ACADEMIC AND TECHNOLOGICAL PARTNERSHIPS BETWEEN A NEWLY CREATED UNDERGRATUATE COURSE IN NAVAL ENGINEERING AND NEW SHIPYARDS IN NORTHEASTERN BRAZIL

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SUMMARY

Brazil has established in the last few years new naval poles. Those poles, capable of building ships and platforms, were planned to meet the demands arising from new oil fields discovered off the Brazilian coast, since the capacity of the traditional hub in southeastern Brazil did not allow further expansion. Among the investments in northeastern Brazil there are two shipyards in SUAPE complex, in the State of Pernambuco - one large and one medium-sized. In order to supply skilled labor and also taking full advantage of the proximity between the University and the Naval Pole, UFPE has created an undergraduate course in naval engineering which is focused on shipbuilding technologies.

Both shipyards and the newly created course faced the same initial problems such as lack of local skilled labor, non-existent infrastructure - which was after created with the implementation of projects - and a total absence of a shipbuilding-related culture. In order to reduce the time spent at the learning curve and speed up the training of high quality human resources and get the expertise demanded at the region, partnerships were created between the shipyards and academy. In this work, we intend to transmit our chosen approach to accelerate to obtain good results in expertise and human resources formation by presenting the first activities within these partnerships. In addition, we include the initial search of points of common interest, the results of the first months of implementation, and the prospects for future improvement.

1. INTRODUCTION

The shipbuilding industry of Brazil became the second in the world in the 70’s, going into decline in the 80’s. From the years 2000, the sector is being resumed, thanks to a consistent Government policy of revitalization of the national shipbuilding and offshore industry.

In the past, the sector was heavily concentrated in the Southeast and South of Brazil, particularly in the State of Rio de Janeiro. In this new scenario, was idealized a decentralization of industry, with the deployment of large shipyards in the Northeast and Northern Brazil.

Particularly with respect to the Northeast, the region did, until recently, only with small shipyards focused basically in the production of fishing boats. There was no major venture and productive capacity, due to the lack of strong naval poles, also there was no availability of skilled labor.

With the decision to deploy in large shipyards region productive capacity, constructed according to modern technological criteria, in order to meet the new demand, some problems had to be solved by new entrants in the sector in the region.

One of these problems is the number and qualification of the workforce, non-existent in the region up to that time. Several initiatives have been taken to try to speed up the natural process of formation of labor in a region without a strong tradition in the sector.

To meet this demand, were created, in addition to the training programs of their own labor, technical courses, specialization courses and an undergraduate course. Some measures have been taken to address short-term emergency issues, as well as medium-and long-term measures, which are in the process of consolidation.

In this paper, we present the motivation for the creation of an undergraduate course in naval engineering and the partnerships created between the shipyards and the aforementioned course in the State of Pernambuco, whose main objectives are, on the one hand, meet the need of top level professionals in the area of shipbuilding for the shipyards and, on the other hand, create skills for the formation of good quality of professionals in a region without tradition.

2. CREATION OF THE SHIPYARDS IN THE STATE OF PERNAMBUCO, NORTHEAST BRAZIL

According to POMPERMAYER [4], in almost all countries where developed, the shipbuilding industry has been supported by public policies, facilitated financing, guarantee market, customs protection, programs to train manpower and promotion of research and development.
In Brazil was no different and as far in the 70’s, as these days, such moments of naval industry growth were positively influenced by public policy.

However, an important question is how to positively influence a complex shipbuilding industry, so that it could be reversed after reducing or cease such public policies, especially which of market protection, that would leave exposed to external competitors. That's what occurred in the decades of 1980 and 1990 in various sectors of the Brazilian industry.

Quoting again POMPERMAYER [4], "... the basic premise is that the advantage is sustainable. The use of innovation would be the most appropriate means to ensure the sustainability of the current advantage in time, expanding constantly and in anticipation of the competition ... ".

