Knowledge Market for Education in the Digital World: Problems, Challenges, or Opportunities?

Natalia Ivanova
Petersburg State Transport University, Russia
nataliv62@gmail.com

Heikki Ruohomaa
HAMK University of Applied Sciences, Finland
Heikki.ruohomaa@hamk.fi

Krassimira Ivanova
Institute of Mathematics and Informatics, BAS, Bulgaria
kivanova@math.bas.bg

Abstract
This article is about the transformed Knowledge Market for the educational sphere in the frame of the digital and global world for professional skills development and support. The new behavior of knowledge consumers and influences on the knowledge market and its player's behavior are described. The issue about digitalization in the education sphere is the question about whole changes for the business environment of universities and it is huge transition and change for the organization culture and working environment as well. The article has a look on the advantages and disadvantages of the knowledge market for education during digital transformation.

Keywords: knowledge market, digital knowledge market, digital world, market transformation, digital transformation, digital education.

JEL classifications: G14 Information and Market Efficiency; M53 Personnel Economics: Training; L10 Market Structure, Firm Strategy, and Market Performance; I25 Education and Economic Development

Knowledge Market in the educational sphere as we have seen it ten years before

The growth of the global information society shown that the information and, especially – knowledge, becomes important and necessary article of trade. The open environment and the market attitudes of the society lead to arising of the knowledge customers and knowledge sellers, which step-by-step form the "Knowledge Markets".

Since the beginning of the century we have observed this phenomena in the frame of the open educational environment [Ivanova et al, 2001], we have outlined its common rules and principles [Markov et al, 2002], we have pointed the basic elements of the Knowledge Market and interactions between them [Ivanova et al, 2006], and we have pointed the special nature of the staple commodities of the Knowledge Market [Markov et al, 2006].

Here we will make a brief overview of these investigations (references are mentioned above).

As the other markets the Knowledge Market is the organized aggregate of participants, which operates in the environment of common rules and principles.

Usually a person or enterprise, called **Employer (Er)**, hires **Employees (Ee)**, who have exact skills and knowledge and transform them in real products or services during the work processes. This process is served by the Manpower Market. But the Employees, even owning a high education level, need additional knowledge to solve the new tasks of the Employers. In this moment they became **customers of new knowledge**, who arouse the necessity of the Knowledge Market, which should rapidly react to the customers' requests. **In other words, the Manpower's Market causes the appearance of the Knowledge Market.** These two members of Knowledge Market form one side of the market – the knowledge customers.

The continuous changing of technological and social status of the society leads to appearance of new category – **Consultants (C)** – peoples/organizations, who have two main tasks:

- to promote new technologies to Employers in convenient way to implement them in practice;
- to determine the educational methods for training the staff for using the new technologies.

The educational process is carried out by the **Lecturers (L)**, who transforms new scientific knowledge into the pedagogical grounded lessons and exercises.

During the realizing the concrete educational process the Lecturer is assisted by **Tutor (T)** who organizes the educational process and supports the Employees to receive the new knowledge and to master theirs skills.

At the end of the educational process, a new participant of KM appears – **Examiner (E)** – who tests the result of the process and answers to the question "have the necessary knowledge and skills been received". These six Components of the Knowledge Market, which contact each other via global information network, form the first level of the knowledge market, called the level of the **"information interaction"**.

As far as these components are too much and are distributed in the world space, the organization and coordination of theirs information interaction needs adequate **"information service"**. It is provided by a new component called **Administrator (A)**. Usually the Administrators are Internet and/or Intranet providers or organizations.

The rising activity of the knowledge market creates the need of developing modern tools for the information service in the frame of the global information network. This causes the appearance of the high knowledge market level, which allows the observing the processes, as well as developing and implementing new systems for information service. This is the **"information modeling"** level.

It consists of two important components – the **Researchers (R)** and the **Developers (D)**.

