6TH ARTICLE

Development of Technology in University-Industry Partnership: A Groundbreaking Case in the Northeast of Brazil

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ABSTRACT

Economic transformations have pressed the Brazilian companies into a continuous search for improvements in its processes, overriding the resource scarcity with the creative development of partnerships. BRASKEM S.A., an Odebrecht Group affiliate, has excelled in this sense: after multiple restructurings during 4 years, kept developing its processes as permanent tonic. Universidade Federal de

Alagoas/UFAL has been a constant companion, sharing a story of years of mutual cooperation, written through R&D projects developed under accompaniment of BRASKEM. The opportunity for the consolidation of the partnership occurred with the release of a public notice during the year of 1998 which allowed the proposition of cooperative projects between companies and universities. The cooperative project of technology development for a Chlor-alkali was design and executed. Highlights must include as the transfer of a complete research lab in the industrial area of BRASKEM, assigned to the partner university, which happens to be an "Advanced campus" of the University within a company the absolute leader of its segment of the domestic market.

1. OVERVIEW

1.1. Concepts

The importance of University-Industry interaction is largely based, always focusing on the benefits of the related parties and local development, is the scientific initiative, technological, and even regional economic and social. However, the greatest challenge of the University-Industry interaction is not only information management that enables the goals achievement of technological development, but the construction of a transformative relationship of the parties involved (Plonski, 1999, pp 13-17) with power of interference in its surroundings and, if possible, serving as a catalyst for structuring government action.

Professor Abraham Sicsú (1998, pp 162-179) argues that peripheral regions in search of development, such that the northeastern Brazil, must use the artifice of cooperative projects with regional characteristic, as a result of arrangement initiatives between institutions. In fact, cooperative processes tend to dictate guidelines for contemporary society, in contrast to the innocuous competition taken as default until the decade of 70's in the productive sector.

The opportunities generated for business between University and Industry can be caused by imminent needs of targeted solutions to solve local problems of the productive process, generating technology and – always - resulting in the formation of more qualified human resources. The local technological development can be planned from punctual actions, if developed and concatenated by a director policy actions in this sense, and the interactions between the productive sector and academies are the catalysts of this behavior change that can result in effective economic and social development of the region.

1.2. Technological Development of the Brazilian Northeast Region

The Northeast of Brazil comprises the area of more than 1.5 million km^2 (18% of the country), being made up of nine States, where live 50 million inhabitants, almost 30% of the Brazilian population. Although a characteristically poor region, Northeast GDP growth surpassed the country (156.6% against 133.9%) between 1980 and 1995, one of the highest growth rates in Latin America. On the other hand, the northeastern economy grew more than Japan in the period between 1965 and 1985, according to the World Bank. The magnitude of the northeastern GDP (US$220 billion in 2010 or 13.5% of the Brazilian GDP) outnumber countries as Chile, Singapore, Venezuela, Colombia and Peru.

It is appropriate to point out that in the last four decades the Northeast rose from a mere manufacturer of traditional goods to producer of special steels, electronic products, irrigation equipment, boats, chips, software, batteries and petrochemical products, as well as famous labels trademarks, leather and canvas shoes, fabrics of all types, grapes, mango, melon, acerola and other fruits for domestic consumption and export. Particular progress can be noted in the areas of chemistry, with basic industries being deployed in the decades of 60 and 70, notably in Salvador (petrochemicals) and Maceio (chlorochemicals).

The Project was conducted at Alagoas State. Alagoas is located at East of the northeastern region. It counts with an area of 27,933 km^2, corresponding to 0.32% of the national territory and 1.8% in the Northeast region.

2. DEVELOPMENT OF TECHNOLOGY AND ITS CHALLENGES

2.1. Partners in Project Development

Universidade Federal de Alagoas (UFAL) is a Federal University and was created in 1/25/1961. When the Project begun, UFAL had a number of 862 teachers, of which 21% at a Doctoral and Postdoctoral level, and 37% at Masters level (UFAL, 1999). Chemistry Department (DQ) had a well-qualified workers team, with 14 research laboratories and with infrastructure for the most advanced activities in chemistry and biotechnology. The Electrochemistry Group began operations in 1986 and its work was focused on basic electrochemistry and organic electrochemistry.

