Digitalization and the global technology trends

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Abstract. Digitalization, connected products and services, and shortening innovation cycles are widely discussed topics in management practice and theory and demand for new concepts. We analysed how companies innovated their business models and how are the new the technology trends. We found out, that have a positive approach to digitalization but the technology strategy still runs its original business model. Digitalization forces to new solution orientation. For companies it is necessary to master the digital transformation, new innovations have to be developed. Furthermore, digitalization / Industry 4.0 linking the real-life factory with virtual reality, will play an increasingly important role in global manufacturing. Companies have to obtain new digital capabilities, in order to make their company sustainable for the future. A long term growth and welfare in Europe could be guaranteed only by new technology innovation.

1. Introduction

The world of companies is marked by high dynamic and complexity as well as globalization of competition and digitalization. The intensity of competition increased much in the last years due to increased opening of national borders, the expansion of multinational companies and digital networks. Therefor the economic result of the companies depends on their innovation capability.

In the highly industrial developed countries, innovations are responsible for half of the economic growth and therefore of great macroeconomic importance. The innovation capability is not only a success factor, but also a business necessity. It provides decisive competition advantages and prevents suppression from the market. [1]

As result of globalization, of shortening innovation cycles and increasing invention costs as well as industrial digitalization, the diffusion of innovation increased. Many companies must develop more and more products in shorter time. The innovation cycle for example at Notebooks, Smartphones is at about some months.
The Chinese competitors need today, for many products only some few months to develop an imitation at cheap price and put it on the market [2].

The importance of product innovation protection by trademark rights becomes more and more important for companies with future oriented thinking, in order to amortize the investments made in research and development. Only those companies who protect their new technological developments effective by patents, trade marks, utility models or designs can achieve economic advantages against competitors. Innovation without suitable protection strategies cannot be afforded today by any company. Innovations become more important for technology intensive companies, in order to secure their lasting position in the global competition and to generate new growth opportunities for the future.
Due to decentralization of competence centres and digital networking, the complexity of innovation processes has significantly increased. The use of modern information and communication technologies provides new possibilities, for example Internet-innovation networks, that are targeted base for research cooperation. Many problems could be solved more efficient and time saving with Crowd-Innovation, if it is online outsourced to an user group. The teams work with Scrum will increase – a form of project management, based on a few rules and flexibility, instead of using an overflow of planning and documentation. As a result the enterprise structures and hierarchy will be changed. Internal social networking, as well as workshops, roadshows, open spaces, digital life days will boost the culture of innovation increasingly and promote an independent inventive thinking.

The present challenges for companies are complexity and dynamic as well as investment costs and digitalization. Companies with future looking try to gain advantage by innovation. The newest trend in some areas is to provide individualized products adapted to the respective clients. Other innovative branches try to create lasting differentiation advantages and to refresh the products constantly. The products are orientated on the changing requirements of the clients. On this matter many companies have still to respond.

According to statements of the World Intellectual Property Organization, The Business School Insead and Johnson Cornell University Germany is placed on rank 10, 2 places in advance compared to last year, in the global Innovation index 2016. This points out that that German people take more active part in invention and implement better their ideas in marketable products. On top of the ranking list of the most innovative economies of the world continues to be placed Switzerland. The confederation holds this top rank for the sixth consecutive year. On position 2 to 5 follow Sweden, Great Britain, The United States and Finland. China is placed for the first time in top 25 nations. India and Brazil are situated on position 66 and 69.

The study considers as causal favourable the good cooperation existing between companies and the German universities and research centres and the fact that small and medium companies invest in new technologies. A relative weak point in the innovation ranking for Germany is the foundation of companies [3].

The number of new foundations is continuously decreasing in the last 20 years. The World Bank checked which countries support the Start-Up-Culture. Germany landed on place 107 among 189 states, after countries like Tajikistan, Colombia and Senegal. Due to the fact that the newest technology revolutions come from Start-Up-Companies, Germany has to catch up as soon as possible, in order to be able to develop also here, guiding technologies for the future.

2. Methodology

In this article, we study how companies innovate and adapt their business models and what are the new the technology trends.

The increased digitalization occupies with its effects private households as well as companies. In order to be able to react in due time to the changes, it is necessary to have a culture that is open to changes and to revise the thinking. Almost all companies are affected by it and switch over to a digital networking. Innovative ideas, courage to new invent of oneself as well as affinity to invest in the digital change, are now demanded. Experts speak about industry 4.0, the fourth industrial revolution after steam engine (1.0), electrification (2.0), and computerization (3.0).

