IS YOUR COMPANY TEAM ABLE TO CREATE INNOVATIONS FOR THE MARKET?

Do you have a list of innovations that you would like to reach ?

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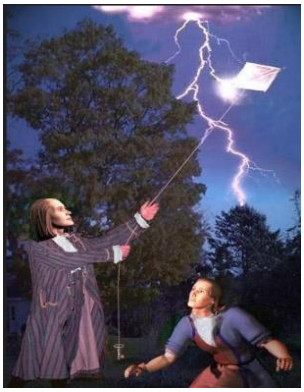
Author name: **Sergio Feitoza Costa**

Affiliation: COGNITOR – Consultancy, Research and Training Ltd.

Email: sergiofeitoza@cognitor.com.br sergiofeitozacosta@gmail.com Site : www.cognitor.com.br



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1) BARRIERS AND POTENTIALS FOR DEVELOPING IMPACTING PRODICTS

Forty years ago, when I was a recently graduated engineer trying to join a R&D center in Brazil, I did an interview, for my hiring, done by Dr. Nils Hylten-Cavallius. He was a renowned director of a major research center abroad. He was there to help set up in Brazil the first and still the only electric energy research center in South America. CEPEL and its large testing laboratories were successful, and the Brazilian electrical industry took a huge leap that was not followed by other countries in South America. I worked there 25 years.

The main question of the interview was to test my level of creativity and general knowledge. The idea was to mount a team of young researchers to be fully trained after. The question was not to test the speed of obtaining information. This is the (wrong) practice I see in companies today. Nowadays most of the R&D and training leaders think that everything is resolved on Google and WhatsApp. That's the reason of the almost inexistence of innovations in the electric industry, at least in the Occident.

Instead of creating useful news, we waste time in getting more beautiful names and wrappings for old products.
The creation of knowledge that evolved a lot in the 60's to 90's stagnated after that. That is why much more is invested in commercial marketing than in R&D.

Innovation do not mean only developing a new equipment based on superconductivity. Innovation depend on the stage of development of a country. Many years ago, to explain this, I wrote the article "Inducing & Assessing New Technologies for the Electric Industry of Developing Countries". It is in the link to follow and most of those sentences are even more true in our current moment http://www.cognitor.com.br/InducingNewTechnologiesSubstationEN.pdf

In a poor country the improvement of an old expulsion type fuse used to protect distribution transformers (IEC 60282) of aerial electrical networks is much more useful than a high-tech fully automatized hybrid switchgear . A good reading to get a wider view on this is the Brochure Cigrè "Contemporary Design of Low-Cost Substations in Developing Countries" (740 / 2018). I am co-author and had the honor of participating in the working group that prepared it. It is a must for substations specialists. Among the several excellent chapters there is one about equipment technologies and another, unique, about "Training & Development of Substation Practitioners"

Recently I wrote an article about Education and Training in developing countries. To keep the focus of the article well defined I will not speak about it here.It is in Portuguese language and, if anyone have interest, the translators will enable to read it in the link http://ec09e43.contato.site/educacaopib

2) ABOUT CREATING A TEAM TO PRODUCE INNOVATIONS IN THE ELECTRIC INDUSTRY

The dream of manufacturers of electrical equipment for substations is to develop or to improve a product that becomes, in the commercial market, a successful example of a new, cheaper, energy saving and creative product.
I am used to hear from people, in manufacturing companies, that they frequently have ideas for products that looks promising but does not know how to turn them into a commercial product. They mention that the two main barriers are:

(a) to do the engineering calculations necessary to define the product conceptual project.
(b) after the first step, how to deal with the high costs of the laboratory tests to develop the prototype and, after, to get a type tests report which could be used to commercialize the product.

The differences between the companies, which overpassed these steps, are not their size or the money available to invest in new ideas. The difference is only in the attitude, vision and creativity of some 2 or 3 persons of the team. Everything starts in having a proper R&D view in the moment of hiring the team, particularly the engineers and designers. This can be achieved when there is a direction with a view in the medium- and long-term future.

My experience in this kind of process started 35 years ago, as manager of a set of big high power and high voltage testing labs in the R&D center. We mounted a team, contracting persons that would work initially in testing activities but with a vision that some of them would be, after getting some years of experience in testing, the main researchers and R&D managers. The products of the center were tests (in labs having as clients mostly manufacturers) and, in separate, R&D projects (another team having as clients mostly power utilities).

The profile of testing engineers and researchers have some key differences. The fact is that, in the initial team of some 30 engineers and technicians, only some 4 of them became high level researchers and R&D managers. So, the first "must" for a company to reach success in developing impacting products is to have some 2 or 3 persons reasonably technically prepared to go beyond the routine production activities of a manufacturing company.