Universidade Federal de Campina Grande (UFCG), headquartered in the State of Paraiba, is ranked among the best universities in the country. Electrochemical Engineering Laboratory, sited at the Department of Chemical Engineering, structured in1996, studies electrochemical systems and electrodes materials.

Also develops theoretical (modeling of electrochemical reactors) and applied research (electrochemical wastewater treatment). At this group actively participated 4 doctors, 2 masters and 4 undergraduate students.

BRASKEM S.A., an Odebrecht Group affiliate, is the largest Brazilian petrochemical company with its production focused on polyethylene, polypropylene and PVC. In 1988, BRASKEM-Chlor-alkali Unit, then called SALGEMA, deployed the Technology Center – Alagoas (CT/AL), seeking higher value-added alternatives to its produced chlorine. This Center included an infrastructure with more than 2,000 m^2, including pilot plants, laboratories and offices. The exclusive area for research in electrochemistry, with 218 m^2, had a room for bench and pilot cells, chemical and electrochemical analysis laboratory and electrodes preparation laboratory.

2.2. Production of Chlorine and Caustic Soda Process

The manufacture of soda caustic and chlorine is one of the most important among the heavy industries group, which also integrates the sulfuric acid, sodium carbonate and ammonia. The applications are so different that it is hard to find a commodity that, at a certain stage of its manufacture, has not depended on chlorine or caustic soda. Traditionally, industrial diaphragm type cells have used perforated plates or screens in mild steel as cathode, justified by the low cost and good operational stability at the catholyte media, i.e., an alkaline solution with approximately 12% NaOH. However, the overpotencial associated with the cathodic reaction contributes 10% of the total potential difference of an industrial electrolyzer operation. This surplus energy is able to supply 22,500 households with average monthly consumption of 200 kWh.

3. COOPERATIVE PROJECT

The partnership between UFAL group (fundamental electrochemical expert), and UFPB (electrochemical engineering expert), and BRASKEM (extensive experience in industrial electrochemical processes) demonstrated to be highly synergistic.

The proposal for a joint work coincided with the release of a notice from the Brazilian Ministry of Science and Technology (named CDT/01/98 PADCT). The edict allowed public and private companies, business associations, research and development institutions and universities to organize and implement cooperative projects, using governmental funds. It has been prepared and submitted a joint project, whose scope was aimed at developing technology in new materials and designs of cathodes for hydrogen evolution in alkaline medium, using materials with expected electro-catalytic properties. Although the funds have been partially released (less than 10%) and after the deadline, the project was conducted with partners funding, achieving relative success.

4. MAIN QUANTITATIVE AND QUALITATIVE RESULTS

As innovation, a new experience in the Northeast of Brazil, the Company released the use of its electrochemistry pilot area by the universities, ensuring the optimization of communication and synergy between teams. In addition to the researchers and engineers, a learning group worked directly at that pilot area: 3 graduate students, 4 Masters candidates and 3 undergraduate level technicians.

For the University, training in industrial safety and business & administration, disciplines that are not always available in the curricula of undergraduate or graduate courses, meant a differentiated formation. The company obtained a better qualification of its staff: one of the engineers defended his dissertation on the topic. Other engineers, from this interaction, enrolled in Masters Courses or isolated disciplines as a way to supplement their training. An 'In Company' Master's Degree was promoted by UFCG at Company's offices.

Contracts between the Company and universities have been reworked to provide:

- Confidentiality Agreement
- Intellectual Property Agreement.
- Fast services hiring (chemical analysis, training, lectures or similar).
- Systematic process for hiring medium and long term services (studies and research).

The Project won a prize offered by FINEP for Northeast region (2001).

Table 1 presents a quantitative list of papers generated by the group.

Category	coluna 1
International Journal	9
National Journal	2
Book Chapter	2
International Events Communication	14
National Events Communication	40
Master's Degree Concluded	5
Doctorate/Master's Degree (Ongoing)	2/8
Patent Application Filed	1

5. CONCLUSION

A summary of the positivity of the interaction can be done based on the items contained in the targets of all involved: "Prospecting for new business together". Even without an effective technological progress from the partnership, the three parties put as a priority to seek out new opportunities for joint action in the medium and long term, regardless of the field. This relentless pursuit of interaction is seen by senior managers of the Company and Universities as strategic differentiator qualification of the parties, so that all institutional support is contributed to the executors and administrators of this specific project.

6. REFERENCES

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