Investing in Nanotechnologies — A Three-Dimensional Approach

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***Abstract*—The nowadays industrial landscape suffers major changes as a consequence of more evident phenomena that guide towards new directions, difficult to anticipate. Technology is the main tool of change and the entire developed world dedicated efforts for decades to this direction. Even the expectations are not yet satisfied, the research in finding adequate solutions goes ahead. A relevant example is nanotechnology where most of discoveries still remain into laboratory and could not succeed to find the right way to the market. Meeting this situation the question could be: "is it fair to continue to invest more and more in the name of an uncertain future but with very little impact on the present?" This paper tries to find a positive answer divided on three - dimensional approach through a descriptive analyze based on available information supplied by the European case studies, reports and literature.**

***Index Terms*—Europe, KET's, nanotechnology, technology.**

I. Introduction

The nowadays industrial landscape suffers major changes as a consequence of more evident phenomena that guide towards new directions, difficult to anticipate. The financial crises, the obvious poor availability of raw materials, the new technological discoveries and interdisciplinary collaborations help in designing new business models. Now, more than ever, the accent is first on ideas and then on the material side of the business life. Our material world is shaped through ideas. Everything that exists in physical life is limited and the number of thinkers is also limited, but only a part of the unlimited number of ideas brings responses for a better life. New business models guide towards personal and special needs.

The change is more and more required, but it takes time and it is extremely costly. The reality is very generous offering many alternatives of change. Big players like states and big companies are involved in the selection process of these alternatives. All of them are interested in gaining on the long term, but their efforts seem fruitless in the present.

The big and small companies cannot develop without co-operation. The interdependency between them is now a condition to their existence.

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Sometimes life proves many examples when co-operation turned into competition and the process starts again in different conditions selecting new alternatives of change.

Technology is the main tool of change and as the history showed us it marked and sealed all our entire human existence. Learning from the past, the human race understood that this is a key to get progress and focuses on investing in everything that can improve the technological level.

The last decades the world dedicated efforts to this direction. Even the expectations are not satisfied, the research in finding adequate solutions goes ahead. A relevant example in this direction is nanotechnology. Most of the discoveries still remain into laboratory and could not succeed to find the right way to the market. In front of this reality, states, companies, researchers from all over the world demonstrate strong efforts to continue their work using investments that seem apparently to go to nowhere.

Despite of these efforts, the fair question is if this alternative of change is the right one. This paper tries to find explanation from the unseen side of the nanotechnology magic world by offering an answer on three dimensional approach through a descriptive analyze based on available information supplied by the European case studies, reports and literature. Behind the euphoria of what will be in the future, states understand the big potential of these discoveries and for the first time in our history the change seems driven to give responses to big societal goals for a better future life in poor conditions of environment change and less raw materials.

The paper has three main parts. The first part of the paper focuses on the literature review presenting concepts about technology, business models, and competitive advantages through technology, key enabling technologies and nanotechnologies. Into the second part a descriptive three-dimensional approach is given to the question: "is it fair to continue to invest more and more in the name of an uncertain future but with very little impact on present?" All these approaches offer an affirmative answer: through the first one the answer comes from the explanation that many of the discoveries could affect the existing industries, but their potential for the future is proved now, in the present; the second approach is given by the goal of nanotechnology to improve our future life being considered the technologies of the new era; the third one follows the fact that states help any nanotechnology actor, but the big actors play a major role for promoting technologies on the commercial products with leverage effect to the entire society. Finally, the last part of the paper comprises some of the conclusions. Even the information was compacted, the answer given by this paper is far to be complete.

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II. Literature Review

The raw materials crisis forced researchers to discover new technologies, rethink the existent industrial process and push towards an interdisciplinary co-operation in finding the best solutions. The result of the entire process is still difficult to estimate when new industries are in the way to be born since technology designs the boundary of a certain industry [1].

Reference [2] shows that every new technology which becomes attractive may create new business. The first who succeeds on the market have the chance to create and impose own technical standards. In time, if the number of players on the market will grow it means that business has success. The first movers on the market impose barriers for the others. Who is not able to follow the trend of that new technological design cannot recuperate investments and they are forced to leave the market.

When a technology is analyzed, financial aspects matter, but also its impact on the future is very important [2]. The technology selection concerns the product life-cycle that incorporates that technology [2].