It is necessary to invest in these persons with training and participation in technical events in which they can improve and compare the results of their R&D activities. The main motivation of a good R&D staff is not money but instead, to create and win challenges. This is the fire to be maintained on.

The profile of the members of the "new products developer team" should be like:

- Having sufficient engineering calculations abilities (electricity and mechanics) and, beyond this, an excellent disposition to learn new things out of the main area of knowledge. For example, it is very good when an electrical engineer is not afraid to do some mechanical structures calculations.
- Shall be a disciplined person in the work and persistent in reaching goals. It is useless to have very intelligent people who cannot keep their focus on the goal to achieve. They rarely generate results, complain all the time and overload the rest of the team.
- Must have good skills to write the results of the work and to defend them, speaking in public.

I have witnessed that, the highest potential for new creative products is in small and medium-sized companies. Most big companies, after arriving to the comfort zone, produce more advertising and marketing than R & D. The big size international companies I know, only produce R & D and knowledge in their headquarters. This technology will reach its subsidiaries in less developed countries 5 to 10 years later. You do not find R&D people in these subsidiaries. Only application engineers without the task of improving products.

3) HOW TO ARRIVE TO NEW PRODUCTS

The main barriers mentioned by the companies are to do the engineering calculations of the conceptual project and the costs of the investment in laboratory tests. For the engineering calculations, the team shall be prepared, at minimum, to calculate things like:

- Temperature rise of components submitted to currents

- Forces and mechanical stresses during short circuits and structurers to support them.
- Overpressures caused by internal arcs and supportability of structures
- Magnetic and electric fields near equipment and near substations
- Transients of voltages and currents in electric power circuits.
- Inductances, resistances and capacitances of conductor systems
- Supportability and time life of conductive and insulating materials to electric, mechanical and thermal stresses

It is also a must to understand the requirements of specification and testing in IEC standards like IEC 62271-200 , IEC 61439 , IEC 62271-307 , IEC 62271-100, IEC 61641, IEC TR 60890,IEC 61117,IEC 60865-1,IEC TR 60943.

If the team engineers, technicians and designers have reasonable fundaments obtained in their regular formation courses it is easy, with short duration trainings, to prepare them to the calculations above.

About the costs of the investment in laboratory tests many things changed in the last years. Tests remain necessary as the past. High power and high voltage tests are inherently expensive because the installations used to do them are expensive. One day of laboratory use involve at minimum some USD 3000,00 to 15.000,00 plus the preparation of prototypes cost. It is not for beginners.

The new thing is that nowadays it is possible to design equipment with less than a 2% probability of failures in the lab tests using cheap testing simulations. Read the other posts in this series to understand or the section “Publications” of my site. For using simulation tools, the designer will need a small training.

When I write, small I refer to some 4 to 10 days of work, depending of the skills of the trained person. This is not so much for a company wishing to grow based in solid fundaments. Outsourcing companies to make the calculations is a management error and can be even more costly. The good strategy is to train your own tea.

I learned this doing services for many companies all over the World. In South America most of the companies prefer to pay me three- or four-times times to do the calculations than to pay me much less to teach them to use the training and simulation tools. After this they will not need me anymore and could do the service alone. It is very common here to have the silly vision that if you train people, they go to another company to get a better salary.

This is one of the reasons why many Asian companies evolved a lot and became much more competitive than South American companies . Both were in the same level in the 60’s to 90’s but after this the Asian advanced investing in training and education but South American companies stopped in the time.

4) FINAL COMMENTS

I have witnessed that, the highest potential for new creative products is in the small and medium-sized companies. The key word for their success is “training”. This was the aspect that enabled a lot of advances and innovations in the 60's to 90's . Real knowledge, with rare exceptions, stagnated after that. Nowadays we have much more investments in commercial marketing than in R&D.

This is something that cannot be sustained in the medium and long term. I see a lot of people in the America´s and Europe complaining that Asians are invading all the other markets. It is time to acknowledge that for the past 25 years they have invested in training and education while we just pass the time looking at WhatsApp and Google, waiting for “the miracle of the knowledge” . The bill is coming, and the problems exposed by the terrible situation of this 2020 virus show that the western world is no longer in the comfortable position it once was.

Innovation do not mean only developing a new equipment based on top technology. Innovation depend on the stage of development of a country.

So, the first action to be done in countries or regions is to have a list of , let’s say, the 10 more wished “innovations”. Do you have a list of innovations that you would like to reach ?