staff of teachers and instructors in specialties and quantities required for all courses to be run.

3) Candidates who meet the prerequisites of the courses

The selection of candidates who meet the prerequisites of the courses, in the amount needed to fill the classes involves important aspects that should be considered, especially when dealing with an investment program that takes place in several regions, some of these, Greenfield capital projects.

One alternative is the selection of students by the reference entity in the places where the courses will be conducted. Another step would be to give the selection process to an entity

that is specialized in handling large application process, which would bring greater consistency and security.

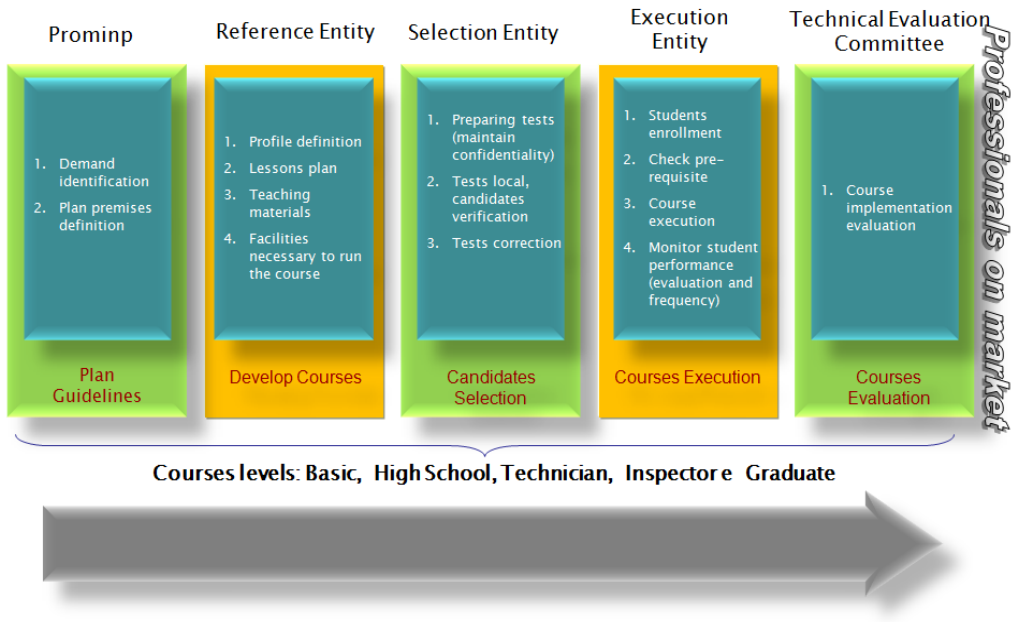
In the implementation of PQP, especially considering the magnitude of the plan - number of education entities involved, workers to be qualified and diversity of geographies of the courses – the decision was to make the application process with a specialized public entity.

This Organisation, also called "Application Entity", structures and executes a public application process and has the responsibility to develop the tests, provide local logistics for the proper conduct of test, correction, revision of application grades, as well as publication of the approved list. Once approved in the public application process, the candidate must prove the prerequisites of past education and previous work experience, required by the professional category applied, to be registered on its course. This activity is performed by the execution entity, upon registration of candidates during the classes' registration process.

## Steps for Professional Qualification Plan Implementation

As we have seen before in this paper, the main motivation for PQP implementation was to meet demand for skilled personnel associated with investment projects in O&G in Brazil. The plan followed certain steps for its implementation:

(i) Definition of qualified personnel demands;
(ii) Enablement of the financial resources needed to implement the plan;
(iii) Qualification plan structure, including professional profiles definition, courses lessons plan, teaching materials preparation;
(iv) Plan implementation, including selection and hiring of reference and execution entities, applicants selection, courses execution and evaluation. This structured flow of activities is shown in the following Figure 1.



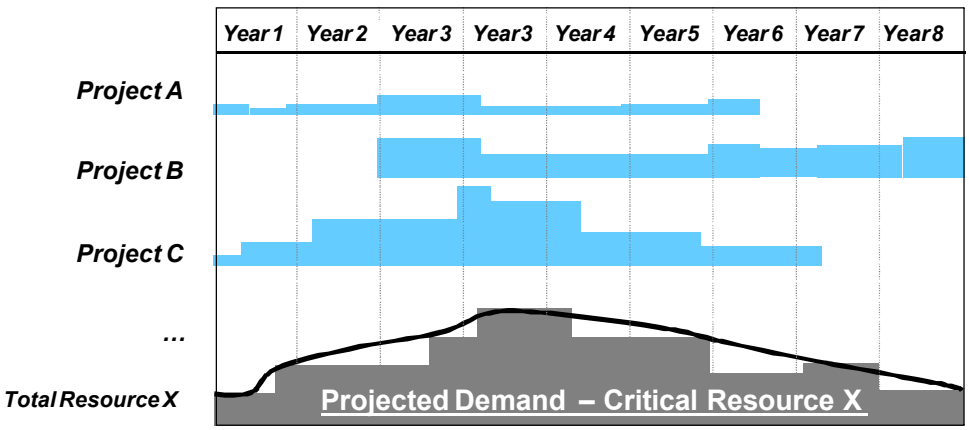

Source: PROMINP

*Figure 1 – Steps for PROMINP Professional Qualification process*

## Identification of professional qualification demands

The first stage was the identification of the gaps on professional qualification. For this purpose, a demand diagnostic system was developed together with the program stakeholders, especially professionals from O&G Operator's engineering department, Construction and Assembly companies and engineering companies.