From the theoretical point of view, the position of the company depends on the way it applies a certain patent [2]. On the other hand, when it is about new technologies it is difficult to estimate their potential on the market, but the volume estimation could be an important indicator [2]. Thus companies with large technological possibilities have intensive research and development departments and they succeed in extending their market-share [3].

The firms must resist in front of strong competition and the business trends are going towards global optimization [4]. The future factories will produce the right product, at the right time, in the right quantity and quality. New technologies require new innovational standards and those involved in the research activity are the founders of these trends of the change.

Neither theory nor practice could offer examples of sustainable models of production or consume [5]. Innovation requires sustainable development at the level of production [5]. It could be incremental or radical; the last ones do not attract big companies [5].

The manner to allocate material and human resources could guide to an accumulation of intangibles, the decisive determinants for growth [6]. These intangibles consist in the ability to create relationships and so the knowledge and new technologies are spread as a result of a good network [7].

A good business relationship supposes the entrance into a value chain. Leaders on the market could reconfigure the industrial value chain by eliminating or adding new suppliers [8]. When companies develop in time, their position into the value chain could change and so do their influence [8].

To identify the competitive advantages of a company the analyze of the value chain is required for a better understanding of the business connections [9]. Due to the globalization the value chain reflects the links between companies, regions and states [10]. At the international level a vertical specialization becomes more evident to assure some production stages [11]. In the crisis conditions, the trade with intermediate products developed [11]. Sometimes the value chain supposes to realize some specifications required by the buyer [9]. When the product is standardized it can be produced in any quantity and needs less marketing communication since it is known on the market [9]. In comparison with this, when the product is non-standardized, the producers make more effort to communicate the quality and speculate the buyers need [9].

To overcome the actual crises and create conditions for national growth the level of investments in research and development activity have to increase [6]. The competitiveness is linked directly to the investments level of research and labor education, but this could not be enough for economic growth [5]. The way in which resources are allocated could be as important as investments [6].

The advantage of investing in research is a premise towards a process of intelligent manufacturing where competitive advantages consist not in owning a new technology, but to possess qualified labor using that technology or in the company ability to hire the best researchers [3], [4].

The practice shows that new technologies are results of co-operations at the highest level, generated usually in clusters. The clusters quality depends on local governments to create and develop proper conditions and favorable policies in supporting these [12]. Research policies have to assure mechanisms of co-operation between public and private entities considering industrial priorities.

The competition in international trade forces states to adopt measures for implementing good conditions for the new technologies [13].

There are two ways for a society to prosper: working harder for long time or innovating which is sometimes better [14]. There is a direct link between new discoveries and national economic prosperity [14].

New discoveries require very high level of research and development (R&D) activity that are interdisciplinary, capital intensive and need high qualified labor [11]. Generally, they are created in small or medium enterprises organized in clusters, but because of huge investments they require the presence of large companies [11]. From the conceptual point of view, these new discoveries are called "key enabling technologies" or simply KET's and they have a key role for the future competitiveness of nations offering high level job employment with national impact [11].

There are six KET's as: nano and bio-technology, photonics, advanced materials, microsystems and advanced manufacturing systems [11]. This paper focuses on nanotechnologies.

Nanotechnologies are born officially during the '60's and they refer to designing, producing and using nanostructures at the molecular level with dimensions less than 100 nm. The structures build at this level have electrical, magnetic, chemical, biological and optical properties much more different than those at the macro level [11].

In 2010, the discovery of graphene marked the start of a new era. Its bi-dimensional structure of carbon atoms offers mechanical proprieties never seen before, being in the same time electrical conducting and transparent [15]. As a part of nano-world, this new scientific advance seems to be the most trustful discovery in the last years. The hopeful side of nano-technologies is that they can be applied to all the existing industries.

III. Is It Worth Investing in Nanotechnology?

All over the world, the governments invested huge to

support nano-scientists and their projects. As the reality shows, for the most industrialized countries, the nanotechnology field seems to be very attractive and receives special attention and policies dedication even it is about small length scales. The international competition between governments moved to another dimension were only the quantity of investment in new technologies matters, and where the expected effect will be seen somewhere in the future. Out of all new technologies, the nanotechnology is "spoiled" by receiving important trust and hope. Developed countries supported as a priority the funding for R&D from different sources and this became a global trend in the last decade.

