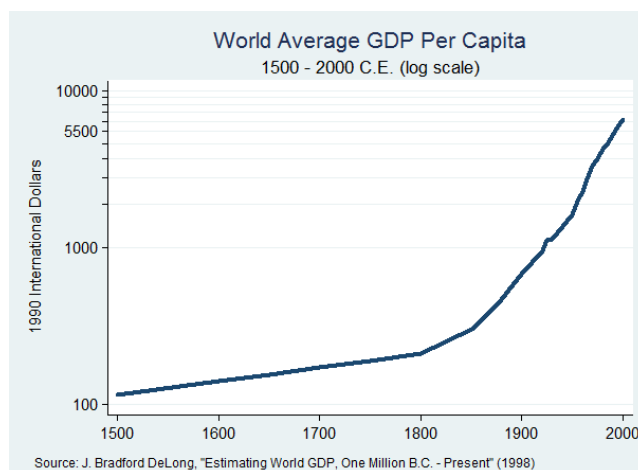


Innovation for the 21st Century

*Observe constantly that all things take place by change,
and accustom thyself to consider that the nature of the Universe loves
nothing so much as to change the things which are,
and to make new things like them.*

Marcus Aurelius

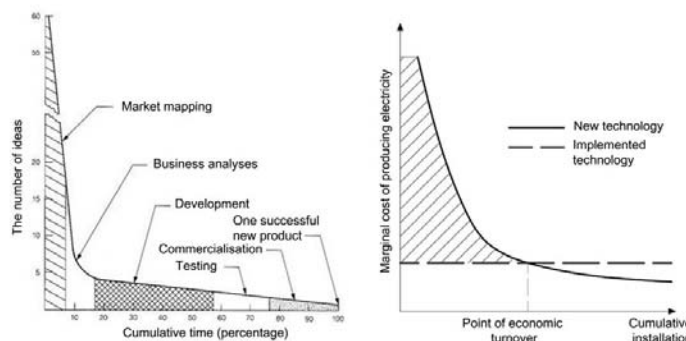
The main driving force of society during the 20th century was rising citizen's standard of living. Never throughout the history of production had society reached such level of standard of living measured in terms of GDP per capita. This large economic output was achieved on both societal and technical levels. Development at the technical level supported the next development of the organization at the the societal level. This way technical development created the basis through which society was shaped and vice versa. At the end of the 20th century a New World Order was announced as a result of technical progress and economic impact. Much larger markets comparing to national markets were formed supported aggressively by development of IT technologies, like internet and mobile communications.



Innovation is a special and very important part of a society's technical progress. Among many different definitions the basics of innovation can be expressed as a process through which economic added value is created. And it doesn't matter whether the economic added value is created on the market via extended sales, or due to reduced cost achieved within internal or external processes of supplier. Enhanced sales can be achieved by enhancing features or cost reduction of product or services provided.

Life cycle of the product and knowledge line

The so called knowledge line of the product life cycle differentiated processes between basic research, applied research and innovation. From the knowledge line it is a given that basic research and applied research need some investment and the research processes per se do not bring direct economic reward. In order to evaluate the reward of basic and applied research it is necessary to include it into innovation and answer the following questions:



Source:

Pierce II J.A., Richard B. Robinson Jr. Strategic Management Homewood Illinois : Richard D. Irwin Inc., 1988.
Stern et al. Stern Review on the Economics of Climate Change, 2006.

1. How many basic new ideas need on average to be generated in order to convert one into a successful product?
2. What is the dynamics of the process of basic research- development- innovation in terms of time span and number of basic ideas?
3. What is the impact of the dynamics of the research and innovation process on society?
4. What is the driving force of this research and innovation process?

Pierce and Robinson reported that during the seventies on average about 60 basic ideas needed to be evaluated in order for one to be converted into successful product (Pierce II, 1988). We also know that risk capital operates with a 1:5 probability of success which means that it represents the border between applied development and innovation. However at the the end of the first decade of the 21st century analysts found that today we need almost 300 basic ideas in order to reach the market with one successful product (Koulopoulos, 2009). Taking linear approximation it can be said that the

dynamics of the innovation process, attached to the process of basic and applied research can be estimated as 7,5 ideas per year. Innovation should reach the economic breakeven point where return of investment starts. There are only few important basic questions:

1. When will investment return?
2. How many times will the investment be returned during the product life cycle?
3. How is it possible to extend the product lifecycle and enhance the return of investment?

What does European history reveal, how does it relate to the dynamics of innovation and individual freedom?

The above dynamics shape society at the same time. In order to cover the ever increasing cost of research, development and innovation, it is not possible to collect such volume of human and financial resources on a national basis in order to successfully compete on the market. The 400 million citizen market is needed in order to cover the expenses connected with full product life cycle including basic research.

Here is what history teaches us. During the Renaissance period several separate towns like Florence, Venetia, Genova, Milano, Roma and Napoli in Italy drove the European economy for almost two centuries. These rich towns were so powerful that it was impossible to force them to create a larger market. However in Northern Europe even in poorer countries larger national based market were established. And the Northern European countries gradually overcame economies limited by town borders as was the case in Italy.