The main objective is to identify professional categories demand required by each project according to their implementation schedule. Thus it's possible to identify the total demand by time for each category, as illustrated in Figure 2.

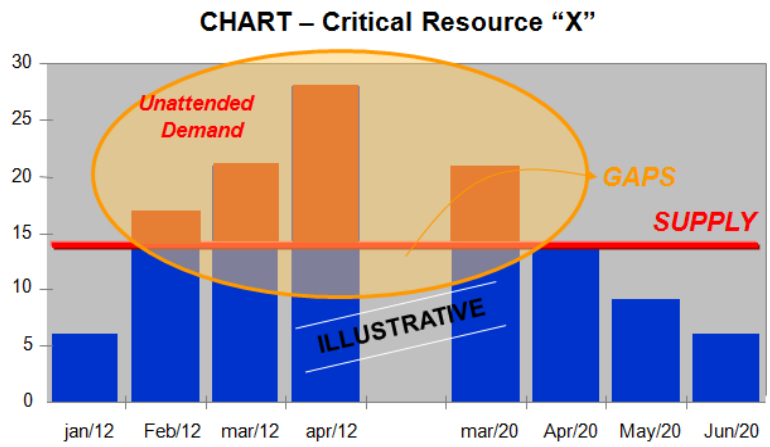



Source: PROMINP

*Figure 2 – Total Demand Curve for Critical Resource*

In addition to demand planning, PROMINP conducts periodic surveys with the O&G supply chain industry on the current availability of qualified professionals supply by region.

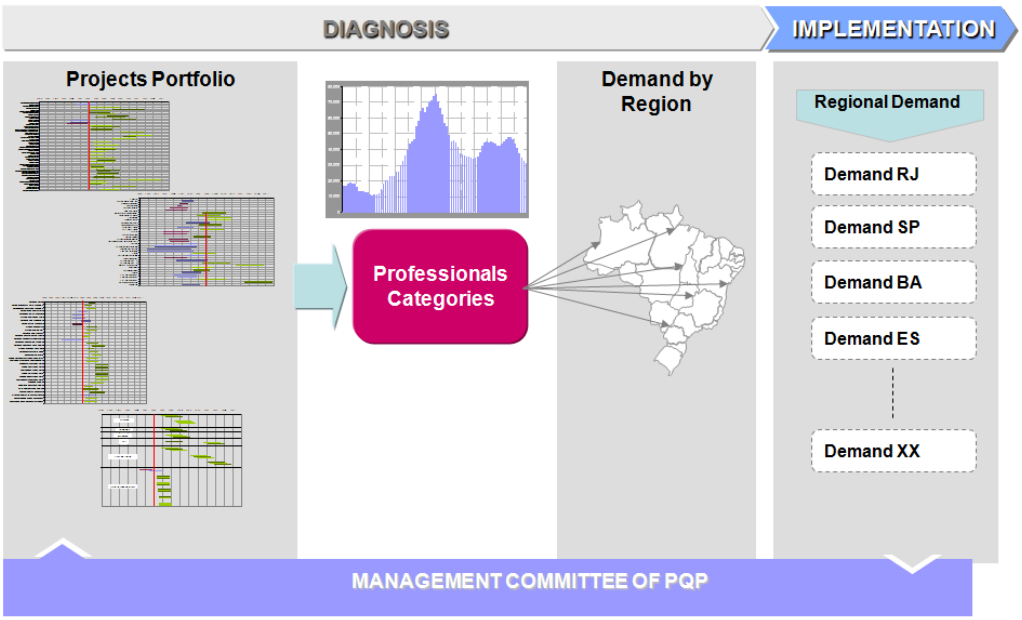
A gap analysis chart is developed after demand identification and supply map by crossing theses information, as shown in Figure 3. This gap analysis chart is made for each critical resource and can be done for both demand and supply at the national level or for a specific state or region.




Source: PROMINP

*Figure 3 - Critical Item Gap Identification Method*

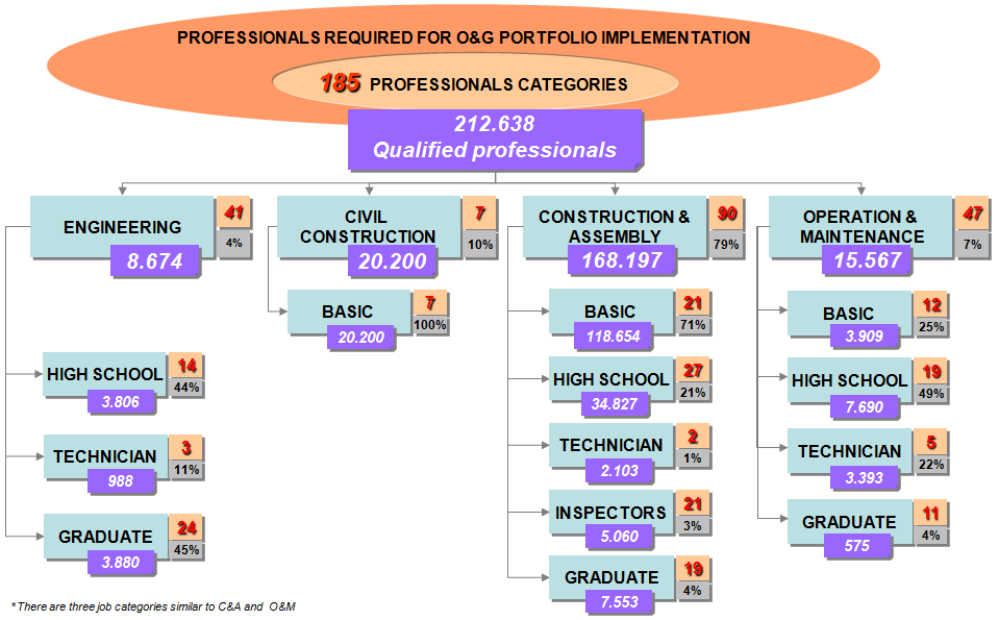
Therefore it's possible to identify human resources bottlenecks by region where projects are implemented, by each critical category, by quantity and month of occurrence, as shown in Figure 4.




