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INFORMATION STORAGE - GREAT CHALLENGE OF MANKIND

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Abstract

Humanity has long sought to store information. The development of the digital economy and society requires quick access to and the storage of information. A static system (library-like storage) is no longer sufficient for the storage and processing of the increased amount of information, but dynamic processing is required which can be achieved with computers. Development calls for digital literacy, which must be interpreted as one of the most important knowledge of the emerging generations. For those who cannot keep pace in this field the world will soon become unliveable. The spread of computers multiplies human opportunities. Nowadays, we do not yet see clearly where the presented processes lead, but their significance in development is indisputable. The generation currently growing up already lives in the digital world, and the world will certainly change in this direction. We must increase our knowledge in this field to be able to cope with the challenges. The rapid growth in the capacity of data storage devices is the result of the increased competition and further success can be expected.

Keywords: *information, innovation, digital economy, data storage, data processing*

JEL classification: *032*

1 Introduction

Throughout history the question of how mankind should handle the accumulated amount of information is raised again and again.

The Big Data phenomenon refers to large amounts of accumulated data in various information systems and the structuring of these data. (CSIZMADIA, 2016).

This phenomenon not only means an increase in the amount of data, but also basically transforms information management. Large databases have three important features:

- the first is the amount of data;
- the second is the diversity of data, the diversity of data types and resources;
- the third property is speed, which is, on the one hand, the speed of data generation and the time available for recovery.

The phenomenon can thus be described by the emergence of rapidly growing and multiplying data masses characterized by enormous variation and complexity, which should be utilized within a short time (BÖGEL, 2011).

Processing huge databases can only be successful if serious technical conditions are met. Data processing is growing in data centres in so-called "cloud computing" (DOCTOROW, 2008; DÖMÖLKI (edit.) 2008).

Today, we are experiencing the industrial revolution of the data, from business life to the scientific life, from state administration to art.

Development is dazzling. It is estimated that by April 2025, as many as 4.4 million data controllers will be required worldwide, of which 1.9 million jobs are expected in the US. The industry grows by 10% a year, twice as fast as the industry as a whole (CSIZMADIA, 2016).

Data and information are therefore appreciated, so the most important resource of the economy is not a physical resource, but people's ability to innovate and adapt in the near future.

The need for the future is to increase the qualification of human resources, and we must strive to achieve it (MAGDA R., 2017).

Today's competitiveness-enhancing trends focus on knowledge, innovation and human resource training. All this means is that we have to think about the measurement options according to the changes (LENGYEL – FENYŐVÁRI, 2010).

The postmodern regional policy seeks to activate the internal resources (regional, social organizational, cultural, environmental, and economic) instead of redeploying resources and exploring new opportunities. The development is conceived by acquiring information, extending knowledge and innovation, and developing contact nets.

Today we have entered the era of the Fourth Industrial Revolution, the age of the robots, leading to an unpredictable future. Innovation and technology are developing very fast. The production of data has been excessively accelerated.

R & D and innovation are the basis of competitiveness. Competitiveness appears in many authors' work (LENGYEL, 1999; BOZSIK, 2003; CSETE – LÁNG,

2005), in which authors find that a universally accepted definition is not yet available.

2 Data and Methods

During this work the development of human resources, the growing role of data storage and future opportunities are examined. The increase in the number of Internet-connected devices is shown by an exponential link. I have completed modelling calculations about what may be expected in the future the results of which will be published in forthcoming publications due to space limit in this paper. The collapse of the system is not yet expected, but in the long run new and innovative ideas need to be put into practice.

Based on literary sources the changes in data volume growth are analysed. On the basis of the results conclusions are drawn and suggestions are made. Relevant data provided by the Hungarian Central Statistical Office (HCSO) is also utilised.

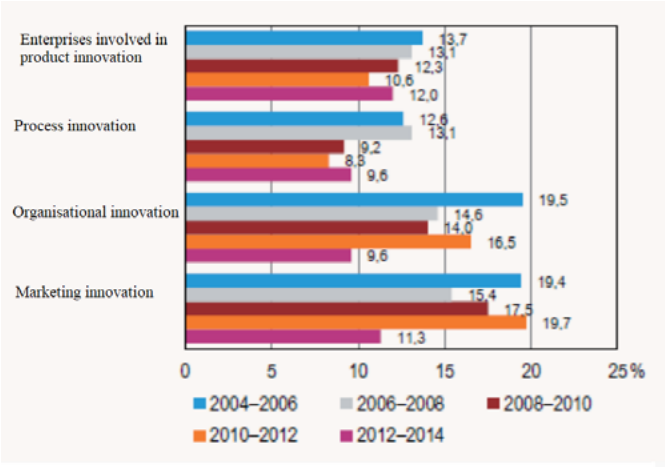
3 Results and Assessment

R & D and innovation include the development of human resources. We are not doing well in this area. Significant changes are also needed in the field of university education to meet the challenges of the future (MAGDA S. et al., 2017).

