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THE CREATING PROCESS OF NEW INDUSTRIAL ACTIVITIES TO MEET THE CHALLENGE OF A NEW WORLD

Realization and commercialization of biotechnology is a process like any other process to make technology real in relation to market and society. That is why I will start the understanding by looking into the general process of the realization of an innovation or any knowledge based idea.

A The process of innovation from a macro perspective

In Europe there will be quite another situation for industry to operate when the integration of the Common Market is a reality. An integrated market and the potentials to create new markets will give a much stronger position for the commercialization of new industrial products and new industrial concepts. But the real big step ahead is the integration of the economies in all Europe. There is a new classical map to consider when Europe i reaching beyond year 2000. In the Far East we have several very fast growing economies and we also have to strengthen our position in relation to Northern America. On the other hand Europe will also have a strong position when big international business and industrial groups form their strategies where to operate new industriel plants and even new development in relation to market.

New infrastructures and planning for the modern urban societies and the relations and economic interactions in different regions are taking place. The fast growing information technology and telecommunication network can produce quite new possibilities for industrial and business networks. To handle and send information - to communicate - in the evaluation of new ideas and to create possiblities for realization of new ideas on a joint-venture basis all over Europe will open new industrial opportunities.

In history, traditions and culture in Europe has got the great potential to create new structures and centers. The

SUN Belt with growing economies near the Riviera regions or Spain as an example shows this phenomena. If we think back we remember classical centers like the Wienna Café, the classical painters in Netherland and Sacre Coeur in Paris as cultural meeting places with the critical mass for creation of new ideas. By the way coming as a scandinavian to Budapest, then You feel it! The similarity with Paris, the city and the river, the European Café culture and not to forget the Hungarian food. Budapest as one of the most beautiful capitals in the world. The situation is right You say - as an entrepreneur - the potential is there to play an active role again as one of the important centers of the european map. It is a challenge to go to Budapest today.

B The process of innovation from a micro perspektive

In the discussions of how to support development in a region or a country then the question of money and capital is focused as the central problem very often. When different actors like politicians, economists and industrialists as well as scientist in the universities are discussing development, the main problem then is often definied as an almost isolated problem of capital and money. How to start up new activities in a society and then new jobs and social welfare on the other hand focus the debate in questions related to the problems to realize new technology and new industry. Together then the main question will be formed as the need for risk capital. For the single inventor in his efforts to try to realize his invention, and because he also very strong believes in his invention, then he will get the impression that there is not anyone in the society who has got the will and the right instrument to support his invention with the risk capital. So everyone in the process gives the conclusion that the whole problem in realization of new technology is a problem of risk capital. This is not the right pricture to act and operate from. In the creation and realization of new ideas and new technology then the process itself is a more complex one consisting of the integration of a whole cluster of parameters to make it a succesful one. But generally speaking You can always say that the basic parameter is the need of knowledge and the right knowledge to be put in the realization process at the right moment. The process itself can be defined as a logistic one like KNOWLEDGE JUST IN TIME. You need knowledge to evaluate ideas and You need knowledge to operate the realization of ideas. So the most important thing is the human capital.

C The position at the gate to the Baltic sea - the bay of Hamlet (Öresund)

Now I have to give a perspective based upon my own experience in project management and entrepreneurship together with innovators, scientist and different types of industrial management. But even so I do think that my experience over 20 years can be generalized as references for the creation of similar roles and situations. In my case more than 10 years of my experience has got its position in the development staff at the university management in the university of Lund. Almost in 10 following years I have been operating the idea of the IDEON Science Park concept. The university of Lund at the southern part of Sweden is the biggest university of Scandinavia. Even the Institute of Technology is integrated in the university of Lund. Almost 25.000 students and a turn over of about 350 million US dollars are some short figures of university of Lund. We are situated about 20 kilometers opposite to Copenhagen in the city of Malmoe and of course the academic city of Lund. Malmoe is the third big city of Sweden and a commercial and industrial center of southern Sweden. The university of Lund has got departements in Malmoe too, but 17 kilometers northeast of Malmoe is the main academy city of Lund situated. So the IDEON Science Park are situated both in Lund and Malmoe in close relation to the university profiles. Specially at the IDEON Science Park in Malmoe we have got very close links to the SYMBION Science Park at the university of Copenhagen as well. If You give a circle ratio 50 kilometers and put the middle in Malmoe then as a high-tech parameter more than 65% of the pharmaceutical industry of Scandinavia are operating within that circle and about 15.000 scientists in two big universities, two institutes of technology and other research institutes.