Source: PROMINP

*Figure 4 – Professional Qualification Plan Concepts*

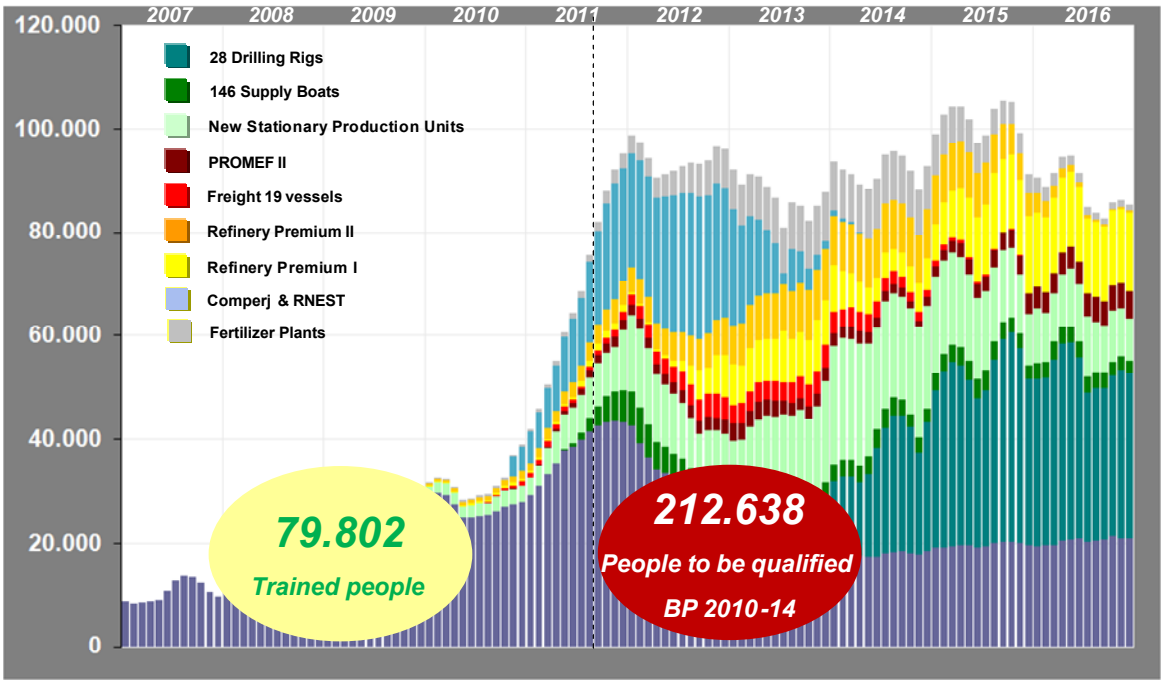
On its most recent plan based on Petrobras Business Plan for 2010-2014, the diagnostic system output indicates the need of qualifying over 212,000 people in 17 Brazilian states, in 185 different professional categories, as summarized in Figure 5.




Source: PROMINP

*Figure 5 – Demands Summary of PROMINP Qualification Plan*

The demand assessment can also provide the time of the personnel needs which is an important input for the planning of the professional qualification actions, as showed in the Figure 6.




Source: PROMINP

*Figure 6 – Actual Results and Demands of PROMINP Qualification Plan*

## Enablement of financial resources needed to implement the Plan

With the definition of the demand and the planning of PQP courses it was possible to measure the need for financial resources to enable Plan implementation, which currently represented the sum of around USD 450 MM.

The major source of financial resources for PQP is **Petrobras** that, with a specific authorization from ANP, applies resources from the clause of investments in R&D of the concession contracts for fields that pay a tax called *special participation*. These resources from Petrobras are complemented with those from Ministry of Science Technology and Innovation (USD 4 million to date) for MBA courses and from the Ministry of Labour and Employment (USD 17 million to date) for civil construction courses.

In these amounts, are included costs associated with (i) structuring the courses, (ii) elaboration of didactic material, (iii) the tuition of the courses executed at various locations, (iv) scholarship aid for unemployed students, plus the costs of (v) communication initiatives and management of the Plan.

## Structuring the Professional Qualification Plan of PROMINP (PQP)

After the definition of the demand for qualified human resources and resolved the necessary financial resources, the next step was the hire of the reference entities, responsible for structuring the courses offered by PQP. This stage involved the development of the following activities:

- Definition of input and output profiles for each professional category;
- Establishment of courses content;
- Preparation of learning materials;

- Definition of infrastructure requirements and instructors profile to be used by execution learning institutions.

To support the management of all stages of PQP implementation it was developed a website portal with features covering the stages from the application process, classes registration, provision of didactic materials, control of student attendance and grades, scholarships payment control, publication of students curriculum and follow up of the employability of these students.

The different stakeholders involved in the qualification process provide or use information of the portal: (i) reference learning institutions, (ii) candidates and students, (iii) selection entity, (iv) executing learning institutions, (v) technical evaluation board, (vi) PROMINP and anchor entity, (vii) oil and gas companies and their supply chain.