The digital change is to be found everywhere and revolutionizes the entire value creation chain. New innovative products are developed and new business models. So companies are forced today to think over their strategies completely. The integration of IT in the production processes causes decisive modifications, special regarding the work and enterprise culture.

The economic growth and the prosperity of industry nations are more and more dependent on the technical progress and on innovations. The problem is aggravated by the networking: how is it possible to prevent that the expensive developed technical functionalities are taken over by competition? The digitalization forces to new solution orientation. Because not only growth and
success of companies depend on their innovation capacity, but in many cases also the general continuity to exist.

Good chances to survive have companies that are based on strong innovation capacity and are able in due time, to track down the present market and technology trends and to advance in development of corresponding solution ways. In the present knowledge – based society, it is of great importance to recognize the trends in right time and to find the corresponding technical ways to reach a solution. It is important to anticipate which technology trends are to influence in the future the products and services for the client, in order to develop new solutions in right time. But the classical methods are no longer sufficient, therefore new Big Data-Analyses and different Cluster are used, in order to recognize early the new trends.

The digital transformation puts the companies in front of basic changes. Many companies were already seriously concerned about this matter, because we can see how many innovations were able to displace well-known products from the market. In order to correspond to the demands of the new digital economy today, development that reach different areas is needed. Scientific areas merge more and more. These interdisciplinary research works open up a great potential for new development for the next twenty years.

The world has arrived before a radical change. In a few years all machines that surround us will be connected by internet equal if it is about the own car or production plants. To maintain the development speed and to handle the change from the mechanic-analog world into the digital era, it will be important to create a digital culture. One must innovate more quickly and produce market orientated solutions, to remain competitive against other competitors.

Many companies did consider the digitalization as a chance and are concerned to advance into the digital change. Because these companies are going to bring on the market intelligent new products and services, controlled by digital components and to stand out from competitors in this way.

Through this network, companies will be able in the future to improve internal processes, to optimize the production plants and to reduce the production costs. In this manner it will be possible that entire industry branches, that produce today large amounts of products in low priced earning countries to be brought back to Europe. Digitalization will help to conquer new markets as competitors, by producing more efficient and cheaper products. As hard as it sounds, investments and digitalization will cause that people even in low salary countries will become "needless".

For development of new ideas more companies put accent today on cooperation with science, to be able to offer innovative products, market oriented solutions and services for the world of tomorrow. Therefor many companies search for protection of their own innovation capability, contact to universities, faculties and research institutes and this mostly on regional area. It is also important to build targeted research cooperation, special with research institutes. Because this scientific connection will be more important in the future.

Also the targeted cooperation with external research and development partners to complete in short time different areas of competence will increase in importance. The newest development and research activities of competitors and external partners to be known as well as the newest trends, will have a decisive role.

In the future innovative ideas will occur more frequently due to cooperation of different partners. These partners could be research groups from universities, who examine the new ideas in an early stage regarding their practical suitability and also business partners who are different parts of the creation of values.

3. Findings and Discussion
Globalization, technological innovation as well as digitalization and increased products, capital and people circulation are the most important long term growth drivers. New digital systems bring huge advantages to the people. First they ease and support people by creating more space for creativity and development of new strategies. Then appear new chances for man. Because a man can do more than a machine. Man can act more intuitively in commerce, cross thinking and take quick decisions.
However through digitalization and networking appear also new challenges like risk of perturbation in the delivery chain. If such perturbations appear, they can cause wide circles and risks may spread out in a chain reaction. Therefore our society may be susceptible to such risks, which may increase because of existing interdependence worldwide.

The last decades were a phase of outstanding quick technological changes. The innovation speed increased continuously and this acceleration is to be continued.

The effects of digitalization and of therewith developed new technologies will penetrate all aspects of economy and society; because the technology change will influence the economic growth more. New digital opportunities open up for continuous development and improvement of products, processes and services.

Robots become more important for production. Today already millions robots are used in factories, but in the coming years they will be used on a larger scale. Small and medium sized companies will increasingly use industrial robots. This fact will cause an important increase of productivity together with decreasing prices. Therefore is expected to occur a return of production capacities from abroad back to Europe.

