Incubator of Ideas: how to prepare entrepreneurs inside the University

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Abstract - *In a globalized economy panorama, where the new society paradigms converge to "knowledge", the insertion of Third World countries in the international market is indispensable by the modernization of its old structures. This "scenery" induces to a situation where, in those countries, engineering education can play a very important role, as the way to reduce cultural and economic dependence. Although localised in a poorness region of Brazil, the State of Rio Grande do Norte is pointing to use its copious natural resources and qualified personnel in strategic areas for the regional development. The first step has been to create and consolidate the local System of Science and Technology, that includes the co-operation between the academic/scientific community, the productive sectors and the government instances, to start up the Technology Park and Incubator complex, even though lately if compared to developed regions. Meantime, also in developed areas, previous similar experiences show a very high death rate of technology based enterprises, mainly in the two initial years, that represents a unaccountable misspending of human and economic resources, for underdeveloped regions. In Brazil the analysis of some possibilities to reduce this kind of problem, allowed us to observe that the main reason of those enterprises unsuccessfulness is a consequence of immature management. Habitually organized by researchers, those enterprises reflects the academic laboratories "style", that means another sense of spending time and a different final quality exigencies on developing products. The needs of immediate results, inherent to industrial activities and the adoption of the productive process can also generate the failure of many promising ideas. The proposition of an "Incubator of Ideas", inside the University Campus, at the Centre of Technology, using its research possibilities as laboratories, allows the participation of engineering education structure to prepare entrepreneurs among students, teachers and technical crew, by creating a structure for the maturation of product and process before the traditional enterprise incubation. That kind of "pre-incubation" can contribute to reduce the distance between the idea and the final product, enhancing the possibilities of market insertion and the chances of a successful result.*

Introduction

> *"Due to the "globalization of markets" every country region and organisation suffers from - or will, in the very near future- the sensitive impact of new conditions pertaining to production, competition, information & communication arising from a "society of knowledge".*
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> (Maximiano Martins)

In the present times where new paradigms induce a "society of knowledge", the most important challenge to the underdeveloped countries, resulting from the globalized economic panorama, is to be able to survive in a interdependent business world, submitted to continuous changes that instantaneously affects the local economies due to the existing hegemonic model, implemented with the support of an efficient "real time" communication system.

The impressive increase of competitivity obliged those countries to promote the urgent and indispensable modernization of its old and obsolete structures, preparing the industrial sector to quality programmes, that involves the priority in personnel qualifying. As informed by De Meis[1], the fast generation of new technologies opens new possibilities for gain to the productive sector; but it obliges to prepare workers to technical enduring apprenticeship.

Strategic Planning allows to preview some "sceneries" to face this kind of need and in any possibilities Engineering Education can play a very important role. More than the production of goods, it is significant the possibility to reduce cultural and economic dependence in comparison to developed countries, that represents according to Bonsiepe[2] the opposite of our technology consumers' reality. The producers group maintain its leadership by the continuous use of a powerful strategy, the technological innovation, with the generation of new products and/or improvements of the productive process.

Looking toward to promote safe and sustainable development, engineering courses at the universities are preparing to respond to the modernity's challenges by implementing changes and promoting instruments, as national and international partnerships with other institutions as universities, enterprises and government instances, to increase internal capacity on the students qualifying. The start up of the Enterprises Incubators and similar activities make part of this kind of efforts.

Science & Technology Parks

and Enterprises Incubators in Brazil

To respond to a change of mind in the technological area inside the University, occurred the early 70s', by the arise of a different kind of professor/researcher turned on entrepreneuership, a very limited number of engineering schools had prepared some buildings to lodge the production of some technology based objects, simultaneously to the creation of the legal structure to encourage those activities, as research and development (R&D) foundations.

The FIPAI, a foundation turned on R&D at the School of Engineering of São Carlos (EESC/USP), for example, supported the production of an agricultural use airplane and also of a high technology artificial orthopaedic members, installing those born industries on a old shed, temporarily out of use. Those characteristics Pre-incubation activities could represent the seeds of the present Technological Park and Incubator.

The most important role of that initiative, meanwhile, consisted on the mind changing that has put São Carlos in evidence for a very large period and permitted to attract researchers turned on entrepreneuership from other states, by fixing an image of technological innovation, associated to the School of Engineering and the University of São Paulo.