**Implementation of the of Professional Qualification Plan of PROMINP (PQP)**

With the definition of the demand for qualified human resources training, enablement of financial resources and the structuring of the courses, PROMINP proceeded to the deployment of PQP through the selection of students, courses execution and evaluation the results achieved.

1) Selection of students for PQP courses

PQP is implemented through periodic cycles of public application processes in all the planned locations simultaneously. Therefore if mitigates the migration of people from one region to another to attend the course. In each cycle, it's offered in public application, the courses and vacancies opportunities that will be started sometime in the following period. Thus, it is possible to meet the legitimate aspirations of the local authorities of maximizing the use of local labour, respecting Brazilian law which guarantees the right of movement of all citizens - which prevents the reservation of vacancies in the application process for only people of a certain region.

The public application processes are conducted by an entity with recognized expertise in large public selection processes, since it comes to simultaneous actions in several cities and involving hundreds of thousands of candidates in each process. The main channel used for application enrolment is the PROMINP portal on the Internet (www. PROMINP.com.br), complemented with alternative enrolment in post offices and, more recently, by specific posts of enrolment in various locations where the courses will be held.

At this stage, the main challenges have been filling out all the classes offered, which has required a set of continuous improvements, which will be discussed in details later on this paper.

2) Execution of PQP courses

After the selection of the students, the next step is the execution of the classes. Considering that the O&G project constantly review their implementation schedule, PROMINP periodically review and adapt the courses plan timeline in order to be better aligned to the real demand. So, PROMINP try to adjust the availability of qualified people as close as possible to the moment that will be required by the market.

By the end of 2011, around 80,000 people had been qualified, of which 56,000 professionals with basic level, 19,000 technicians and 5,000 MBAs. This represents investment in courses and scholarships-aid of around USD 150 MM.

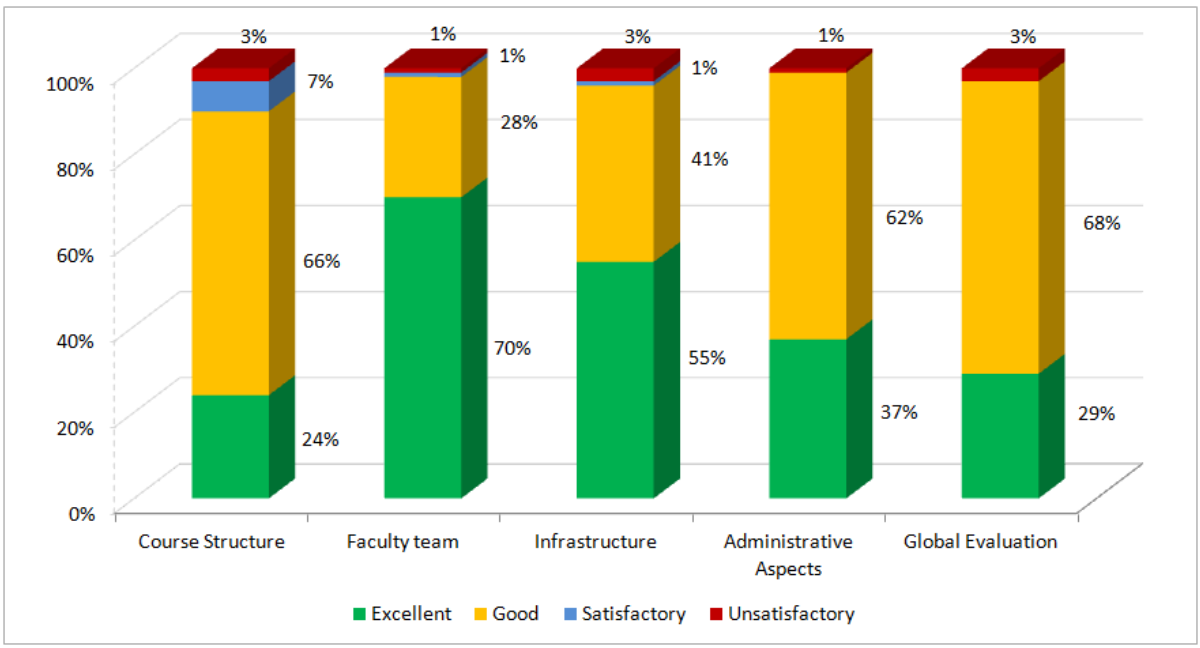
The current PQP planning indicates that by the end of 2014, should be qualified about 286,000 people, representing a total amount of accumulated investment of approximately US$ 450 million.

3) Evaluation of PQP courses

In order to ensure the required quality standards of the courses, two major quality assurance actions are conducted:

(i) Assessment of the course structure by teachers of execution learning entities, focusing primarily on issues related to the curriculum and learning materials prepared by the reference entities;
(ii) Assessment of the courses by the students, including questions regarding the quality of the faculties, facilities, classrooms, laboratories and workshops, the course design, learning materials etc.;

The results of these evaluations are summarized in Figure 7 below, which guides the improvement actions to be implemented in the courses, both in its execution, and in its structure, when required. In the global ratings of courses by 2010, 96.5% of students evaluated positively (excellent or good).




*Source: PROMINP*

*Figure 7 - Results of the evaluation of PNQP courses*

4) Resumes and link between professionals qualified and the market

After their registration for the PQP courses, the students resumes are available in PROMINP portal with their basic information (name, contact, course held, course period and learning institution). Students can complement their Curriculum Vitae with details of other courses taken, certifications, language proficiency and work experience.

