

RELATIONSHIPS BETWEEN DIGITAL/ DIGITALIZED ECONOMY AND KNOWLEDGE BASED ECONOMY

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ABSTRACT

Intensification of digital revolution and knowledge revolution from last years has accelerated the processes of shifting from classical economy to digital/ digitalized economy and knowledge based economy, which are rapidly enlarging in the developed countries and - gradually - in the other countries. In this context, the paper aims to underline the relationship between digital/ digitalized economy and knowledge based economy and to approach them considering genesis, scope, foundation, nature and performance. Also, the paper present briefly the phases of digitalization, the main features of knowledge based economy and the implications associated with the transformations that are currently occurring.

KEYWORDS: *digital economy, digitalized economy, knowledge based economy, knowledge revolution, digital revolution.*

1. INTRODUCTION

Knowledge revolution fulfills the change from capitalist economy to the knowledge based economy, being according to the experts from the Denmark Ministry of Economy and Public Finance, a very complex process (Burton-Jones, 1999). In their opinion the information and communication technology have an essential role in the fulfillment of the knowledge revolution. The new information and communication technologies, determine radical changes in the economic and social activities and, concomitantly, in the ways to acquire, create, disseminate, share and use the knowledge. The new informatics and communications technologies and knowledge determines substantial modifications in the organization and in the methods used by the goods and services producers. The proliferation of these new technologies and the changes in the knowledge role and function, generate profound mutations in the modalities in which the people work, learn, entertain and communicate. In the economy, as a general result of all changes presented, the knowledge becomes the essential factor in obtaining the high productivity and competitiveness, by the companies, industries, national economies and the world economy.

The formulation "knowledge revolution"- although increasingly used in the last decades - is not enough known and used at international level. Certain persons could consider it as just a replacement of the "information revolution" or only a "tautology", while the others could replace "knowledge revolution" by "digital revolution". Although it is a close connection between the information revolution and the knowledge revolution, the last one is quite different from several points of view. For this reason we will undertake a comparative approach of digital/ digitalized economy and knowledge based economy taking into consideration genesis, scope, foundation, nature and performance (Burton-Jones, 1999).

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2. DIGITAL REVOLUTION AND DIGITAL ECONOMY

Digital revolution has started a few decades ago and there are many and very diversifies approaches. Recently, in MIT Sloan Management Review, two specialists (Unruh & Kiron, 2017), proposed a framework for understanding digitalization and its implications, which in our opinion is very helpful (see figure 1).



Figure 1. A framework for understanding digitalization

Source: adapted from Unruh & Kiron (2017)

In fact, in this framework there are presented the three phases of the digital revolution:

- The first phase is digitization, which refers mainly to the products and services changes from analog to the digital format. The digitization has happened first in the sectors where products and services rely just on information (publishing, music, finance) and it has been slower, for more tangible, physical products. The main result of the first phase of digital revolution has been digitized products and services;
- The second phase – digitalization – has focused on organizational level, involving industries in which have been developed new business models and business processes, able to valorize the benefits to the newly digitized products. In this phase have started and developed rapidly the new type of companies like Apple, Amazon, and so on. Digitalization has not been limited only to the business section, going to the public sector too. The main result of this phase are the new organization models and processes.
- The third phase – digital transformation has occurred at the end, of the entire economy and society, because of the large scale diffusing to the new technologies. Digital technologies alter the individual and group values, decisions, actions, and behaviors. Digital technologies transform everything at the individual, organizational and societal level (Nicolescu & Nicolescu, 2005). They transform even the human genome (Unruh & Kiron, 2017). The main results of this phase - which is continuing rapidly - are the major changes in the economy and in the society, structures, mechanisms, behaviors and performances. These transformations there are both positive and negative.

The technologies having major contribution to digital transformation, with tendency to increase their impact in the next decade, are the followings: internet of things (IOT) and connected devices, artificial intelligence (AI), big data analysis and cloud, custom manufacturing and 3D printing, robots and drones, social media and platforms and autonomous vehicles (World Economic Forum, 2017; Pigni et al., 2016; Fisher, 2017; Ben-Ner & Siemens, 2017).