According to the requirements of the European Union, the Hungarian Central Statistical Office reviews the innovation data of enterprises employing at least 10 people every two years. The scope of data collection has changed recently.

In 2012-2014, 25.6% of the surveyed enterprises implemented some type of innovation (Figure 1).

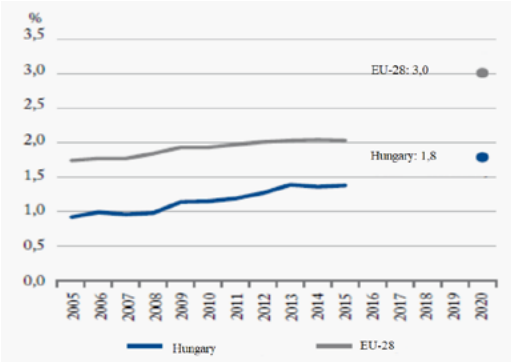
Figure 1 **Innovative enterprises as a percentage of all enterprises according to the types of innovation**



Source: HCSO, 2016.

Employment is mainly provided by SMEs. Well-functioning innovation can greatly improve their position. According to PEREZ (2009), innovation is part of the quality of economic development and can make a significant contribution to growth. Expenditure on R&D in Hungary is not enough, we should strive to achieve the EU target (Figure 2).

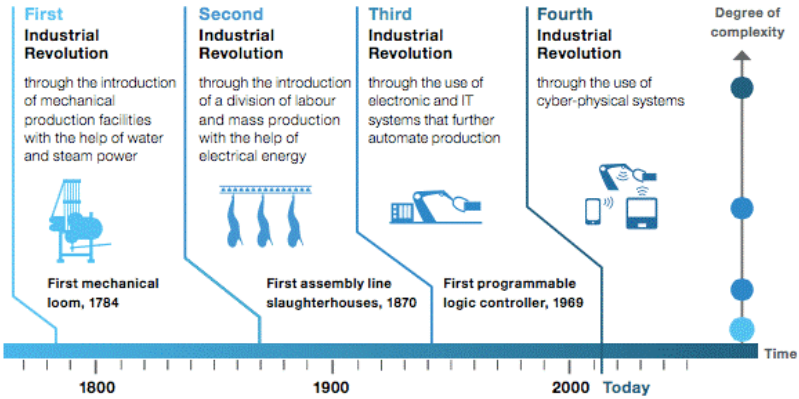
Figure 2 **R&D expenditures as the gross domestic product (GDP) percentage**



Source: HCSO, 2017.

One of the most important facts today is that the information environment is rapidly changing. There are advantages but also disadvantages. Benefits can be achieved most of all, therefore we do not miss anything and ample data is provided for mathematical analysis, from which we can deduct our conclusions and analyses. Among the disadvantages is the uncertainty created by the rapidly changing environment. Furthermore, the view that there is a great deal of emphasis on the human factor is growing, which provides better protected against non-moral economic activities. The world is currently experiencing the 4th industrial revolution, which seems more significant than the previous ones (Figure 3).

Figure 3 **Industrial revolutions from the classic first industrial revolution to the industrial four**



Cyber-physical assistance systems are driving the fourth industrial revolution
Source: Siemens, Pictures of the Future, Spring 2013

Source 1: https://christianmanrique.com/2015/11/04/the-fourth-industrial-revolution-christian-manrique/.

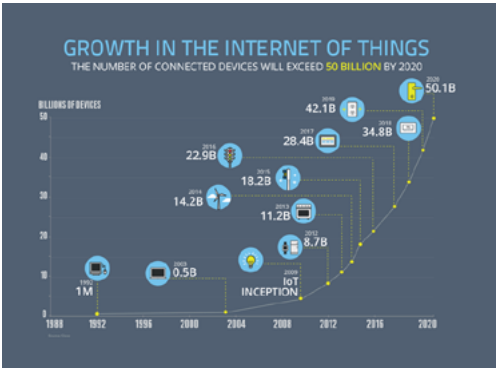
There are four main challenges to data (4V):

- Volume, that is, by 2020 it is expected that up to 40 zettabyte (43 trillion gigabyte) data will be generated;
- Variety, i. e. the different nature and diversity of data;
- Velocity, i. e. the rate of data flow, the New York Stock Exchange uses 1 terabyte of commercial data for each transaction;
- Verocity, i. e. the credibility of the data, one in three businessmen do not trust the information used in decision making.