In this sense, it was decided instead to use a large installed base of shipbuilding in Brazil, in South and Southeast poles, but with old or insufficient for a rapid growth plants, create new and modern shipyards in new regions of the Brazil.

The main idea would be to take the decision to encourage the revival of shipbuilding in Brazil, with the creation of new naval poles, redistributing economic activities for poor regions, but with growth potential, as in the case of the Brazilian Northeast.

So, it was created the Shipyard Atlântico Sul (EAS), a large yard area and with potential for almost 200 thousand tonnes production/year, aimed mainly to the construction of large ships and offshore platforms, and the shipyard VARD Promar, smaller, more focused on the production of support vessels.

Both were built on empty land, since the plant and in both cases the pressures on contractual deadlines necessitated the construction of the shipyard while construction of its first ships. Similarly, both passed by difficulty of skilled labor, because the region had not qualified professionals for the sector.

To meet this demand, both had different strategies depending on their backgrounds and business profiles, but with a factor common to two, which was the importation of workers in its early stages of operation.

The VARD Promar (VARD), which already had another shipyard, recruited a group of local professionals and took them to their other site, for training and qualifications and, later, to work in the new plant as soon as the same began to operate. That decision, combined with a smaller staff, downplayed the initial problems of lack of labor, being, however, maintained the need for a large contingent of professionals from other regions of the country and outside of Brazil, until it could qualify local labor.

The EAS Shipyard, in turn, by lack of skilled professionals, had to resort to massive importation of workers, hiring other companies to high costs and encouraging the return of professionals who had migrated out of the country to work in world shipbuilding. As this strategy, due to their high costs, could only be held for a short time, encouraged the creation of technical courses, specialization courses and even the top-level training to meet the demand in the medium and long term.
Although both shipyards have suffered from the problems of low professional qualification, which is reflected in their rates of productivity, yet far from the competitiveness with foreign peers, the strategy followed by VARD somehow sped up the natural learning curve, suffering less than the EAS.

The EAS, due in part to his larger size (applicant of more human resources) and in part because they don’t have a past history, had more difficulty to overcome the barrier of low qualification of their initial manpower, which reflected directly in low productivity at the start of its operations. Only after a few years of operation is that these issues have been mitigated.

It is not the aim of this study to analyses in depth the specific problems for which the shipyards had passed, and their medium-and long-term strategies. However among the actions that have been shown to be promising are the partnerships with leading educational institutions of the region, with the aim of encouraging the formation of human resources of good quality and that meet local needs and peculiarities.

### 3. CREATION OF UNDERGRADUATE COURSE OF NAVAL ENGINEERING IN FEDERAL UNIVERSITY OF PERNAMBUCO

For historical reasons, in Brazil, the professional engaged in ship design is not called Naval Architect, but Naval Engineer. When the first undergraduate courses they were created in Brazil in the 60’s of the 20th century, there was a need for more than experts in naval projects, but of a professional who dominates the knowledge of the entire lifecycle of a project, from conception to construction stages.

It is in this sense that were created the undergraduate courses of naval engineering, where the ticket is formed not only in traditional disciplines of naval architecture (ship design, hydrodynamics, structural design etc.), but also in basic training of naval manufacturing project.

Therefore, the Naval Engineer in Brazil dominates in part, the expertise to not only act in the basic design of the ship, but also act directly on its construction.

The first few courses created, such training was basic and limited more to the knowledge of the processes of shipbuilding.

In the creation of the undergraduate degree in Naval Engineering at the Federal University of Pernambuco, took the strategic decision to advance a little more in knowledge of shipbuilding, giving more disciplines focused on manufacturing technology, besides the traditional disciplines of naval architecture, making the professional formed by this course could act more directly in shipbuilding and support the shipyards in their needs of top-level professionals with comprehensive overview on shipbuilding.

However, one of the first difficulties in creating the course was similar to that suffered by shipyards: the lack of professionals available to teach and train future graduates.

The Federal universities of Brazil are public and teachers are hired by a public selection process. There are great difficulties in engaging professionals from the market and in most cases if you're looking for professionals with higher education degrees, preferably with a doctorate.