The digital revolution has multidimensional effects not only technological, but also economic, ecologic, human, and so on. Certain specialists, like Jorge Becerra from the Boston Consulting Group, in his speech at Davos Forum in 2017, consider that even "the digital revolution is not about technology, it's about people" (Becerra, 2017).

We present a selection of the major effects of digital revolution based on the works of the representatives specialists and organizations in the field (World Economic Forum, 2017; Bukht & Heeks, 2017; Dahlman et al., 2016; Schwab, 2017; Rifkin, 2016; Meyer, 2017):

- The change of the consumer expectations
- The cheap and better technologies
- The falling cost of advanced technologies
- The product enhancement
- The development of the collaborative innovation
- The cheap connection and more connected world
- The rapid proliferation/extension of the networks
- The three big impacts on the labor markets: substitution, augmentation and creation.
- The disruption of existing economic processes, systems and sectors
- The re-shaping existing consumer behavior, business interaction and business models
- The restructuring of the economy and society
- The deepening inequality in society
- The trust in all technologies sectors declined
- The positive contribution to the decouple economic growth from an increase in emissions and resources
- The increasment of the productivity in many sectors
- The new opportunities for leisure, artistic expression and healthier future
- The generation of new risks, challenges and opportunities for individuals, organizations, economies and societies

The generic results of the digital revolution there are – according to its three phases – digital sector, digital economy and digitalized economy, as we could see in the figure 2.

The figure reveals explicitly the content of each of them and the relationships between their content. Digital economy is defined as – "that part of economic output derived solely or primarily from digital technologies, with a business model based on digital goals and services" (Bukht & Heeks, 2017). Digital economy "encompasses both the core digital sector and also the broader range of extensive digital activity, without claiming that all digitized activity is part of digital economy" (Meyer, 2017). The dimension of the digital economy is huge (Gada, 2016), with total value of 2,9 trillion USD (devices and interfaces – 36,63%; e-commerce – 33,66%; search – 16,83%; social media – 11,88%; content – 0,99%). The digitalized economy is the result of the digital transformation and it is more comprehensive quantitative and higher from qualitative point of view comparative with digital economy.

