

NATIONS AND FIRMS ON THE WAY TO INDUSTRY 4.0

1. Fourth industrial revolution as a current stage of postmodernity

Since the beginning of human history the progress has been influenced by natural phenomena mainly. One of the key milestones for our civilization became undoubtedly the end of the last Ice Age 12,000 years ago. That led to the emergence of important civilizations, the emergence of knowledge and culture and last but not least boom of towns. This development, however, was very slow and lasted for a long time. Then there were undoubtedly important discovery overseas trips strongly emerging from the 16th century and starting period of Modern Times in Europe. It brought to Europe new natural sources and wealth.

A radical change occurred in the second half of the 18th century, when the forces of nature were added by the power of technology. Since the invention of mechanical loom and steam engine in late 18th century the beginning of the Industrial Revolution, human society began to develop more dynamic than never before.

Two hundred years later, in the late of 20th century, the wave of digitization appeared and the growth curve has obtained the exponential shape. Digitalization and its societal impact are presented mainly by technicians and economists, more recently also by policy. But this technological footprint in history is also reflected by historians and sociologists. They understand it not as a new stage but as the following one with special meaning. This stage mostly covers the term of postmodernity. The publications of sociologist describe this “post” period that appeared in last decades of the 20th century. The good example is books a book “World Risk Society” (Beck, 1998) or a book “The Consequences of Modernity“ (Giddens, 1996).

Students in the last century learned only one industrial revolution. But the IT development in 90s brought the new division of history. Newly there were determined the first and the second industrial revolutions followed by the “information revolution”. First industrial revolution was based on steam engine and the second one on electricity power, cars and planes, incl. mass production. The information revolution meant the development of production, products, services and way of everyday lives influenced by information technology (IT).

The unlimited paradigm of IT specialist and their trust in the further future progress are much more positive compering with perception of sociologists and historians. The ambitions of IT and technologists are more open towards future. They also have a tendency to interpret the progress of the whole society and they use ways of thinking and their tools for that. Therefore they describe the current era like the industry 4.0 or they speak about the 4th industrial revolution.

The term industry 4.0 is very often used and there are many publications on this trend 4.0 and prosperity based on technology. The book "The Second Machine Age" (Brynjolfsson and McAfee, 2015) is one of them and is dedicated to progress and prosperity in an era of high technology. The authors also consider how new digital technologies will affect human society in the future. They also discuss the pros and cons of human co-operation with the robots.

2. Industry 4.0 at level of national economies – strategies and readiness indexes

National strategies towards Industry 4.0

The industry 4.0 is significant phenomena today not only at the firms and their management. It represents also the important efforts at the national level. The good example is German government. The German Federal Ministry for Education and Research offers 183 different documents to this topic at the moment related. There is for example a project of future “assembly 4.0” among them that was awarded as the project of the month of 2016. The industry 4.0 was also proposed and adopted as part of the “High-Tech Strategy 2020 Action Plan” of the German government (Recommendations, 2013). The expectation is the general growth of Industry 4.0 in Germany till 2020 1,7% each year – mainly in chemistry, manufacturing, ICT and farming branches.

The similar steps were done in other industrial developed countries like the USA - in “Industrial Internet” document (Industrial Internet Consortium, 2014) and China in “Internet+” (Li, 2015) document and in the ambitious plan “Made in China 2025“ (Kenedy, S., 2015) where the Chinese government declares her that the country aims at the Industry 4.0 implementation.

There is important that the Czech government also strongly support this global strategy in “The national strategy Industry 4.0” announced in September 2015 (National Initiative, 2015). It has been prepared and guaranteed by the Czech Ministry for Industry and Trade and not only technological trends are elaborated. The changes at the labor market are highlighted as well.

To describe preparation of nations different readiness indexes are used. The one of them is the NRI (Networked Readiness Index) used by world economic forum in the Global IT Report printed every second year (Global Report, 2016). This index represents summary of 51 partial indicators reflecting preparation and use of IT in each country. Newly the NRI is also used for the Industry 4.0 Readiness Index where the second axis represents a portion of industry in the GDP of evaluated country.

There many surveys oriented on industry 4.0 penetrations. These surveys are done at the global level (Infosys, 2015) and also on the national level (Eiseret, 2014 and Perspective, 2015). The survey done by the Infosys (Infosys, 2015) analyzed more than 400 companies in industrial high developed countries – China, France, Germany, the United Kingdom and the United States. It shows the maturity level of industry 4.0. China is described here like the leading innovative country among five analyzed (China, France, Germany, the UK and the US) and has highest percentage of early adopters (57%). Germany is on the fourth place with only 21% of early adopters.

Industry 4.0 at firm level and their readiness

The industry 4.0 has penetrated very fast even into the firms level – both firms and consultancy firms. The consultancy firms have started with preparation of different studies dealing with Industry 4.0. The good example is the company Roland Berger. They discussed various initiatives to address this trend and analyzed social changes that occur through the fourth industrial revolution (Roland Berger, 2016). The “Big Four” consultancy firms also address the Industry 4.0 issue. The survey of more than 2,000 respondents from 26 countries done by the PwC analyzed in 2015 and 2016 how exactly the company is dedicated to Industry 4.0. The firm Deloitte is the study deals with the clarification Industry 4.0 and outlines its four main characters.

The authors of this contribution have analyzed the Industry 4.0 readiness in selected Czech and Polish companies and the results will be available at the conference.

2. Open questions of interdisciplinary aspects of Industry 4.0

But the “4.0 wave” is even bigger because it does not hit only manufacturing area. The “4.0” principles penetrate also in other area like farming and education for example. The term “farming 4.0” - digitalization and ICT in agriculture and farming – means that agricultural machinery and the world of farming are no exceptions to the further penetration of the ICT (Report, 2014). It can be imaginable like precision farming and virtual testing for example.

Last but not least example is higher education process known as the Alma mater 4.0. The reason for the Alma Mater 4.0 is the new situation for the universities. They will be in the near future for the first time in the position when they will accept students from the new generation that has grown on the ICT tools mainly (both at home and at school). The growing importance will thus have the former trends of Massive Open Online Courses (MOOCs) applications.

3. References

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