From 2000 to 2015 governments around the world invested 67 billons USD in nanotechnology, but if the corporate or private sources will be considered, the amounts could reach 0.25 trillion USD dedicated to this field [16].

From 2007 to 2011, under The Seventh Framework Programme – FP7, 1400 nano-projects received 2560 millions of Euro from a total of 19000 projects financed with 50.5 billion Euro [16]. 896 million Euros were dedicated to Nanoscience, Nanotechnologies, Materials and new Production Technologies – NMP- where 238 projects received these amounts [16]. With these investments, the Europe is at the same level with United States and Japan [16].

Taking into consideration all these, the first question is: why nanotechnology receives strong support in comparison with the other KET's? The answer could be simple since the nanotechnology is spread to all the other new technologies. In this way biotechnology meets nano-biotechnology and nano-medicine, micro-systems incorporate nano-electronics, photonics are based on nano-photonics, advanced materials are build from bottom-up by assembling nano-structures Lego-like molecular building blocks [16].

Everything has the right explanation until the results are analyzed. When it comes the moment of the truth the effect of all these efforts is not seem as optimistic as before.

In 2011, more than 1500 nanotech companies were identified [17]. 478 companies received support from FP7 – NMP [17].

The nano-market could not offer a relevant statistical data, since many of the discoveries are not mature enough to be lunched on concrete commercial offers and on the other side, it is still difficult to pick-up the accurate information from the companies involved. That is why all the reports and case studies measure this field through the number of patents and number of publications.

The nanotech reality in Europe after an intensive investment activity is reflected in the following table by the number of companies, patents and publications.

The Table I comprises the number of publications from 1998 until 2009, the number of patents from 2000 to 2010 and the number of companies in 2011 [17]. As it can be seen the top of the field is composed by Germany, UK, Italy and Switzerland, but Germany is by far the leader in Europe. At the first glance, this table does not reflect a dynamic commercial reality since the patent can be passive as a potential development into products and may remain like this forever, instead of becoming active, through an existing product. The patent is a first result of research, but its real value matters only when it is found somehow on the market: as final product or industrial production process. Also the number of publications does not reflect in itself the value of the patent, depending directly on the scientific enthusiasm to the discovery.

TABLE I: NANOTECH VIEW FROM 1998 TO 2011

Countries	Companies	Patents	Publications
Germany	380	3730	6449
UK	230	942	2688
France	140	998	1491
Italia	90	130	955
Sweden	80	224	816
Switzerland	80	314	1031
Netherlands	70	720	650
Finland	40	75	494
Spain	40	14	409
Belgium	30	110	319
Denmark	20	70	191
Norway	20	0	0
Austria	20	87	590
Other UE	200	83	1360

It is important to emphasize that some sectors were more attractive for publications as is the case of energy sector, whereas others were patent intensive generators like chemicals and materials. From 1998 to 2009, the energy sector attracted more than 524 published articles and chemicals and materials registered 4669 patents. On the opposite side, the textile sector showed less attraction with only 60 published articles and 90 registered patents [17]. The studies show an optimistic view of nanotechnologies actors, but in the same time they reveal that nanotechnology is not the principal source of their revenue, even if this activity grew in the last years that is why the table does not contain turnovers for nano-products, an essential information for a complete picture of this field [17].

The most relevant impact is on information and communication technology (ICT) and security sectors, while the most reticent are textiles companies [17]. The main obstacles that slow the effect of these concerted efforts are: technological immaturity in terms of technological features of production, high price products resulted through these technologies, low demand from public and finally environmental, health and safety aspects due to the processes used.

In the near future, Horizon 2020 will allocate 80 billion Euros for innovation and future and emerging technologies. 1 billion Euro will be dedicated to grapheme, the so called the material of the 21st century [16].

Looking to this picture, another question arises: is it fair to continue to invest more and more in the name of an uncertain future and with very little impact on present?

This paper proposes a positive answer based on three-dimensional approach to this question through a descriptive analyze based on available database supplied by the European case studies, reports and literature. Through a careful comparison, behind the euphoria of what will be, the studies reflect a part of reality as it is.

A. Nanotechnology Proves Its Validity for the Present, but First Traditional Industries Have to Become Obsolete

Avoiding speculations, the hidden parts of the above affirmation is reflected from the analyzed case studies [18] .