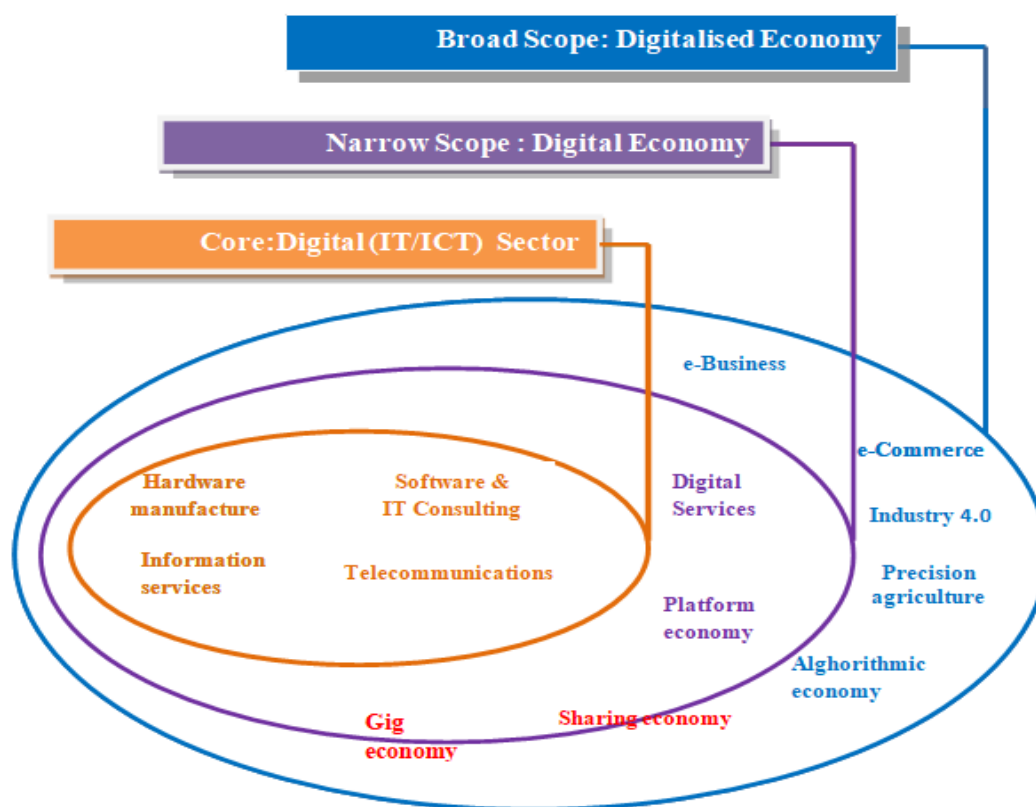


Figure 2. Scoping the digital economy
 Source: adapted from Bukht & Heeks (2017)

3. KNOWLEDGE BASED ECONOMY FEATURES

The identification and the presentation of the main characteristics of the knowledge based economy contribute to the better understanding of its specificity and of many and major impacts on the all economic and social elements in the society. In the table 1 we indicate what are the most relevant of characteristics of the knowledge based economy, according to our research, which are largely different comparative with the characteristics established by other specialists (Garmise, 2006; Gant, 2006; European Commission, 2010).

Of course, these features of the knowledge based economy there are not exhaustive and some of them are more difficult to fully understand since their specific nature. But all together provides valuable elements in order to grasp the specificity of the knowledge based economy and the essential differences comparative with the economy which still is predominant in the present.

Table 1. Knowledge based economy features

No.	Features
1	The knowledge primordality in all components of the economy
2	The rapid increase of the intellectual property value, which, gradually shall become predominantly in economy
3	The focus of the economic activities on the knowledge, innovation, and production of knowledge goods
4	The economic activities are based increasingly on the intangible resources and collaborative work
5	The diversification, acceleration and enhancement of the innovation in every economic branch and process

No.	Features
6	The pregnant specificity of the knowledge capital
7	The predominance of intellectualization in all work processes
8	The dematerialization of the economic activities and outputs
9	The proliferation of the digitalization and of the symbolic equipments and products
10	The division of labour at the micro, macro and international level tends to reflect the knowledge distribution and possession
11	The fast multiplication of the knowledge based employees, who become the most important part of the occupied labour force
12	The demassification of the production
13	The structuring of the economy in the new type of companies – knowledge based companies (hub, technological platform, and so on)
14	The amplification of the technologies design and their importance in all fields, the digital technologies and the information networks becoming the prerequisite of the development
15	The huge amplification of the export, the knowledge detaining an increasingly major part
16	The services represent a large percentage in the economy, continuing growth
17	The rapid multiplication of the SMEs, which shall predominate relatively and absolutely in the knowledge based economy
18	The proliferation and diversification of the companies association in the economy, of the different types of companies networks
19	The globalization of numerous business activities, which are able to generate high value added
20	The competitive advantage of the national economies, industries, companies, etc. is based predominantly on the differences between the knowledge possession and use and between their innovation capacity

Source: adapted from Nicolescu & Nicolescu (2011a), p.162

4. COMPARATIVE APPROACH BETWEEN DIGITAL/ DIGITALIZED ECONOMY AND KNOWLEDGE BASED ECONOMY

In the previous paragraphs we have presented what are the main elements which characterized the knowledge based economy, digital economy, digitalized economy, digitization, digitalization and digital transformation. In order to better understand the complex relationships between them and their influence on the management, economic and societal processes, we analyze comparatively digital/ digitalized economy and knowledge based economy. We identify five main differences:

(a) Genesis

- Digital and digitalized economy are the results of the digital revolution having as main content the digital technologies.
- Knowledge based economy is generated by the knowledge revolution, which involves five technical causes, four human causes and ten managerial causes (Nicolescu & Nicolescu, 2017).