CSIZMADIA (2016) claims that the American Walmart is carrying out more than a million purchasing trances every hour, producing 2.5 petabytes of information, equivalent to 167 times the total library volume of the US Congress Library.

Diagram 4 shows the enormous development of innovation, especially the technology, as to how much progress has been made in this area. Today, nearly 42 trillion devices have been connected to the Internet. This produces data in a giant way. Today data is much faster generated than previously, as it is no longer stored in physical form, so we can store very large amounts of hard disk space on new hard drives thanks to new data capture technologies.

Figure 4 **The number of devices connected to the Internet is growing exponentially - are we ready for this?**



Source 2: https://www.ncta.com/whats-new/behind-the-numbers-growth-in-the-internet-of-things.

The amount of data production increases exponentially. Most of the data is clearly visible in the corporate sector for continuous monitoring. Of course there are companies here, mainly financial data, and as they are analysed in terms of micro aspects and controlling considerations. Naturally, they continue to fatten the so-called Big Data, which has gained an amazing size by today.

The spread of computers multiplies human opportunities. Nowadays, we do not yet see clearly where these processes lead, but their relevance to development is indisputable. The now-growing generation is already living in the digital world, and the world is shaped in this direction.

Some authors call the "digital gold mines" the potential of producing, processing and using enormous data masses (WATERS, 2011). Instead of the

energy-intensive economy, the opportunities of the "green economy" increase (MAGDA R., 2011). Fast data growth increases storage needs.

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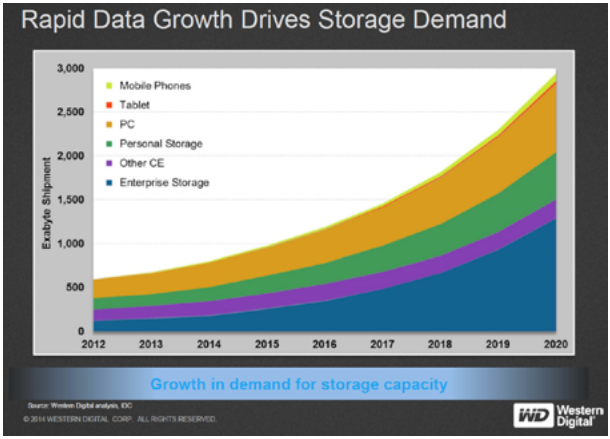
Figure 5 **Increasing demand for storage capacity**

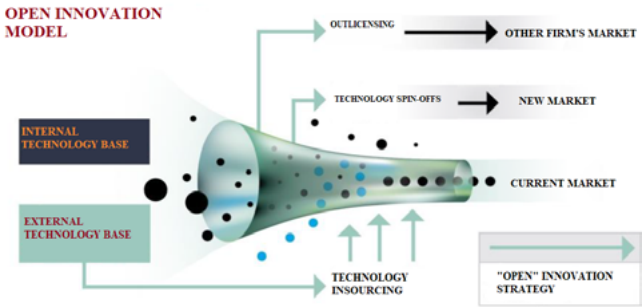


Source 3: https://anandtech.com/show/9866/hard-disk-drives-with-hamr-technology-set-to-arrive-in-2018.

"Big Data" affects the overall corporate environment. Significant processes have started in companies.

It is well-observed that today the growth rate has accelerated to a great extent, nowadays companies may become incorporated within 2-3 years. As a new trend, many of the larger financial investors are concerned about taking a company as soon as possible and then investing in it and investing in another similar opportunity. The question is, of course, whether these processes will dilute the stable business community with unstable ones, but that is another problem and issue that brings about the issue of morality. It is worth taking a look at the most widely used models today (Diagram 6).

Figure 6 **An open innovation model**



Source: Dőry, 2012.

4 Conclusions

In the course of economic development, we find increasingly better solutions to meet the needs of people. In doing so, the role of information becomes more important while the raw materials are reduced. The value of companies is increasingly attributed to technology, manufacturing processes, technical solutions, descriptions, documentation, and data content, as well as skilled workforce.

The appreciation of the role of data in the economy is inherent in human development. In innovation-driven economies, instead of increasing the amount of production factors, efforts should be made to increase quality.

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Internet source

Source 1: http://bkik.hu/iparitagozat/ipari-tagozat/osztalyok/bkik-vii-hirkozles-informatika-osztaly/vii-osztaly-hirei/ipar-4-0/
Source 2: https://www.ncta.com/whats-new/behind-the-numbers-growth-in-the-internet-of-things
Source 3: https://anandtech.com/show/9866/hard-disk-drives-with-hamr-technology-set-to-arrive-in-2018