Malmoe and Sweden will in year 2000 be even more closely linked to the european continent by the bridge to Copenhagen (the Capital of Scandinavia). Looking at a region in relation to development opportunities and important infrastructure You can define universities as important centers to operate knowledge and as such centers in communication. Other centers of importance in communiction are of course international airports. The bridge between Malmoe and Copenhagen will give the city of Malmoe a quite new position of only 17 kilometers to Copenhagen airport.A business Park will be developed close to Copenhagen airport. Even our airport in Malmoe will then have a new position to support the Copenhagen airport by the bridge and the urban region at the bay of Hamlet will be a very important economical region in Scandinavia and northern Europe.

D Universities as important partners to seek and use knowledge in the realization of new ideas and innovations

A university has got two main goals ir its operations. The first and exclusive one is the creation of knowledge itself - that is science. The second one is to communicate and distribute its knowledge together with its students to the society. This is done through the single academic course and when different courses are linked and integrated together we call the structure - education. But the responsibility to realize knowledge in the reality of a society then it is up to others than the univesity to respond in economical applications of knowledge. On the other hand for operators in a society it could be essential to have close contact with a university and its potential as a critical mass to seek and point out knowledge. Qualified industrial development or social development must be strongly knowledge based to stand and take the problems in realition to international competition and to get the support and confidence from the surrounding society.

As an example of the role the university have in relation to the surrounding society and how important it could be to a region and its progress in prosperity and social welfare let us look into a historical educational case as an example. In USA in year 1858, the state of Minnesota had to establish the three main important legal organs and institutions. The first, at the time considered as the most important location from the central government, was the possibility to have a state prison. Secondly in priority was considered in importance the possibility to have the location of the local state government and its parliament and local departements. Thirdly in priority at the time was the possiblitiy to have a university located to one of the cities in the state of Minnesota. At the time there was three cities who had to compete and qualify to the central government in USA. The cities were Still Water (by the way a city with many scandinvian immigrants), S:t Paul opposite to the third one Minneapolis by the river of Mississipi. First to choose were the city of Still Water, so they got the best alternative, they thought, the state prison. Second to choose were the city of S:t Paul, so they got the local state government, local state parliament and the local state departements. At the end the city of Minneapolis they were sorry because they had to choose the university.

Today, then we could measure the result and the impact of the three different locations in three cities. Still Water has not been the most prosperous one, but they

still have got their state prison. In spite of the location of the legal authorities even the city of S:t Paul has been beaten by the city of Minneapolis, because they have got the university location and therefore has become the most progressive one.

In our time it is considered as very important to a region to have the location of a univesity and research institutes. Also for example it is important to be close to international airports as communication centers for industrial leaders, bussinessmen and decision maker.

Universities are international because science is international. That is why it is so essential to operate knowledge based development close near by these knowledge centers. University regions form together a very interesting network and links as satellites all over Europe. And of course even so all over the world.

There is however another problem or dimension to have in mind. Talking about the phenomena of science parks, techbnology parks, research parks or innovation parks then from a perspective of the established sosiety -they could bee looked upon as the missing link or even a "provocation". Let us imagine that the cooperation between a university and the established mature industry in a university region is in a theoretical sense optimal. Even so we also imagine that the established industry are optimal in their dynamic operation to start and develop new industrial concepts. Then You could say there is no need for an organized science park as a project of urban planning. But as an entrepreneur it is always a challenge to realize new ideas. In consequenses even new products could mean that people as users or consumers of new technology like biotechnology have to even change their social pattern and social behaviour. There is always psychological dimensions in the creation process of new development. So to make this process a more easy one the science park phenomena can operate as a meeting place for the realization of new ideas in centers of spinn-off companies. On terms or conditions by business and industrial life the science park will be looked upon as a technology "window" in cooperation with the established industry and society.