(b) Scope

- Digital and digitalized economy contain core digital sector (IT/ ICT) and the other components of the economy where there are used digital technologies (see figure 2). Potential for development is very large. For example a study by Roland Berger strategy consultant, cited by Schweer and Sahl (2017), concludes that the digital transformation could add around 1,25 trillions euro to Europe industrial value creation by 2025. Another evaluation presented in Davos Forum in 2017, estimated

100 trillions of value that digitalization could generate over the next decade in the world (World Economic Forum, 2017).

- Knowledge based economy unfolds at the level of the entire economy, where the economic processes are focused increasingly on the knowledge. It is much larger than digitalized economy, because of many knowledge – and primarily tacit knowledge – there are not digital and couldn't be digital.

(c) Foundation

- Digital and digitalized economy are focused on the use of the digital technologies: Internet of Things (IOT), artificial intelligence (AI), data analytics and cloud, 3D printing, drones, robots, technological platforms, etc. and their impact on the level of product, organization and – to a less extend – the economy and the society. It is not done the difference between information and knowledge, not emphasizing the essential capacity of knowledge to create value added.

- Knowledge based economy is focused on the knowledge (creation, purchase, store, dissemination, use, share, learn, protect, valorize, and so on), taking into consideration both explicit and tacit knowledge, the last not being organic associated with digital technologies.

(d) Nature of processes involved

- Digital and digitalized economy deal mainly with the information processes, where there are used largely the digital technologies and to a smaller scale their impact on the business processes.

Knowledge based economy deals with all economic processes based on the knowledge; the economic and social processes are approached taking into consideration their multidimensional nature – economic, social, ecologic, and so on.

(e) Performance

- Digital and digitalized economy performances are evaluated to a large extend by specific indicators, which reflect the particularities of the digital technologies used. For example, digital traction metrics, presented at the Davos Forum in 2017 (see figure 3, adapted from World Economic Forum, 2017). Of course, usually they are filled with some financial indicators.