These resumes are visible to all companies in the oil and gas supply chain that are registered on the PROMINP portal, that were over 4,500 in 2011. These institutions may have access to information on the availability of qualified professionals, by specialty and geographic region, completing the cycle of the professional qualification, i.e., by allowing the employability of qualified personnel. These data also allow the monitoring and identification of the index of students' employability.

## Public selection process of candidates

At first cycle, nearly 13,000 courses seats distributed in 15 cities in 10 states were offered. From the 43,000 candidates in the selection process, 21,000 have passed the selection examination. Nevertheless, some offered classes presented insufficient number of candidates. Therefore, only 48% of offered places were filled, even when dealing with free of charge courses, with scholarship aids for unemployed students, in a sector with great appeal in the Brazilian economy.

In the second cycle, close to 23,000 courses seats in 39 cities in 14 Brazilian states were offered. There was a significant increase in the number of applicants that summed 97,000 of which 48,000 were approved. Thus, still only 64% of positions offered were filled out.

In the next cycles, the level of fulfilment of courses seats offered has increased to close to 90%, and the number of candidates had also significant increase reaching over 965.000 for 25.520 courses seats offered in the last one.

## Actions to improve the public selection process of candidates

With the results obtained at the end of the 1st cycle of public selection – completing only 48% of offered vacancies – the causes of unsatisfactory performance were analyzed and some main questions were identified:

(i) Issues on the communication process. The low level of information of people about the training program, the courses offered and opportunities;
(ii) The insufficient number of candidates with the prerequisites, especially regarding prior professional experience;
(iii) The low level of basic education in Brazil;
(iv) The lack of knowledge about specific professional categories, resulting in unbalanced applications for the courses offered.

To ensure a better result in the application processes, some actions concerning the key issues were taken in order to improve the filling of the vacancies to be offered in future processes.

## Actions to improve the PQP Communication Process

The communication actions are intended to increase the ratio of applicants/seats and, thereby, extend the possibilities of filling these classes as much as possible, with the goal of total classes offered.

As seen in the first cycle, 13,000 courses opportunities distributed in 15 cities in 10 Brazilian states were offered. In total, 43.000 candidates registered for the selection process, with an

average nearly 3.3 subscribers per seat offered. In the second cycle, this ratio increased to 4.3 with 97,000 applications. Since 36% of the seats were still not fulfilled, it was analyzed that some of actions taken before Cycle 2 to improve PROMINP presence in the media and some reduction of prior experience requirements were insufficient to ensure satisfactory results in the public selection. Some major actions should be developed for the following selections.

Thus, as a preparatory measure for the third cycle public selection, a massive communication program was structured. The strategy included action in all locations that a seat would be offered, with the mobilization of the main regional actors and entities. Specific communication actions were developed for the least known professional categories (that received lesser applications in previous cycles), and the information of the ratio of applicants/vacancy in the previous cycles were disclosed to the public.

The 3rd cycle communication initiatives represented a total investment of USD 1.2 MM and were perceived as sufficiently appropriate and their approach were repeated in subsequent cycles.

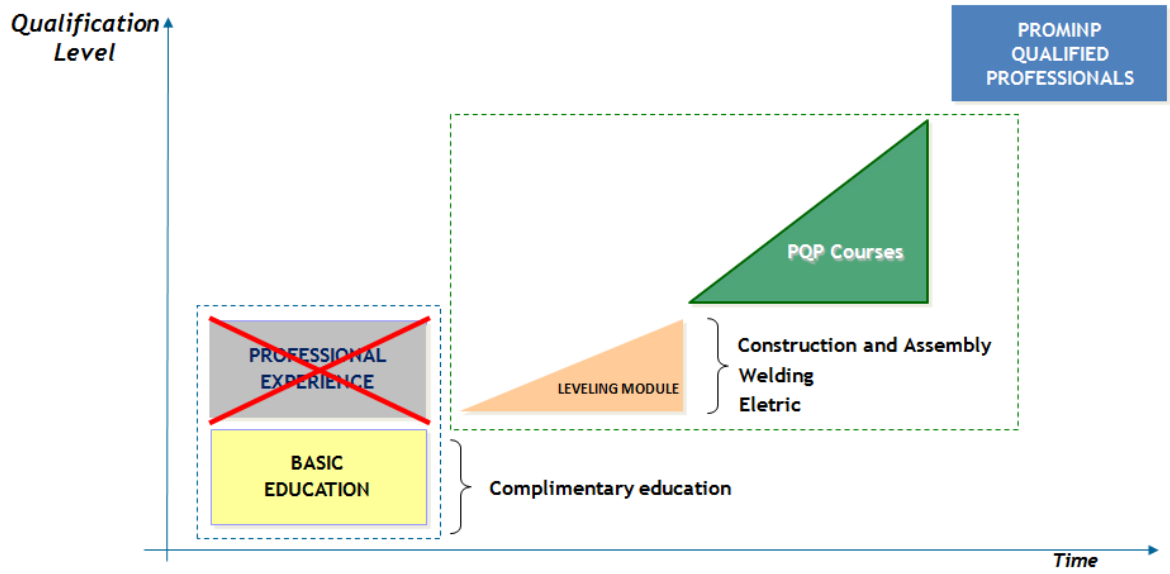
At 3rd cycle, 15.500 vacancies were offered to 13 cities in 41 Brazilian states. The process received 145,000 entries, with an average of 9.3 subscribers per seat offered.

**Prior experience requirements adjustment**

In addition to improve the communication actions, it was clear to be very important addressing a major obstacle to the selection of candidates for the courses: the professional experience requirement, especially in regions with no industrial tradition.