E The idea of a development park strategy to support the developing countries

So specially in realization and commercialilzation of new technologies like biotechnology, science parks and industrial incubator centers are strategical important as technology windows. In the industrialized countries in the world economi the trend to create different kinds of technology centers therefore are very strong. In Japan for example the evolution of science parks and technology

parks are put together into patterns of multipolis functions, that is integrated networks to create new opportunities in realization and commercialization of new technologies.

As a speaker at the UNESCO conference in Paris in July this year (Engineering Deans and industrial leaders) I focused the situation of industrial development in relation to the developing countries. In a quite new situation, politically and economically, with a new Europe and an evolution in the former Sovjet Union. Then there will be a new challenge to create progress together with the developing countries in the world industrial economy. After ten years in creation and operation science parks and also being active in international networks and conferences - then I would say that this phenomena has been related almost only in relation to the industrialized economies. So that is why I made a proposal at the UNESCO conference to the Engineering Deans and Industrial Leaders, but specially adressed to the delegates from the developing economies, that a special concept should be developed to support industrial development in the developing countries.

The phenomena science park, as a strategi to realize and commercialize knowledge and technology, has been defined from situations in the industrialized world. That is big and strong universities and research centers, good engineering education, supporting infrastructure, knowledge based big industries and operating market economies with strong international integration. The situation in a developing country is as we all know quite another one. So another concept has to be created. My suggestion is DEVELOPMENT PARKS could be the instrument to define and create identities just like science parks in close relation to universities, research centers, schools and so on. It will be important that a development park will get official status by government and the established business life organizations. Even to have international recognition will be important. A UNIDO and UNESCO qualification could be one way to go. But firstly those development parks have as technology windows to translate important local needs into support by coordination and creation of operational units and companies in the park to meet those needs and transform into industrialization and commercialization in relation to the local structure. The point is that a development park identity will just like science park have the possibilities to support the realization of ideas with firstly knowledge even on a international basis. As a network organization the development park can be linked even to the network of science parks, so entrepreneurs could act and build up bridges of technology and educational transfer. I am quite sure that a strategy like this will be successfull and create progress in many

ways. The real process of realization and commercialization does not start with money. If it is biotechnology or any other technology the process starts with people, ideas and the coordination of knowledge. When the identity is created in a project or so, the money will come in one way or another.

Of course there are many aspects on this strategy. But for example when technology transfer from a position like my own is to be operated in relation to a developing country, then I need identity like a development park to form the operations. The same goes for big international companies when they are to start u new operations. And of course the other way around when an idea in a developing country have to seek international support in realization and commercialization, then the Development Park will have the competence, identity and the good international links in this perspective.

F The idea of the IDEON and the structure of the IDEON concept - as an example

The university of Lund, founded in 1666 and the Institute of Technology established in the middle of 1960th, integrated in the university of Lund, could be looked upon as the mother for the idea of the IDEON. To have the regional support in the creation of the IDEON Science Park concept a special foundation - the SUN foundation (in Swedish that is cooperation university and industry) was established by an initiative from the university and the regional governor. The SUN foundation (the father of the IDEON) then was founded by the university of Lund, the regional government, the regional chamber of commerce and the regional development fund. As an associated member the agricultural university was connected. From regional perspective the initiative of the idea of the IDEON was to form this technology window and link between the univesity and industry in the surrounding society. In the initial phase this foundation had to operate the creation process of the concept. The SUN foundation was established in 1982 and I was appointed as the managing director for research and development in this foundation. Today it is more lika a policy board between the univesity as such and the IDEON as a science park concept. In structure of the total IDEON the SUN foundation are divisionalized because there are three different physical parks. There are different IDEON policy boards for the three parks and the research and development companies who wants to establish in the parks have to qualify in relation to the policy in these IDEON boards. That is, the industrial activity in the parks have to show up a clear development profile in ints operation in the parks.

The first park started in Lund near by the Institute of

technology in 1983 and can be defined as a research park or technology park. Here You can find new industrial technology in many start up companies or big companies like the Ericsson Radio Systems, Mobile telephone company, in development operations. About 140 companies are established in this park and most of them are new start up high-tech companies which have e benefit or support in being close to special the Institute of technology. Of course the cooperation links could also be strong in relation to other R&D companies in the park.