Reference [18] shows that value chain of nanotech products has the following segments: first comprises the producers of raw materials; second, the companies using nanotechnology raw materials that develop intermediate products at nano-scale levels; many of the second level of the value chain are start-ups; the third level is represented by larger companies that develop nano-enabled end products based on the intermediate products. Nanotechnology has potentially a large range of intermediate products applications [18]. These applications are intermediate inputs to products or systems or business to business products [18].

The value chain is interrupted by the missing demand of the nano- products. In this way the entire architecture seems incomplete. Why to fail at the end?

On one hand, the explanation could be real and acceptable. Beyond the great benefits of nanotechnology, there are major knowledge gaps regarding the adverse effects on human health and environment [16]. Since 2004 the European Union pledged for an "integrated, safe and responsible" approach to nanotechnology [16]. The race to get nano-products could not affect the confidence of the consumer and for this a more transparent system for sharing best practices and testing the nano-products has to be designed. The strongest pressure is from nano-medical field. Nano-products can enter directly into contact with the human body (such as textile) and some potential risks may exist. For this reason special measures are required to improve the public awareness and acceptance of the nano- products [17]. After lots of interviews, companies do not feel that public is well informed and the fear of misunderstanding is strong enough [18].

On the other hand, the value chain and the production of nano-products meet some obstacles like re-production process (scalability) is expensive and the quality is difficult to be compared since the products are almost unique [18]. Generally the small and new companies try to enter into value chains to promote intermediate products that often present better quality than traditional ones, but because of the poor scalability, this could be a barrier to access the value chain [18]. When this barrier of poor scalability is overcome, the competition with traditional products starts. The studies do not reflect a clear difference to commensurate the old and new product [18]. In fact there are some major interests and fears that nanotechnologies could replace the traditional materials or other products and this could erode revenues for companies already existing on those markets [18].

Whereas traditional models of innovation are based on incremental technologies, the nanotechnology is often a discontinuous one [18]. The studies show that the large companies apply to an incremental innovation, whereas new and small companies develop and implement discontinuous technologies. This could be another explanation for the reason why the large companies have interests in recuperating large investments and keep the activity as it is for a while. Nano-based companies act as an extension of traditional manufacturing ones and sometimes they can affect competition in many ways [18].

New products and materials replace some of the existing products [19]. Companies migrate under new conditions to new links with more specialized roles into the value chain [4]. Nanotechnology opens huge opportunities to collaborations with new groups that will guide to new competitors [19]. This is another explanation for affecting the existing businesses. Besides nanotechnology may play a key role in upgrading traditional industries this process could seriously affect by adding new functionalities and value to the final products [18]. When technologies are very new with no connection to the past, they could create better products with characteristics that can easily replace the existing ones.

The standards for new products sometimes are difficult to be created since the consequences cannot be anticipated; the procedures take time and when the products are ready to be sold, their technological time could not be available any more. During this process, traditional products and producers are in advantage.

In their short existence, nano-products or nanotechnologies demonstrated their potential in creating competitive advantages through better characteristics of products or processes and this could be an important reason for the states to continue to invest in nanotechnologies.

B. Nano-Industries Are Created and Controlled to Be the Industries of the Future

The entire literature about nanotechnologies presents them as the technologies of the future with important impact on our lives and giving answers to the main societal questions. If the investments until now reflected a great quantity of ideas, the perspective of the 2020 focuses on transforming the ideas into commercial products.

The most optimistic visions show that every industry will be impacted by nanotechnology. Healthcare will be focused on individual treatment, physical injuries, drug delivery and antibacterial bandages [16]. Cloths will become smarter and better, monitoring vital signs, supplying energy for personal devices, offering extreme temperature resistance, improving protection for military personnel acting in difficult conditions, offering self cleaning and water resistance [16].

Nanotechnology will support the power supply system from lighting system to supplying energy directly from an inside-home source [16]. Cables will be replaced by nanotubes [16].

Everything from home, office, public buildings will find place for nanotechnology starting with insulation, thermochromic windows or energy-generating facades [16].

Petrochemicals will be replaced by new generation of nano-catalysts that will allow a suitable industrial process [16].

Smart cars will absorb nano-energy through nano-materials [16].

Heavy industries will be replaced by nano-process using less energy, less raw materials and friendly environment [16]. Finally, nanotechnologies mean less pollution and lower emissions [16].