In the first cycle these requirements were very high and the result was a low fulfilment of the vacancies. Thus, for the second cycle selection, PROMINP reduced the level of experience required, allowing the entry of people with less professional experience in the courses. However, this action was not enough, giving that the plan has massive vacancies and there is a large contingent of people without experience.

Therefore, in the third cycle, it was decided to adopt a bolder strategy for entry-level courses, which represent the most demanded level. The previous work experience requirements were eliminated and have been replaced by an additional module to the previous course, with a large amount of practical classes in laboratories. This module, with a strong workload practice was incorporated into the courses of basic-level categories. Thus, it was almost doubled the number of classroom hours of courses, which now have an average of 400 hours, as shown in Figure 8.




*Source: PROMINP*

*Figure 8 – Prior experience requirements adjustment in the Process of Professional Qualification of the PROMINP*

**Complementary education enhancement for PROMINP candidates**

Another measure taken to complement the previous ones was to deploy an educational intensification program, developed in articulation with local governments, in order to prepare local people to the application process exams, and thus increasing their chance to be approved.

The first case occurred in Pernambuco, a state with little industrial tradition and little professional qualification and where major investment projects were under construction or planned for the upcoming years.

In the third cycle, around 2,500 courses seats were offered. To compete for these vacancies, the local government identified about 10,000 persons who met the basic requirements of the courses - age and education – and among these, 5,000 were selected to receive tutoring on complimentary education to compete for it and then contesting the 2,500 vacancies.

The State Government invested about USD 2.5 MM in this initiative, which yielded the expected results: 15 candidates applied for each vacancy, which was a record thus far in the country, and all the vacancies were filled, with a high share of the candidates that attended the enhancement education courses. This initiative has been repeated in other regions of the country, especially in regions with lower development and education rates.

**A successful experience of enhancing the education level in Brazil**

A major obstacle for the selection of candidates to courses lies in the inadequate preparation of many of the students (especially those with complete basic level) throughout the school life, especially in regions of lower rates of development and education. This creates a great difficulty in filling the classes provided and hence the impossibility of the candidates in entering in the labour market.

Though, a way to solve this problem was structure a tutoring program for potential candidates to PROMINP courses, focused on areas in which we detected the lowest levels of performance on tests. In this context, was designed by Petrobras Gas & Power Area the project called "Building the Future".

The project aims to qualify for low-income youth in order to be able to access the job opportunities that will be generated by oil investments, as well as access other job opportunities in the region. The project offers young people the opportunity to generate their own future, by raising the academic performance and subsequent qualification functions of oil and gas industry, also providing the access to first employment.

The Project “Building the Future” fits these purposes, because the qualification of young people seeking low-income in order to improve the conditions of access labour opportunities. The project stands apart from traditional tutoring programs, both in terms of investment, workload and educational goals. It is structured with 873 hours / class and includes the disciplines of Portuguese, Mathematics, Logical Reasoning and Computer Science, and reflects the content required in PROMINP exams.

The project includes a nine-month cycle of learning and classes are held Monday through Friday as a counterpart of the school. The curriculum is organized and evaluated quarterly. At the end of the first two quarters, a simulated exam preparation to PROMINP is conducted, so that students can evaluate their own knowledge. At the end of the third academic quarter, the student assessment takes place through the PROMINP selection process.

**Career Development and High Specialization Courses**

In addition to qualifying students who participated in the public selection, called public students, other action conducted by the Program to provide workers in quantity and mainly in the quality required by companies, is the modality of corporate students, where is promoted the career progression and development of employees of participating companies. Under this initiative, rather than the selection of candidates occur through public selection, firms indicate employees who must be qualified, assuming 50% of the tuition and PROMINP invests the other half.

After the theoretical and practical training, company students go through a period called experiential practice where the trainees participate in the work routine of an experienced professional and are monitored by teachers that periodically check if activities planned in the course are being held. The experiential practice can last from 3 to 6 months, during which time the employee has an identification sign that shows he is still in training and is gaining experience in the activity.

At the end of the training and experiential practice, the qualified professionals take on new responsibilities and are promoted to a higher level in the career of a particular profession. Figure 9 shows an example based on the career progression for Drilling Rig technicians.