The second park started in 1985, also in Lund, and are defined as the IDEON Industrial Park. This identity has been formed by the rebuilding of a former mental hospital and also new buildings have been constructed. As a phenomena this Industrial Park concept is more free. Here the companies are a little more mature in industrialization and commercialization and they are allowed to operate small scale production or as they say pilot scale production. About 40 companies are established in this park.

The third park started as an project already in 1985, but was defined as the IDEON Science park in 1986. This one is established in the city of Malmoe near by the university and general hospital of Malmoe. Even the odontology faculty is situated near by the IDEON in Malmoe. In profile this IDEON is operating new industrial concepts where we applicate an coordinate knowledge in new products or designs. Because of the close location to the medical and the odontology faculty (dentistry) we have a strong preference in medicine, medical technology, pharmaceuticals, technology for the disabled (handicap technology). Today we are also operating industrial automation and of course different types of computer and electronic industrial development and other information technology. Almost 40 R&D companies are established in this IDEON science park in Malmoe.

From the starting point, because the SUN foundation is a non-profit foundation, the capital was supported from the biggest building constructor of Scandinavia - the SKANSKA Company, SKANSKA has played a very important role, not only as a building constructor for all the buildings, they have been the developer in cooperation with the SUN foundation. All together all three parks in the IDEON concept in invested capital by the condition from industry (no subsidaries from the government or the society) - more than 200 million US dollrs has been invested in housing. Laboratories and offices in "tailor made" solutions in coordination with new companies and three efforts to grow in the parks.

Today the structure is such, that two real-estate companies has been formed in Lund to operate the housing

for the first IDEON near by the Institute of technology. Together they have a common service company to operate different kind of service facilities and marketing of this first IDEON park. There is a seperate real-estate company to operate the IDEON Industrial Park also in Lund. In Malmoe there is a fourth real-estate company to operate the IDEON Science Park. I myself am today connected to this MEDEON development company to further develop the idea of IDEON. Still my role is firstly to create new industrial activities and new comapnies on a joint-venture basis. We operate also internationally in strategies ot technology transfer to form different kinds of joint-ventures. All together in the IDEON parks there are about 220 R&D oriented companies and about 1500 employes in those companies.

In a seperate network organization we also operate links, projects and seminars together with the agriculturual university in an identity named IDEON-Agro. This had to do with the relation to farmers and the food industry in first hand, but could have other connections to even the development of new pharmaceuticals.

G Casestudies and some examples from reality of the industralization and commercializatio in biotechnology

G.1 Industrialization and commercialization of biotechnology in focus

Firstly, there is no difference in the structure of general strategy to realize ideas or technology in the biotechnology field in comparison to other fields of technology. That is from a position like mine as a research manager an creator of a science park concept. After ten years inside an university and in close cooperation with the entrepreneurial scientist then the main problem is to get support from outside in the society to realize the idea or use the knowledge in pratical applications. Secondly, I would say, after ten more years of experience in this science park concept of IDEON, then it is even more realistic to start up the industrialization process itself by a good reference or position in the industrialized markets. The process is then in strategy to use the university and the university network to find the specialized knowledge to make the technology products or the production process unic in relation to market. In both cases the science park concept as a technology window creates a milieu in competence to form this process into a successful one. In the science park concept then the idea could have the position as a R&D oriented knowledge based company and organize partnership and joint-ventures on the same conditions as the international industries act.

So starting more from a position of needs and market the main job is to coordinate knowledge into a concept of industrialization and commercialization.

So from this perspective I can not say that we have a special management strategy in the field of biotechnology. On the other hand You could say as a high-tech trend starting up in the beginning of 1980th there was a lot of expectation for example in USA that biotechnology would create a lot of new industry and so even i Sweden. In some sense biotechnology were looked upon as a trend similar to the electronic markets. Today the biotechnology area is looked upon with more realistic industrialized eyes, as one high-tech area like many others.