All this euphoria and promises to transform current technologies invisibly with a low impact on costs push the governments to invest and support this imaginary field that every day starts to become real [16]. Taking into consideration the targets established by international organizations for the near future, the potential of the new technologies could be a huge chance to generate new solutions. For example according to the International Energy Agency until 2050 for limiting the climate change to 2^0 C, 36 trillion USD will be needed to invest. On the other side

European Union pledged to reduce until 2020, 20% of emissions [16]. All these and adding new ones as grand challenges faced by Europe like ageing population, sustainable food and environment, intelligent and safe connected world could be a strong reason to continue the investments in creating the proper infrastructure. In the near future all the estimates show impressive figures about trillions of Euro in turnover for the nano-products [16].

Generally, people with vision could understand better than anyone the future and wait for 3 to 5 years for a new technology to enter the markets. Those states that decided to follow the global trend of nanotechnologies have enough patience and give time for achieving commercially solutions. New business models and environments are created, but everything has to be under control. New discoveries could not replace suddenly all that exists. The change has to be done step by step through a rethinking and adapting of whatever exists. A new cultural approach is required, but for the human being is a chance to receive exactly what really it needs.

C. Nanotechnologies Help Large Companies to Benefit from the State Creating a Leverage Effect

All the KET's are capital intensive without any exception. Bringing nano-products to the market requires substantial budget. Most of the innovation projects are under state aid rules. All the states policies were formulated to assure that the financial support does not distort competition between companies or states [20].

In Europe funding strategies like structural funds, public-private partnerships, grants, fees and public procurement were created in order to help companies and member states to bring KET's to the markets.

Structural funds offered solutions to deploy new technologies to new European Union member states as Poland, Hungary and Romania [20]. The public-private partnerships and funding helped big European projects as Christian Doppler Laboratories or Innovation Alliances in Germany [20]. The use of grants and fees helped research institutions of different initiatives as it was in the case of France where "Key technologies for Digital Economy/ calls for proposals on Nanoelectronics" supported full funding for pilot installations [20]. Another way was dedicated to sustain start-ups by creating conditions for public procurement.

At the national level strategies for nanotechnologies under big programs were implemented by synchronizing education, industrial projects and research clusters policies. New infrastructure architecture is on the way to be born.

Nanotechnologies can be created in very small companies with few employees or in very large ones where thousands of researchers are involved. The research activity is in-house, but collaboration with universities and "star scientists" are often habits to spread knowledge, especially when it is about small companies [18]. Small companies are focused exclusively on nanotechnology, while big companies blend technologies [18].

Due to their critical mass of researchers, big companies seem to be able to assimilate better nanotechnology discoveries [18]. Nanotechnologies may depend more on physical - tools, instruments or machines – than on human capital. This is another argument that large companies could be in advantage in comparison with small ones when it is about resources to possess proper assets [18].

In small companies, scientists themselves are the owners and founders. Generalist researchers are welcomed in this field, but it is not enough. The characteristics of the interdisciplinary approach and limited human resources can be an important barrier for small companies to create scalability [18]. Nano-based companies require technicians, engineers or other people with practical skills [18]. Recruiting personnel process is often done from abroad. Using foreign scientists or qualified people is more common among large multinational companies with global operations. Sometimes using domestic personnel can be a brake in the growth process and it is a characteristic of small companies that cannot afford recruiting the right people [18].

The role of small and medium enterprises in the KET's deployment is essential [20]. The small company does not have the ability to play at the global scale, but it can succeed with the help of a big company. In the world of the KET's and so in the nanotechnologies, the mixture between small and big could translate the research and development efforts into commercial products [20].

Linking all these ideas, even if the theory puts the small or medium company as the core of the new technologies, the large ones help to transfer an idea into the reality. It is obviously that big companies are absorbing the advantages from some of the players in the field and they are the real beneficiary from the state support through different ways.

When state implements co-fund programs the research activity of big ones meet this support [18]. Another indirect benefit from the state comes during cooperation between universities and small companies, supported in their projects at their return by the state. In other words, states offers support to some idea generators and then these will help big companies to become "bigger". At the first glance it could be nonsense, but behind this, the aid is leveraged to the entire society as a positive effect. Some of these efforts could be seen in the present not only in the future.