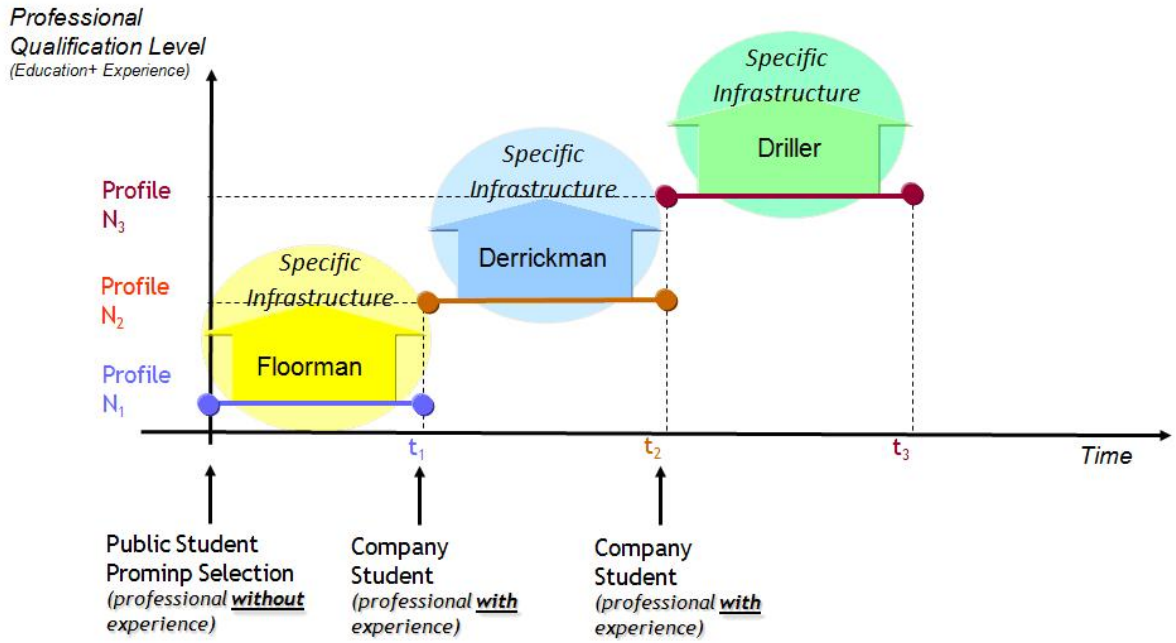



*Figure 9: Career Progression*

In general, this type of training is for advanced and highly specialized courses (Figure 10), which assumes an initial prerequisite education and previous experience. Professionals who have this level of qualification (education + experience) generally are employed and are not available in the labour market, so they must be indicated and released by companies to be qualified.

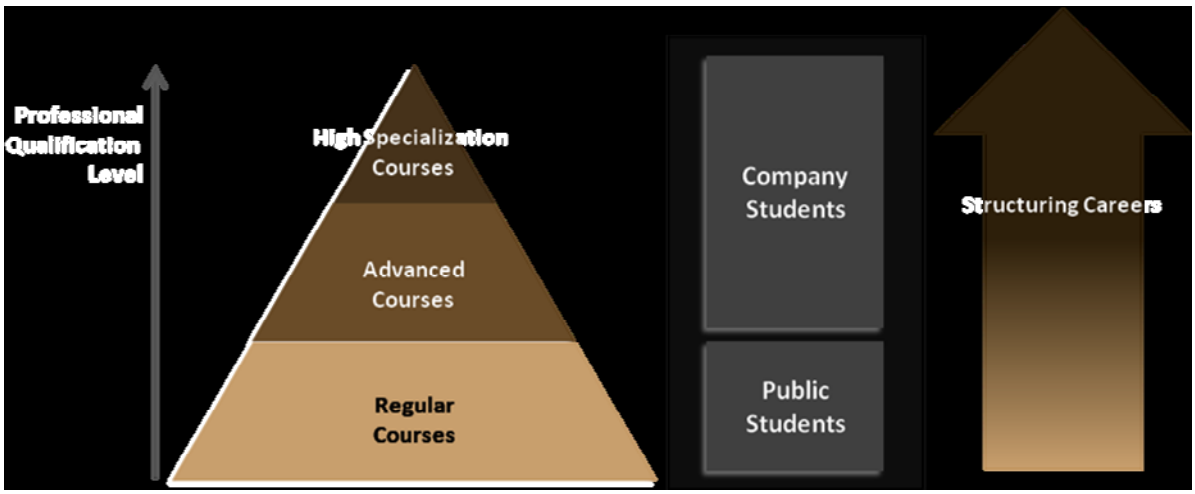



Figure 10: Type of courses by sector expertise level.

### d. Results

As already mentioned, by 2010, about 80,000 students had completed courses offered by PROMINP, with scholarships aids for unemployed students. It is expected that until the year 2014, approximately 286,000 students will have been benefited by the Plan.

Until now, 185 distinct and specific courses have been developed to the oil and gas sector. About 80 educational institutions in 17 states and 34 cities participated in structuring the courses and in the execution of classes.

In a survey conducted among the official data of employment generated by the Ministry of Labour and Employment, it was identified that, before the PROMINP courses, approximately 32.8% of students were employed, and at the end of their courses this indicator increased to 67% of professionals qualified by the program who were already employed in the formal labour market. The rate of insertion in the labour market raised to 80%, considering workers who said they were already employed in the informal market, but are not in the official records of employment in the country (Figure 11).

| Overall Evaluation (Financial Sector Independent) | | | |
|---|---|---|---|
| | Formal Market | Informal Market | TOTAL |
| Initial employment (beginning of course) | 32,8% | n/d | 32,8% |
| Employability Index * (after the course) | 67,1% | 13,6% | 80,7% |
| Overall Evaluation (Oil and Gas Chain) | | | |

*Figure 11: Employment rate before and after training*

The employability index is greater for MBA students or with higher specialization courses, as Figure 12, because the oil sector requires high qualification, especially for the Health, Safety and Environment issues.