The course was designed and initially developed by a joint team of teachers of Federal University of Pernambuco (UFPE), Federal University of Rio de Janeiro (UFRJ) and São Paulo University (USP) between 2008 and 2010, but only started working with his first group in mid-2011. At this time the national market was heated and the few doctors available was attracted by the older institutions, because there was a strong demand for more engineers.

The newly created course of UFPE needed then plot a short-term strategy for obtaining teachers who attended to their stringent requirements in order to train professionals to meet the needs of the region.

In planning the creation of the course, predicted-if 17 teachers directly acting in the formation of naval engineering, of which 7 were part-time, maintaining its activities in the market and the remaining 10 would be doctors in more traditional disciplines of naval training.

As there were no doctors, specialists in naval engineering, available in sufficient number, it was adopted as a strategy for short term professional re-qualification of other areas to work in naval area in most disciplines linked to manufacturing processes, design of equipment and logistics and shipping, with professionals from mechanical engineering, and basically accept naval engineers without a doctorate, accelerating their training as teachers of the course.

At the time the course has four doctors in Naval Engineering (being one part-time), four doctors with training in mechanical engineering and civil engineering (being one part-time), two masters in naval engineering, that are in the process of doctorate, a master with a background in mechanical engineering, but with professional experience in shipyards and a master (part-time) with expertise in logistics and maritime transport. In addition, the course counts on the collaboration of several professors of mechanical engineering, especially in the
disciplines of basic training and manufacturing technologies.

Still in an effort to add a differential factor to the fullness of our first graduates, with the financial support of the human resources training program of Petrobras (PRH-PB04), enabled the coming of several teachers of renowned national and international institutions in the teaching of naval engineering, for lectures, short courses and teacher training.

The course has the visits of teachers of the universities of Tokyo and Yokohama (Japan), Turku (Finland) and Newcastle (United Kingdom), in addition to the USP and UFRJ. Some of these actions have turned into formal partnerships, which enabled the exchange of students and teachers, to enrich student education.

4. PARTNERSHIPS MADE AMONG THE SHIPYARDS AND THE UFPE

In the major Brazilian universities teaching, research and extension are placed in equal importance. A large part of our faculty are full-time teachers and exclusive dedication.

As common in these cases, many of these teachers has never had another job unless University professor. It is natural that effective teaching personnel in the industry will become less frequent. In this sense, the society of the industrial sector is not only beneficial but also essential. You could say the same about the students with professionals from the industry in equal conditions to those of most academic training.

In this sense, to approximate the yards and the University were signed agreements with EAS and VARD. These Covenants are intended to complement specific technique of initial shipyards also include research and development projects, as well as internships. The agreement with the EAS also includes the possibility of internship at Ishikawajima Heavy Industries (IHI) Corporation partner shipyard in Japan.

The complementation technique is given by sparse participation of professionals from the construction site at the invitation of the course, teaching classes on some of our disciplines and field lessons, complementing more direct and specific form the theoretical classroom instruction with information about the current reality of the shipyards in the region, as its methods and challenges. This interaction also facilitates integration between teachers and the company, creating an environment conducive to research and development partnerships.

The internship at the site is better targeted, because the students’ contact with the professionals and facilities of shipyards throughout the course allows the prior understanding of the State of the art of shipbuilding, and a faster setting, shortening the lag time between the start and gain experience satisfying rhythm and student productivity in practical activities.

The achievement of an agreement between the UFPE and shipyards faced a paradigm on public University's partnership with private companies in teaching activity in Brazil, or rather, the lack of this type of relationship. Traditionally, in the country, the Universities Act as a repository of skills, which companies use to suit your needs. The formation of these skills is viewed as a task of the Academy, restricting the partnerships only to research and extension activities.

As companies do not consider necessary to participate in the training of undergraduate students, the Academy considers the same way. The result is that partnerships between companies and public research University, aiming to complement the training of undergraduates are very rare in Brazil.