The characteristics of location have impact on knowledge intensive sectors [21]. Small firms develop in regions where there are qualified employees [21]. Large companies do not depend too much on external knowledge since they benefit from internal knowledge production as their own knowledge stock [21]. In this way, qualified people are more important for smaller firms acting in knowledge intensive industries than for larger ones [21]. Specialization in nanotechnology has a negative impact on employment [21]. As it was mentioned before, larger companies blend technologies and this could have a positive impact on employment [21].

The growth of the nano firm depends on the characteristics of knowledge [21]. The difficulty comes from identifying that kind of knowledge that could leverage positive effects on the market. Many of the companies could concentrate on the same idea for many years, but only some alternatives could be considered as a choice. Until then, paid jobs stimulate the ideas creators.

The European Union identified KET's as new opportunities for growth and jobs with great impact on future industrial competitiveness [20]. Creating competitive advantages aim to produce and create value added inside the member states.

The often argument of the state intervention in supporting KET's is to eliminate market failures [22]. On the other way, the intention in supporting competitiveness can find an interest to protect domestic enterprises or sectors, attracting foreign investors to produce and crowd out companies from abroad [22]. Many other non-European Union countries offer incentives to attract companies in KET's deployment. These last ones are major multinational companies with headquarters in the European Union, but operate at the global level. Recently, investing in Asia was very interesting, the main reason being the cheap labor, but when it is about new technologies, the terms of investors attraction move to a higher level [22]. Thus, Asian states offer incentive package consisting in grants for R&D and energy; soft loans with 0% interest; fiscal incentives and rent-free land [22]. In these conditions, Europe acts reactively despite of proactive behavior from other countries and it should make big efforts to keep the headquarters in Europe [22]. The reasons why multinational companies deploy KET's are sometimes justified. Barriers in implementing investments in Europe are generated by the state rules that cannot obtain attractive location package [22]. On the opposite side, the Asian countries offer this to boost their economic development through high-tech production.

In order to protect domestic companies and to foster knowledge inside Europe, important measures have to be created. As business, companies will always follow that direction which will be more fruitful and guide to success.

Now it can be well understood why states are in a race to offer important support to the companies. Even if this aid is huge and big companies benefit most from them, these are the most tempted to find new and better opportunities. The states are interested in attracting them to generate a local industrial, educational and research development success.

IV. Conclusion

Between all the KET's, nanotechnologies received the highest level of investments. The reason is that all the other technologies are based on and generated by nanotechnologies.

Governments continue to invest more and more in something that apparently do not offer the expected response. Many of the discoveries remain into the laboratories and the commercial impact is low or do not exist. Since the market indicators are missing, the number of patents and publications could serve in understanding where the efforts of so many years arrived. These indicators offer an overview of the research effort, but do not reflect the real market potential.

In the last decade, some sectors were more attractive in publications, other in patent registration, but in both cases, textiles did not demonstrate a real interest for researchers.

The focus of the paper is to offer an answer to the question: is it fair to invest more and more in a field where there are few results with market impact? The answer is on triple directions according to the time or social effect.

The first direction is that nanotechnologies could impact some of the existing industries. The value chain for nano-products is similar to traditional products, but it fail at the end, when it has to arrive on the market. Some real reasons exist depending on consumer's behavior, lack of information, existing health risks. Scalability is another obstacle to succeed, but when it is overcome, the impact on competition with traditional products could start and sometimes could undermine some existing products or producers. From the innovation point of view, large companies invest a lot in their technologies and they require time to recuperate and to earn from their efforts. New technologies could seriously affect existing technologies.

Another reason for investing in new technologies is that they are prepared to replace the traditional ones when these last ones will stop to exist. The entire literature, case studies or rapports present them as the technologies of the future or of the new era. They say that our entire life will be impacted by these technologies, but they will be implemented step by step, under control since a rethinking process of what exists is required. To create a very new infrastructure takes time and it has to be adequate to what will be. Another reason to a slowly implementation is the culture of the people that need time to accept the change.

The last reason to support the field of nanotechnologies is that the real beneficiary is the entire human society through the jump in terms of employment and competitive advantages.

Even if KET's are created in small or medium sized companies, for them to become a global actor, the involvement of big companies is needed. Big companies can offer market solutions and have net advantages in terms of assets, qualified labor, and immigration of personnel. States are interested to control market failure. In Europe policies have to be designed to attract multinational companies in implementing their headquarters in Europe and preserving the domestic companies. A proactive behavior is required following the model of Asian countries in terms of flexibility that are interested in boosting their economies through KET's.

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