G.2 Evaluation of the problems from a process of innovation

To mention some examples from the IDEON perspective, then I could illustrate the BioCarb concept. As an example in Sweden and as a concept in the IDEON, it is one of the heavy ones. The profile of the company was from the start in 1983 to industrialize and commercialize active carbohydrates into different applications. Another example is the Symbicom company also operating in the field of active carbohydrates and biotechnology.

G.2.1 The Biocarb story

This profile in biotechnology (active carbohydrates) was supported by Swedish Sugar company at my university in Lund. As a spinn off from this cooperation there was in fact to company profiles to be born. The one coming from the chemistry departement at the university was the Biocarb group. From the beginning the concept was divided into the Biocarb company as a mother company and the Monocarb (monocular antibodies). This Monocarb was born firstly to support the industrial R&D activities in the BioCarb company. The support to realize and commercialize this industrial R&D was not given by the Swedish Sugar company. In fact there interest as a representative from the swedish established industry was falling, so the scientific group at the university had to look for new support in there strangle for further development in the field of biotechnology. The new risk capital then was coming from two venture capitalists. It was said in the beginning that about 10 million US dollars in 5 years would lead the industrial R&D work to a break situation and then the incomes will be growing.

From the beginning then the Biocarb company in the field of active carbohydrates was oriented into applictions in relation to the market new antibacterioligical products, that is new antibiotica. One strategy was use carbo

hydrate antigenetics to define blood groups. At the same time the Monocarb company was operated to support that development field.

Afterwards, when we have a lot of answers, we can say that the process in industrialization and commercialization from R&D development and into reaching the markets was the main problem. The biotechnology profiles was very advanced and specialized. Only a few specialists and scientists in the world had the competence to realy understand the technology and its possibilities. The management in the companies, coming from the established pharmaceutical industry had great problems to handle the scientists in the group on an international basis. The Biocarb was a pioneer one. No references in industry. Not even the venture capitalists as owners had any relistic chance to support the group with complementary management.

The scientists in the group had other references in their ways to give priorities to activity plans from the so called scientific world. On the other hand the industrialists in the management of companies want to give priority to commercial products in relation to markets and incomes.

In the next phase in a growing process of industrialization and commercialization new companies are integrated in the Biocarb group. The Biocarb Chemical which also takes up agencies together with Biocarb products in the field of fine chemicals. Another comapny in the field of auto immuna illnesses was created as Biocarb Diagnostics. In USA a venture is created in the Biocarb inc. to internationalize the concept.

So in the spring 1991 then the board of the Biocarb group have to realize after 7 or 8 years of operation and after having expanded its risk taking economi to almost 10 times the starting risk capital, that the markets still are far away to create a real break even to the concept.

The owner (the venture capitalist) still wants to reconstruct and redesign the group to realize a new management strategy and possibility to get advanced biotechnology products into market. But because of a take over situation by one of the big business banks in Sweden and a background of a deep real-estate market crisis effecting the venture capitalist and Swedish bankers, then was given the result of a bank ruptcy.

Anyway the Biocarb Diagnostic company managed to handle the situation and they are still active and expanding with market oriented owners and management Even the Biocarb inc USA handled the process right and still moves ahead.

Still we have not seen the end of the process. After almost ten years and a lot of industrial risk capital to support the Biocarb R&D development, then there is a critical mass to create further spinn-off R&D company concepts in future. There is also an effect and stimulation at the university in relation to the biotechnology and chemistry departments. From the process itself a lot of know-ledge and experiences has been developed and to be used in further industrialization and commercialization of biotechnology.

G.2.2 The Symbicom story

In comparison to the Biocarb concept I will give a short description of quite another strategy for industrialization and commercialization of biotechnology. The Symbicom company group was designed from a position in the same field of carbohydrates. In fact one of the important entrepreneurs was a former employed scientist at the Swedish sugar company. At almost the same time when the Biocarb concept was created then the Symbicom concept was formed.

A joint program was developed where small groups of front scientists in the biotechnology field from the universities of Lund, Uppsala and Umeå (all in Sweden) formed the Symbicom concept. Today the whole group consists of about 25 scientists. Some of the scientist are today operating at other internationell well know universities in relation to this biotechnology field. So the network is still growing in strategy to be in the front.