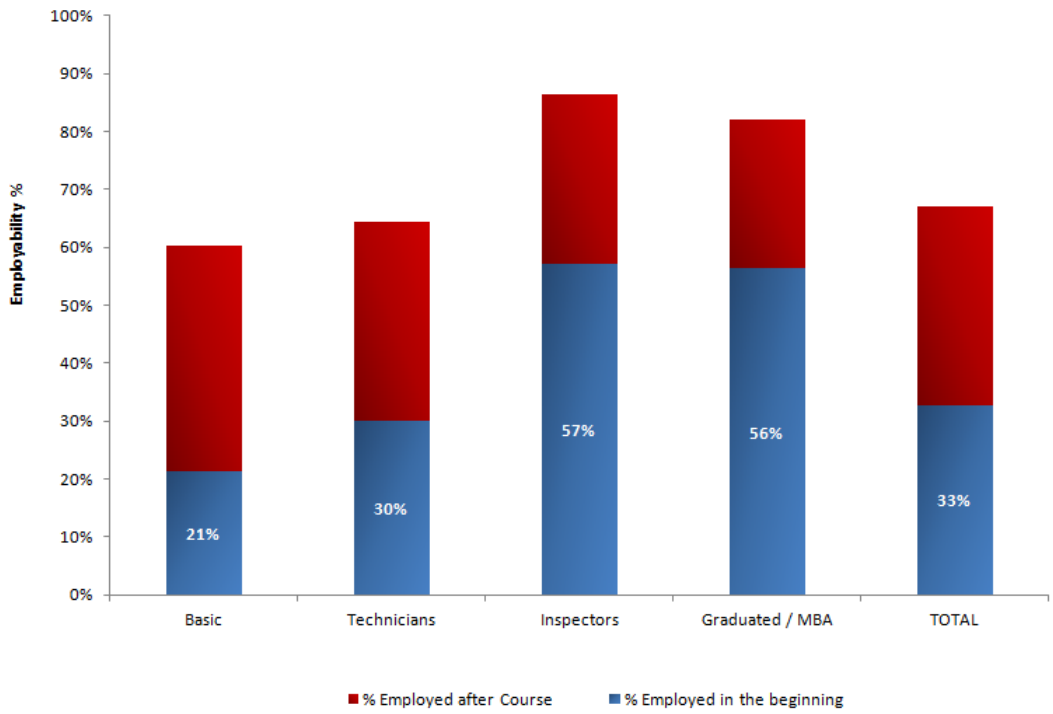



*Figure 12: Employment rate before and after training*

## e. Summary/Conclusions

Since the conception of PROMINP, the qualification of the workforce played an important role in the local content policy and this matter has been established as one of the strategic themes of the program to increase local content and business competitiveness. It was identified that the lack of skilled labour workforce could cause a blackout of workers available and could decrease the absorption of opportunities for Brazilian companies, or could lead to delays and problems with time, quality and cost of Capex projects.

The main task of PQP continues to be, as much as possible, a relevant help to provide skilled workforce for the oil and natural gas industry, and as close as possible to the locations where such professionals are required. Thus, attempts to obtain the complete filling of vacancies and classes offered, based on a combination of two movements: on one hand, works to address the key issues and enable the implementation of courses in various locations such as the availability of educational infrastructure and the availability of suitable candidates who have the prerequisites for courses (entry conditions) in the amount needed to fill the classes offered. And on the other hand, PQP seeks to offer only the positions that may be met with local people in regions where the courses are being offered.

For the public candidates who participated in a public application and generally have no work experience, must be held actions with students to update their resumes and disclosure job opportunities - as with the O&G companies to know the number of qualified and available students, and carry out their recruitment processes, final objective of the Professional Qualification Program.

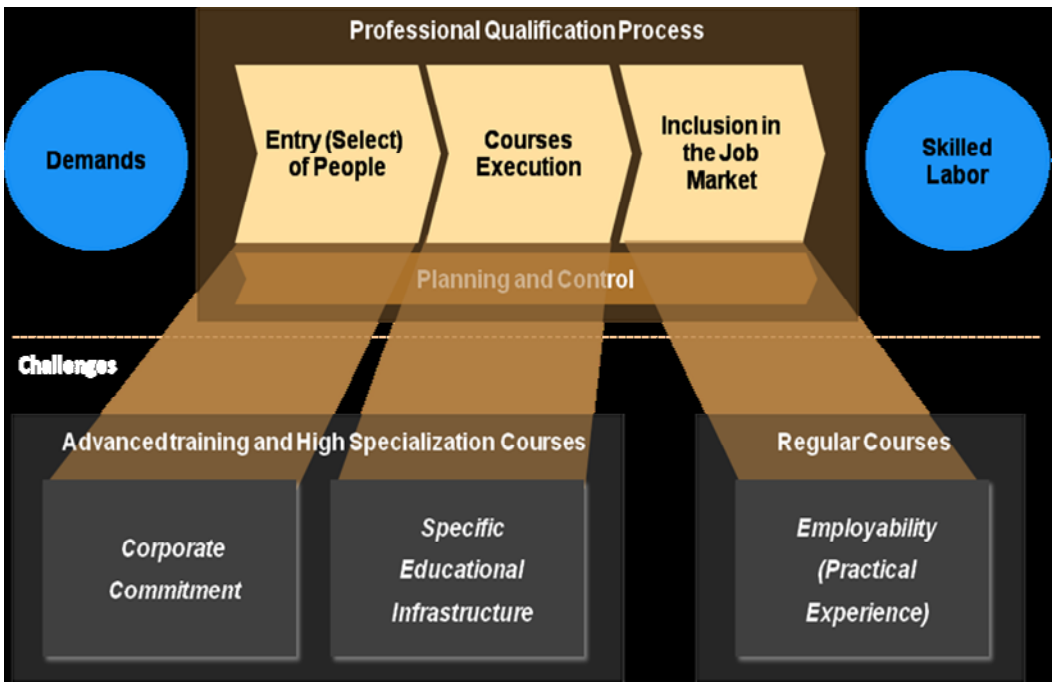



*Figure 13 – Stages of the qualification process, main challenges*

For the companies students, it is necessary a greater involvement of the suppliers executives who must indicate and release their employees to qualify and participate more directly in the training of professionals.

Also, the greater the specialization of the training, the greater the cha llenge of enabling courses in particular because of the infrastructure of classrooms, laboratories, workshops, equipment, tools and simulators that allows the execution of the theoretical and practical course, as well as the availability of trained teachers, who must be trained in advance, or made available by industry (when knowledge is not in the academy), or brought from abroad to share the know-how.