It is the product cycle economics during the second half of the 20th century and the desire for freedom which forced politicians to create the EU a much larger market compared to national markets that existed before. In order to create an effective labour market a new quality of individual freedom was implemented. Politicians adopted the idea of removing national borders and allow citizens to travel without any restriction throughout the Europe. The strength of different European cultures influencing each other for a common advantage did improve quality of life in terms of well being and wealth creation.

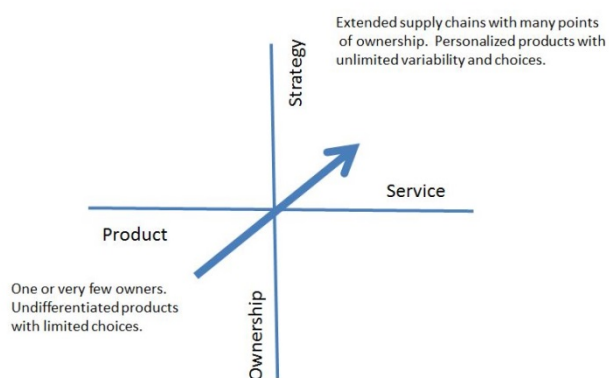
New results of basic research in the fields of mathematics, physics, neurobiology, psychology, sociology and economy allow us to better understand such phenomenon as individual freedom. Basic research shows that individuals are not making their free decisions, but rather their decisions are hardly influenced by external inputs coming from the same decisions made by many more people before an individual decision is made (Simon, 1955), (Ormerod, 1998). Our decisions are based much more on others' decisions than on our own analysis and evaluation (Ormerod, 2012). So the "free market" is shaped by cumulative results of decisions of many individuals taken before individual decisions. In order to find the right idea for a product this new knowledge coming from basic research should be taken into account. From this point of view the new economic approach is based on chaos theory with much more feedback information that regulate output rather than on linear mathematics.

The implication for policy makers is straight forward. Policy makers can effectively influence only strategic and mid-term decisions. The strategic level of the economy is to set up proper market functioning and its regulation. The intervention by means of market regulation can be evaluated as mid-term decisions. The chaos theory proves that direct influence of the market by government decision is more about illusion than reality (Ormerod, 1998). If all participants on the market know what their role is then the market will work very effectively for both the consumers' as well investors' advantages. But if participants on the market seek to influence the regulation in order to get higher rewards the market will lose its effectiveness and customers will pay the extra bill. The same can be observed if government steps in directly into the market. Effectiveness of the market is

going immediately down with consumers having to bear the cost. In such a case we are talking about negatively stimulated market in favour of selected investors and at the same time having customers support the cost.

Is pure competition on the market the best approach?

We know that competition drives the market. But are pure competitive relations on the market the best solution and if yes, for whom? Definitely, competition is the best system for winners those who after battle practically monopolize the market. In the short term it can have some advantages for customers as well. But if there is dominant position of the leaders the dynamics of the market fail and the cost of services and products offered generally increase. The main reason is that the force created by competition either decreases or completely disappears. Many studies from the market show that if the investment market level is controlled by one firm once the market reaches a certain point the effectiveness of the market starts to stagnate or fail. This is the reason why many industries have been deregulated in order to force competition. Basically firms cooperate on investment level either through direct ownership or indirectly through payments for the cost of infrastructure. Such approach shifts the market into a strategic segment which allows effective competition at consumer level of the market while still cooperating on common infrastructure level. The telecommunication industry is such an example. Infrastructure is now accessible for anybody who fulfills physical and logical interfaces and would like to provide services. This way end products used by customers are under very high competition. Only twenty years were required in order to get from the beginning of mobile telephones to such complex smartphones and tablets as are available on the market today.



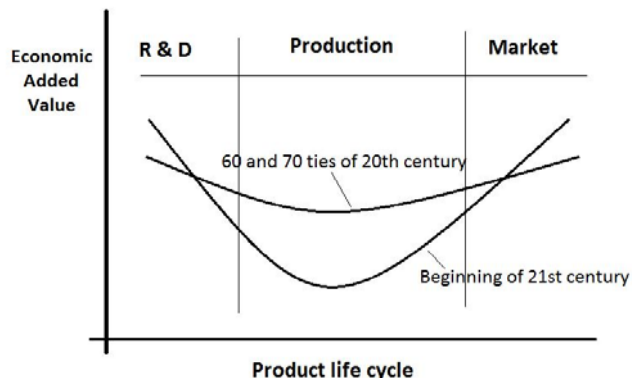
Anthropology studies show that humans are more cooperative than competition from the very beginning of our existence (Ridley, 1996). Cooperation on a large scale compared to other living creatures allows humans to develop their consciousness mind and extend it into the dynamic developing culture. Cooperation is an evolutionary advantage of the human race. The emotions of people accounted for into solutions of game theory show that it is necessary to set some strict regulation in order for market participants to follow a cooperative (altruistic) approach and at the same time competition (individual interest) principles force individuals to match common goals. Such organization of the market forces the dynamics of new services and products development while at the same time bringing cost down due to human and natural resources savings and financial resources as well.