Due to this tradition, the leaders of the yards lacked experience in realization of agreements for this purpose, which hindered the search for an agreement in first time. Two factors, however, led to the realization of the Covenant: the first, already mentioned, linked to the need to speed up the training of people for the composition of his paintings. In this case, to put its professionals teaching classes, would be anticipating a training that would only be given after the signing.

The other factor was the influence of the foreign partners in making the decision of implementation of the Covenant. More accustomed to concluding agreements of this type in their countries of origin, Japanese partners in the EAS, and Italians and Norwegians in VARD took a big support the conclusion of an instrument of agreement, facilitating the decision-making process.

Shortly after the establishment of the Covenants, even before the probationary period, became more accessible to students conducting research of short duration (2 to 3 days), in which accompany the activities of a particular sector of the shipyard and analyze aspects related to productivity, quality and safety of the operations. This enables students to experience in practice the difficulties for the preparation or implementation of the process improvement programs. Immediately also started classes in the students, according to his time on the course, are taken to the shipyards in targeted visits for a day, to meet sectors that make up the yards, Promotes understanding of the spatial organization and production on the premises,
believing that students have a better perspective of their future professional performance.

5. RESULTS OBTAINED

The Covenants are working there is still very little time to have a real dimension on the positive aspects that they will have on the companies involved, but we can already see clearly in our student body, the breadth of the horizon of knowledge that this closer contact has brought. The Covenants are working there is still very little time to have a real dimension on the positive aspects that they will have on the companies involved, but we can already see clearly in our student body, the breadth of the horizon of knowledge that this closer contact has brought.

These results become more evident in the themes and results presented in the work of end of course that students of Naval Engineering, Federal University of Pernambuco, have to develop and introduce, as part of the criteria for obtaining the degree of Bachelor of engineering.

A Naval Engineering course with more than 60 years of existence as the course even of UFRJ, with the proximity to several shipyards, classifier society’s offices and shipping companies, of 51 switch works presented in the first half of 2015, the proportion of work is as follows:

- Ship Design And Hydrodynamics – 58%
- Offshore Design – 24%
- Shipbuilding – 9.8%
- Others – 8.2%

In our course, the 10 works proposed for until the second half of 2015 the proportion is as follows:

- Ship Design And Hydrodynamics – 40%
- Offshore Design – 10%
- Shipbuilding – 30%
- Others – 20%

Obviously, this is a reflection of the encouragement given in the course of a larger vision of the problems of the local shipyards, but is also greater cooperation by industry in support of work involving the shipbuilding issues.

An example is the first of these works, which was the result of a need for the shipyard to treat data VARD manufacture in order to deploy Lean Production and Lean Thinking methodology applied to the design of the Bow of ship blocks of a PSV. This work was developed and implemented in the shipyard VARD for one of the students under the supervision of a professor and a shipyard engineer, this being the first work of end of course the recent undergraduate course in Naval Engineering, Federal University of Pernambuco.

Other actions are underway, as a research project, still in the planning phase, for monitoring and further analysis of the production line of the shipyard plans, panels in partnership between the EAS and Naval Engineering, Federal University of Pernambuco.

6. CONCLUSIONS

By economic crises that momentarily affect all economic activities in Brazil, training in human resources of good quality should be the center of the effort to ensure that the problems arising in this scenario can be minimized.

In this sense, we believe is contributing to the improvement, without abandoning the best scientific/technological criteria, in uniting the industry to direct this learning in the most beneficial manner possible, enabling our students to the market and to the Academy.

Although this "experience", has little more than a year of implementation, we can already see the first tangible results with application in industry and optimistic prospects for the upcoming activities in the short, medium and long terms.

As stated earlier, the integration between academia and industry in Brazil, mainly in the naval area, is rare, and we believe is contributing to strengthen these ties so that in the near future we may have similar scenarios to major centers of instruction in naval and offshore areas in the world.

7. GREETINGS

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8. REFERENCES


BIOGRAPHY OF AUTHORS

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