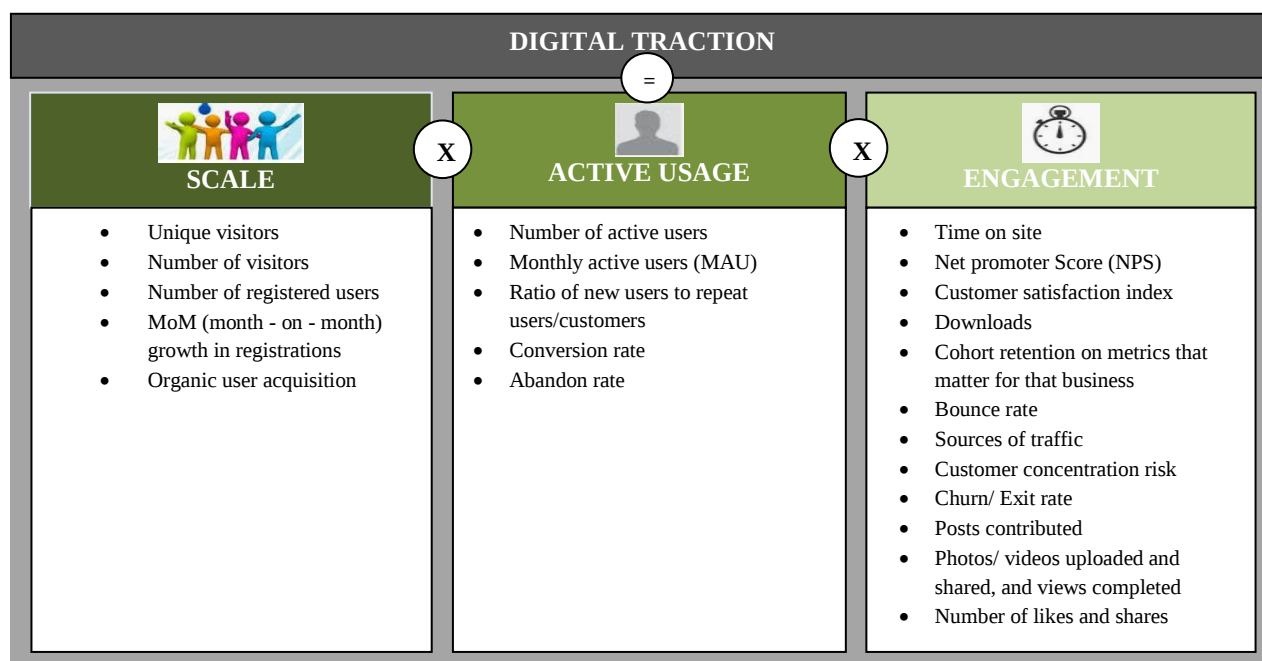


Figure 3. Digital Traction Metrics

Source: adapted from World Economic Forum (2017)

- Knowledge based economy performance there are evaluated multidimensional – economic, social, ecologic and educational. For example, the knowledge economy index (KEI) is based on the

average of four sub indexes, which represent the four pillars of the knowledge based economy: economic, innovative and institutional regime (EIR); innovation and technological adoption; education and training; information and communication technologies (ICT) infrastructure. Each of them is calculated using many and diversified indicators.

Based on these elements we could state that the relationships between the knowledge based economy and digital/ digitalized economy there are relationships of the whole to part. Knowledge based economy is more comprehensive, complex and multidimensional then digital/ digitalized economy. Knowledge based economy incorporates entirely the digital and digitalized economy. In the same time is important to emphasis that digitalized economy is an essential component of the knowledge based economy and it plays a major role in its development.

The knowledge based economy has as principal component – knowledge based organization. The most part of the knowledge based organizations are knowledge based companies which could be defined as companies, which rely on the equilibrate approach from economic, ecologic, social and education point of view and able to highly valorise knowledge and other available resources, generating long term efficiency and multidimensional performances, validated by market and recognised by the society. Knowledge based company is a sustainable enterprise, which establishes the long term economic, social, ecologic and education objectives and has the capacity to fulfill them, through intensive use of the knowledge, producing multiple positive effects for organization, its stakeholders and environment.

Digital company is a very important type of knowledge based company, which is characterised by the large extend use of the digital technologies, by intensive use of digitation, digitalisation and digital transformation. Digital companies are very innovative and flexible, focusing on the uptodate knowledge, closely associated with digital technologies. Usually, the digital company is a networking driven company. There are a large variety of digital companies, like hub, technological platform, living lab, and so on.

5. CONCLUSIONS

In the next future, the digitalization of the knowledge based economy shall amplify with many positive effects on it, but also with increasing challenges and risks. The present knowledge based economy, according to Rifkin (2016), is characterized by “digital interconnectivity, social capital is as vital as market capital access is as important as ownership, sustainability supersedes consumerism, collaboration is as crucial as competition, virtual integration of value chains gives way to lateral economies of scale, intellectual property makes room for open sourcing and creative common licensing, GNP becomes less relevant and social indicators become more valuable in measuring the quality of life of society, and an economy based on scarcity and profit vies a Zero Marginal Society Cost, where an increasing array of goods and services are produced and shared for free in an economy of abundance”.

In the last decades, the knowledge based economy has developed fast, especially in the developed countries. European Union, in order to accelerate the construction of the knowledge based economy has adapted two strategies – Lisbon Strategy, in 2000 and 2020 EU Strategy, in 2010 –, unfortunately not very successfully implemented.

For the next period is necessary using the systemic and realist approaches, not reactive but proactive, at the world and organizations level, to harness the huge potential of the all types of knowledge, of the digital transformation. Davos Forum (World Economic Forum, 2017; Schwab, 2017; Becerra, 2017) and many specialists (Fisher, 2017; Unruh & Kiron, 2017; Bukht & Heeks, 2017; Dahlman et al., 2016; Meyer, 2017; Schweer & Sahl, 2017; Nicolescu & Nicolescu, 2011b; Simion et al., 2018; Popa et al., 2019) have provided many valuable elements able to unlock knowledge value to society.

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