The company group has got a small administration and an organisation of dynamic project management. In profile there is a broad competence in chemical biology. It is a concept which could be called a company of professors. Early in the process then the Symbicom group attracted the Astra Pharmaceutical company in Sweden. It was of great importance to have industrial management integrated from the beginning. Today the Astra group have 25% of the shares and 75% of the shares are controlled by the scientific group. The main strategy of today is to be in the early stage in preclinical research in relation to R&D development of new drugs and medicin. The Symbicom group acts as a strategical coordinator of advanced industrial R&D. The scientists have got their support and stimulation in their academic research and also the possibilities to act and learn in the Symbicom group in relation to the process of industrialization and commercialization. As an established industrial group the Astra comapny has got access to an advanced scientific group in the biotechnology field.

The entrepreneurial scientist from the Swedish Sugar company has today became professor at my university in

biotechnology.

G.2.3 The start up company story, became another one...

As a third case in the molyculear biology field I will present a small spinn-off company concept as a result of the entrepreneurship of a single scientist.

When the first IDEON Research Park in Lund started then the scientist starts a R&D oriented company. The MBL International is borned and operates firstly contract research because the scientist has got very good international links and therefore he is in a way building up a secondary economi to his employment at the univesity. One way of looking at the concept is that he consider the company as a way to sponsor his own research activity by the position in the IDEON Research Park. The strategy was also to support other research labs by diagnostic tailor made kits. One of the aspects of the time was to avoid radioactive materia and another to manage international contract research.

The scientist even if his single tries to develop his company from priorities he learned in the academic world. In our relationship then I have to point out the lack of management and marketing strategies. The essential problem then is not his academic competence. It is to teach him to differ the role of being scientific leader and on the other hand to be a managing director. I have to try to get him to understand that his company has no business plan. It is more like a scientific program.

Out of this process we then have to create management and marketing operations in a wider sense. A special market oriented biotechnology company is the result in a joint venture with operational management and licenses to have a more complete product program in relation to customers and market. The company Saveen Biotech is borned. The partnership with Chem-En-Tech is integrated. This R&D oriented company is a start up company in the Symbion Science Park in Copenhagen. Their profile could be defined as very professional in the field of protein research. They have a good staff of scientists a qualitative management and a strong industrial partner. So Saveen Biotech can now deliver diagnostics and affinity matrises to the pharmaceutical industry. The Saveen Biotech company is a growing one in the science park IDEON in Malmoe and the MBL-International is a sleeping one because the scientist now has become professor at university of Gothenburg. I am quite sure he will teach his students about his active experience from industrialization and commercialization of biotechnology.

H Conclusions

As an entrepreneur, to initiate and operate innovative industrial research and development, then it could be good to create a science park concept. But the real creation function or dimention in relation to the phenomena itself is the incubator dimension. It is a privilege to meet and operate new ideas in a environment or a millieu in close relation to a big university. The possibilities to evaluate and even coordinate knowledge in the strategy to build up and create a concept for realization near by a big university is a qualified support. The human capital is easy to be found. Anyway to make this idea real, the single invention. You need three more essential competences.
Management is the first one. To start up a company is always a risk. Entrepreneurship means risk. Money and capital are instruments and the institutions who handle money are banking, investment and finance companies firtsly. The strategy as I see it is to have the incubator network organization to evaluate and even support the basic invention idea with right knowledge. This is the initial phase in the realization process. After that it is a question of management and then to the management to find the good solution in financing. It is in fact better to talk about risk management than risk capital, because no one wants to give money away. Starting up the company then You need production competence and production facilities. A company must have possibility to deliver products and services. One way to go is to build up subcontractors another could be to create our own production plant and maybee to be organized in a joint-venture basis in a seperate production company. Thirdly You can not forget the competence in market. Inventors and scientists they talk about what they think people need. The market is quite another thing. Then you must have a produc t that people or someone wants pay a certain price f or and You know the cost to produce and distribute it to the customers.

Management, production and market competence are not firstly to be found in an university. This triangle to support the realization of a new industrial idea is to be found in industry and industrial business life. So if this triangle of those three competences can be integrated then even a science park concept could be a successful one and will give the essential incubator function its dynamics to operate just like the human heart gives the puls of life in the human body.