Scarcity of natural resources

The scarcity of the natural resources seems to be main driving force at the beginning of the 21st century. Under natural resources should be taken into account natural processes which are used for renewing natural resources within real time of human economic processes. Recycling wastes as output of human economic processes are a part of it. It has been calculated that on average two thirds of the product or services circulating around the globe deliver nature and the rest is a value of human economic processes (Boumans, 2002).

Large and long lasting energy crises of the seventies were solved through innovation process based on IT technology. IT technology provided an opportunity to reduce the cost material and the energy component of many products while at the same time enhancing features in the form of a new product generation. Many times the use of IT technology allows researchers to make breakthrough insights into products and processes and with these new paradigms even create new markets.

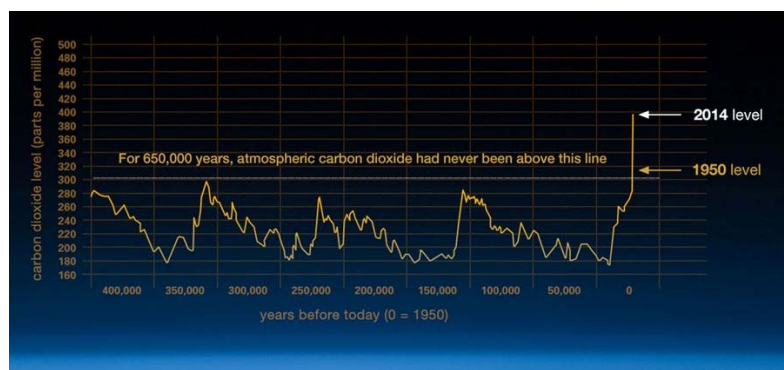
Market for smartphones is one example, home office market is another.



The energy crises of the seventies ended once the average energy consumption per GDP went down one half. New different markets were created as a result of new IT infrastructure. The solution also shifted added value creation within the product life cycle from the production period into innovation and market service part. It took society over 15 years to reach the point when it was possible to say that the energy crisis was over. Many of the products and features were shifted into intangible software solutions. Many of them were redefined or replaced by new quality features and services. It is expected that the impact of IT technology will remain during the next twenty years which will turn many services and products just into software based products. This will reduce the demand for natural resources including energy but also for human resources as well. The process of converting products and features into software based solutions will drive the productivity of work.

Challenge of the 21st Century

If we look at the present situation there are two main societal problems. Society crossed the maximum regulation limit of carbon dioxide cycle worth 300 ppm worked during the last 600 000 years. Since 1950 concentration of carbon dioxide crossed the 300 ppm limit and rose to 400 ppm in 2013 with no sign of slowing down. We can consider this as breaking the balanced breathing cycle of the Earth similar to human. The consequence is climate change.



Source: NASA: <http://climate.nasa.gov/evidence/>

It has been estimated that investment into prevention is twenty times more economic effective than to solve the consequences (Stern et al., 2006). A New version of the IPCC panel report indicates that this threat also creates an opportunity for the economy (IPCC, 2013) in terms of innovation which will bring human economic processes back within the limits of natural processes operated in real time. It has been pointed out that this could drive the economy of the first four decades of the 21st century. The economic drive could be seen in terms of transformation of society into a society based on clean energy.

However the basic research provides opportunity to explore also natural processes which heal human beings and will help with new approach to health. Once again a new paradigm based on our dual reality, material and waves, allows the creation of new measurements methods exploring also its wave part. It allows the creation of new quality of measurements and medical treatments as well it provides for much higher levels of work productivity of medical doctors.

New IT generation equipment and solution innovation in the medical field will introduce very fast so called personalized medical treatment. We now understand much more deeply human mind, consciousness and its relation to the biological body. It is understood that it is not possible to recover the human body without taking into account the human mind as well. This renewed knowledge allows us to find very effective solutions for better healing processes in the way of prevention rather than solving the consequences. Medical science once again is investigating already known body mind healing solutions from traditional techniques written in such valuable sources of knowledge like the Bible.

Both mentioned processes, transformation of society to an economy based on clean energy and personalized healing will provide new and better quality of life while saving at the same time scared natural resources.

In order to achieve the goals of the 21st Century we have to explore possibilities given through better market organization which should deliver more effectiveness and will be the source of cost reductions. At the same time new market organization supported by technology should raise the dynamics of the process of market development and enhance the number of product and services provided.

All that is mentioned above has one common feature:

1. We have to understand how their system created nature either on physical, biological or societal level.
2. Once we understand them we can use the same principles in order to explore it in favors of human economic processes.

And this is the basic idea which has been already expressed by Roma emperor Marcus Aurelius in his famous Meditations.

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