However the rapid expansion of new technologies by networking, makes difficult for the companies, to keep the competition advantage. According to statements of the International Federation of Robotics IFR, robot sales increased in 2015 by 15% to 253,748 units, again by far the highest level ever recorded for one year. The main driver of the growth in 2015 was the general industry with an increase of 33% compared to 2014, in particular the electronics industry (+41%), metal industry (+39%), the chemical, plastics and rubber industry (+16%). The robot sales in the automotive industry only moderately increased in 2015 after a five year period of continued considerable increase.

China has significantly expanded its leading position as the biggest market with a share of 27% of the total supply in 2015. With sales of about 68,600 industrial robots in 2015 – an increase of 20% compared to 2014 - China alone surpassed Europe’s total sales volume (50,100 units). Chinese robot suppliers installed about 20,400 units according to the information from the China Robot Industry Alliance.

There are five major markets representing 75% of the total sales volume in 2015: China, the Republic of Korea, Japan, the United States, and Germany. Sales volume increased from 70% in 2014. Since 2013 China is the biggest robot market in the world with a continued dynamic growth. China will remain the main driver of the growth and will expand its dominance. By 2019, almost 40% of the global supply will be installed in China [4].

In Europe in 2016 was medical technology once again the field where the most applications were filed, despite a slight drop. The strongest growth from among the top fields came from Electrical machinery/apparatus/energy, followed by Transport and Computer technology (an increase of 2.9% over 2015). Pharmaceuticals and Organic fine chemistry saw the greatest drop in the number of applications [5].

Global competition requires continued modernization of production facilities. In the future, the production will occur by digital technologies self organized and extensive automated. So for example the machine will be connected with the client and the supplier and can independently order necessary parts for the next production stage. Today already the component pieces come to many producers from 3-D printers, which cause an important reduction of delivery and transportation costs. These are changes that the companies have to deal with during digitalization. In advance there is a new generation of learning robots, that are interconnected and can exchange data directly, so that perturbations are reported in an early stage and failure times may be reduced. Also the cooperation between man and machine is optimized. Due to artificial intelligence and sensor technic in the production, the robots become more flexible assistants.

4. Conclusion and future research

Digitalization forces to new solution orientation. For companies it is necessary to master the digital transformation, innovations have to be developed. The study elaborated by Mc Kinsey&Company in
year 2015 on “Industry 4.0” showed that only six from ten German companies have a positive approach to digitalization.

Technologies for robotics, artificial intelligence as well as Big Data, infrastructure and security are key technologies for digitalization and decisive for networking.

New data show that the globalization that boomed in the years 2000, is slowing down for some years and that the economic interdependence is decreasing. For example Adidas was a pioneer. Already in the early 1990 years the enterprise suspended extensively the production in Germany and produced instead in low salary countries. This reached China, Indonesia, Vietnam up to Argentina or Mexico. But now the sports equipment producer intends to come back to Europe. Already in autumn the first running shoes fabricated here should be on the market.

Many economy specialists prognosticate that the era of globalization stands before its end. The economic exchange between states stands still, partly the development will be turned back. This depends on one side on the political evolution but also new technical possibilities contribute to this.

Adidas could be a pioneer again. Through new technological evolutions, shoes are to be produced completely by robots. The consequences are that orders could be finished in shortest time and close to the order place, so that long distance transportation will be avoided. Moreover the costs are lower compared to hand made products in Vietnam. In many other branches the new technology of 3-D printing process allows a similar evolution [6].

Innovative technology remains one of the most important business growth factors. Technology decisions are of central importance to firms focused on innovation. Research and development has provided support for a wide variety of approaches to technology decision making. This proliferation of approaches, however, means managers face the challenge of choosing the right approach for a given decision. Industry 4.0, linking the real-life factory with virtual reality, will play an increasingly important role in global manufacturing.

Those companies, that loose now the connection opportunity, will not be able to catch up the backlog and risk their decline. Companies have to obtain new digital capabilities, in order to make their company sustainable for the future. A long term growth and welfare in Europe could be guaranteed only by innovation. The digitalization did start already and with it the future of innovative companies, too. Future research could address how connections between different business models innovation and the new technology trends, in particular digitalization. Additionally, it could be of interest how managers identify threats and chances for their companies, what suggests the application of the attention based view on this research topic.

5. References
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