From the last decade, Science Parks and Incubators of technology based enterprises have play a leading role in Brazil. According to Medeiros, at the V World Conference on Science Parks, "there are significant successful cases in which it was possible to systematise the technology transfer and to structure actions inspired on the science park model, which we can point out: the management of the interface firms-university; the support to creation and consolidation of businesses (specially the micro and small ones); the incentive to partnerships and the encouragement to entrepreneurial spirit; the assembly of networks (which makes easier the exchange of experiences and information); and the enlargement of synergy which represent an innovative environment tuned with the needs of its clients: the firms and the society in general".

Medeiros[3] had offered before, at the 2nd National Seminar of Poles and Technology Parks, at Campina Grande, PB, (1992) an important reflection about the importance that represents qualified and motivated people that believe in their capacitation and decide to reach success, because of the initiative do not prosper if there is not this kind of "anchor", if there is not this kind of people that put their own career on it.

The System of Science & Technology of Rio Grande do Norte

Even though the potentiality, the State of Rio Grande do Norte can not be considered as a region where industries have been installed and the copious existent resources have not been used yet. Consequently, the State is not a developer of new technologies, importing nearly all its needs.

This way, in the course of the last two decades, scientific/academic community, government and the productive sector began an important effort to stimulate the creation of local groups, pointing to the regional vocations sectors in order to promote sustainable development.

At the underdeveloped regions, as Northeast, where instruments to promote development many times are not efficiently used, the University play an essential role to compensate those needs. Activities pointing to prepare and training personnel, diffuse the information or knowledge transfer, are the typical contribution for this kind of institutions, to compensate the lack of specialised human resources in many areas, that represents difficulties, mainly for small and middle size enterprises, reducing the possibilities to promote the desirable regional development.

Those actions must be supported by an organised local structure that can assure efficient informational system, generation and/or transfer of technological innovation, associated to efficient management procedures pointing to solve problems and maximize results.

The first step was to create all the necessary structure to consolidate the local System of Science and Technology, beginning by the regulamentation of the State Found for Science and Technology Development (FUNDET), managed by the State Council for Science and Technology (CONECIT) and the University Foundation for Research and Culture (FUNPEC). Sensibilized, the government created the State Secretary on Science and Technology and a corresponding co-ordination, responsible for the executive actions in this sector. The initial results are beginning by an impressive mind changing, that gains visibility in examples as the fast growth of the Internet use, due to the structure that has been created.

As a consequence, the start up of the Science Park and Incubator of technology based enterprises became a real possibility, to respond to a repressed demand and also facing the challenge that represents to promote the development in a poorness region of a underdeveloped country as Brazil (Santos[4]). Having the Ministry of Science and Technology as a sponsor, the State of Rio Grande do Norte is receiving a complete CAD/CAM Station, including the fast prototyping unity, that will be located at the University campus, to support the Industrial Design projects and R&D actions to be put into practice by the installed enterprises.

The analysis of the possible reasons to the existing high death rate of technology based enterprises

The existing poorness in underdeveloped countries, obliges to promote a whole of actions, that includes a

very close co-operation among scientific/academic community, productive sectors and government instances, aiming at the solution to reduce the unaccountable misspending of human and economic resources, that represents a very high death rate of the technology based enterprises. The analysis of several existing Science Parks and Incubators of enterprises in different regions (and countries), shown this fact is considered as an acceptable possibility, by the managers of that kind of activity.

That problem gains visibility mainly in the two initial years, due to the disadvantage because they must to divide the efforts, spending their energy on the firm initial organization and simultaneously on the development of new products. As habitually occurs, the entrepreneurs are academic researchers and they try to reproduce in their enterprises, the University laboratories style, that -in many times- means some kind of incompatibility.

Actually, the academic laboratories have a special way for expending the time and a particular sense for the final quality on developing products, mainly in terms of appearance and finishing. The need of immediate results, or market exigencies and high competitivity, inherent to industrial activities, are nearly the opposite of experimental activities characteristics that preponderate at the University ambience, where concepts have more value than aesthetics and commercilization.

But the true "neck of a bottle" is the operative global organization, that includes the firm management and a strong structure of commercialization. The new entrepreneurs, that usually proceeds from the academic sector, are advised to contract professional managers (that can use the most recent administration methods) and also to join -or search for co-operation- with market area specialists.

The testimony of Milton Ferreira de Souza, a Brazilian pioneer in optical fibber production, at the Science and Technology Park of São Carlos, SP, in the early 80^{s}, presented at the Anprotec - Brazilian Seminar on Science Parks '88, informed us about the problems to find the ideal formula to commercialize the products of his firm. The close connection with the product, developed by many years, has created a improper attitude to put it into the market, making public an impatience, face some occasional buyers criticism.

The described problems, in association to the difficulties for the adoption of the industrial productive process, with intensive work on product Research & Development (R&D), can generate the failure of the most promising ideas.

"Incubator of Ideas-UFRN": an alternative for pre-incubation

To aim at the reduction of the described problems, the incubators of technology based enterprises (and also the science and technology parks) recently begun to offer management and marketing assistance to the incubated firms. But it is too soon to know the effective results of that action.

As Souza[5], using a flexible version of traditional models, a group of researchers at UFRN Technological Centre is trying to introduce another alternative kind of solution: the Incubator of Ideas. It consists on a system for pre-incubation, acting inside the University campus, in association to the technology laboratories and the CAD/CAM Station (and the fast prototyping unity), in order to promote the development of the most promising ideas for new products.

The researchers turned on entrepreneuership (teacher, students or technicians), individually or associated to undertakers, will have the possibility to use all disposable media, as computers, laboratories equipment and technical crew support, to transform an idea oh a marketable product. They will be able to demystify the wrong image that high-technology is unreachable to poor regions (Ratner[6]), directing its knowledge to maturate products and processes before the traditional enterprises incubation.

As the following step, the researchers can make the transfer (or the sale) of that knowledge to an enterprise to be located at the conventional Incubator System (in which they can participate or not), allowing the concentration of all energies on the organizational structure that includes legal procedures, management, marketing, etc.

It will enhance the chances for a successful result and the market insertion of the product, reducing the presently verifiable misspending of human and financial resources.

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1) DE MEIS, Leopoldo (1994), Os cientistas e as implicações da distribuição de ciência e recursos humanos no planeta. In: Ciência e Tecnologia: Alicerces para o Desenvolvimento, São Paulo (SP), Edição Conselho Nacional de Desenvolvimento Científico e Tecnológico-CNPq, Brazil.

   "A velocidade de produção de novos conhecimentos cria, continuamente, novas perspectivas de produção lucrativa para o setor industrial. Em consequência, requer-se uma força de trabalho preparada tecnicamente e com capacidade de aprender, continuamente, ao longo de toda sua vida profissional."

2) BONSIEPE, Gui (1983), A Tecnologia da Tecnologia. Editora Edgard Blücher, São Paulo, SP, Brazil.

   "O mundo atual está dividido em dois grupos: produtores de tecnologia e consumidores de tecnologia. Os países centrais mantêm seu rol de liderança, usando sistematicamente uma estratégia muito poderosa, chamada inovação tecnológica. Esta se manifesta em novos ou

melhorados produtos e novos ou melhorados processos."

3) MEDEIROS, José Adelino (1994), Situação atual dos Parques e Pólos Tecnológicos. In: Anais do 2º Seminário Nacional de Pólos e Parques Tecnológicos - 1992, Campina Grande, PB, Ed. ANPROTEC/IBICT/CNI/Finep, Brazil.

"(...) é a importância de pessoas que acreditam nas iniciativas e decidam lutar pelo sucesso. Sabemos que a melhor forma de uma coisa ficar no limbo é quando não existem âncoras, quando não existem pessoas que comprometem sua carreira com a iniciativa."

4) SANTOS, Silvio Aparecido dos (1987), Criação de empresas de alta tecnologia. Editora Pioneira, São Paulo, SP, Brazil.

"(...) os Parques Tecnológicos são iniciativas planejadas que visam criar condições favoráveis para que as tecnologias desenvolvidas nas universidades e institutos de pesquisa e desenvolvimento sejam transferidas para o setor produtivo, via pesquisadores que criam ou participam da criação de empresas com o emprego das tecnologias geradas."

(5) SOUZA, Dayse da Mata Oliveira (1993), Alternativas para a promoção do desenvolvimento tecnológico regional: um estudo de caso para o Rio Grande do Norte. Dissertação de Mestrado, Universidade Federal do Rio Grande do Norte, Natal, RN, Brazil.

"As experiências dos Parques Tecnológicos americanos ou europeus servem como referência conceitual. Não obstante, deve-se atentar que cada região possui características próprias, diferentes das encontradas nos países desenvolvidos. Em termos de Brasil, o conceito de Parque Tecnológico deve ser aplicado com flexibilidade em relação a modelos tradicionais."

6) RATNER, Henrique (1979), Estudos do Futuro: introdução à antecipação tecnológica e social. Editora Fundação Getúlio Vargas, Rio de Janeiro, RJ, Brazil.

"(...) ciência e tecnologia são frequentemente utilizadas como instrumentos de mistificação e dominação. (...) A seleção de tecnologias para atender a demanda social deve ser dirigida para aquelas cujo uso menos destruição causaria ao meio ambiente natural e à vida social."

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