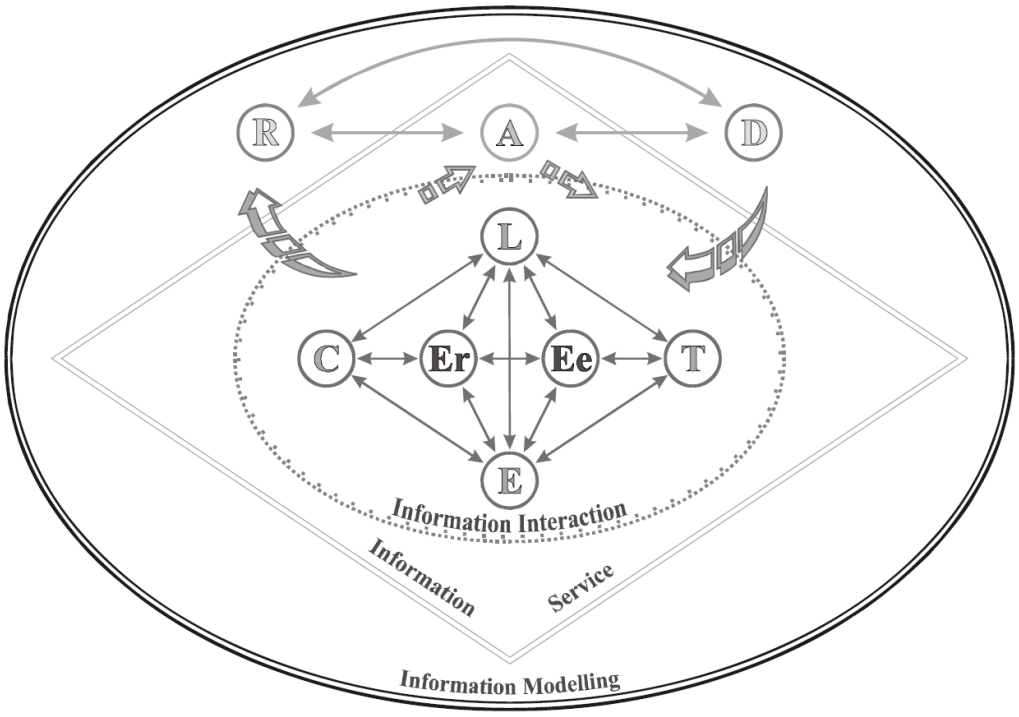

Figure 1: Basic Structure of the Knowledge Market [Ivanova et al, 2006]

Figure 1 presents the scheme of the basic structure of Knowledge Market as it was defined in [Markov et al, 2002] and schematized in [Ivanova et al, 2006].

Change of the consumer's behavior and challenges and new opportunities for the knowledge providers

Learning services for consumer has changed dramatically for the last few years. Before, he has received services using face to face technology directly in universities or educational centers or thorough distance learning opportunities with the using of local and global networks. Nowadays, the universities and training companies have to completely rebuild their business processes to save own clients who are needed to gain knowledge attracting potential new clients too. That is actually electronic market rules start to work and weakest traditional universities and training centers are extruded from market.

So what has changed? Primarily - consumer of knowledge:

- First of all, there was a change of generations, which grew up roundabout of **social networks** and different **mobile gadgets**;
- Today the consumer of knowledge is **"always online!"**. It means that even the procedure of knowledge discovering and acquiring has to be changed;
- The consumer of knowledge moves to Digital World inheriting all previously **accumulated digital data and knowledge.**

In such situation it becomes more difficult to attract and retain consumer of knowledge but for universities and training centers new

and unique capabilities have been opened. These new capabilities allow communicate with consumers of knowledge more effectively.

What training centers and universities should do on the way to a Digital World:

- It is necessary to have representative office in the network. In this case it is not necessary to wait for the client to come to the training center – the Digital World becomes the meeting place;
- Digital knowledge content should be prepared as well and offended to clients directly in network;
- It is necessary to learn and study clients and knowledge consumers on-line;
- It is recommendable to combine the traditional learning services with the digital ones.

Technological changes and transformation

Approximately three years ago it was possible to say that the Basic Structure of the Knowledge Market in the educational sphere (Fig. 1) was sufficiently relevant for understanding of its organization and regulation as well as its player's interaction. Nowadays, after beginning of the digital transformation connected with cloud technologies, using of mobile devices, big data and intellectualization of the services this scheme should be supplemented and refined in the part of the Information Interaction. Ten years ago Information Interaction was realized directly or via e-mail and messengers. Nowadays it is enriched with cloud warehouses, e-learning environments, different collaborative task management applications, and so on. Using of the new technologies and devices creates new capabilities and advantages to joint world knowledge resources.

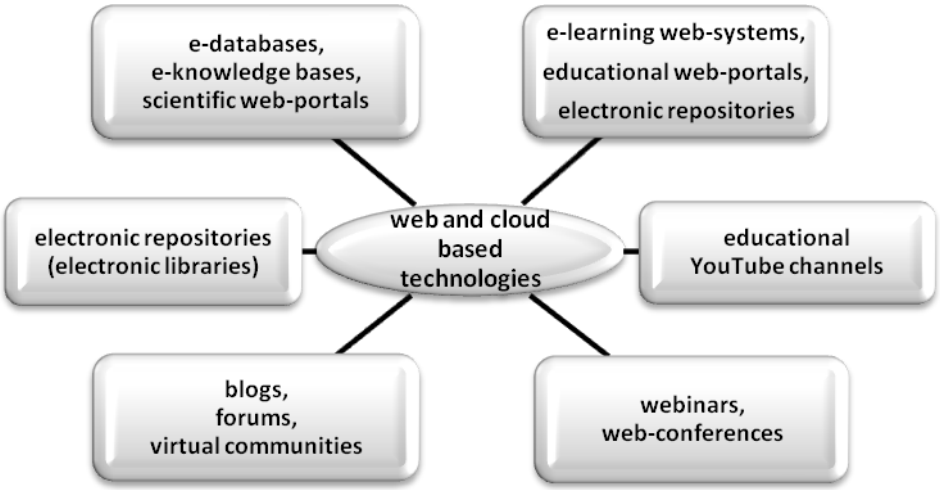

Figure 2: Technological and information capabilities

Figure 2 shows that the new technological and information capabilities provide wide opportunities to organize the learning process using web and cloud based technologies. Unfortunately, these opportunities are still not used to the full extent because there is not enough regulation of this process and the absence of methods, principles and concepts of using these technologies in training process. That is main

Gap of the knowledge market regulation and information interaction between knowledge market players (Figure 3).

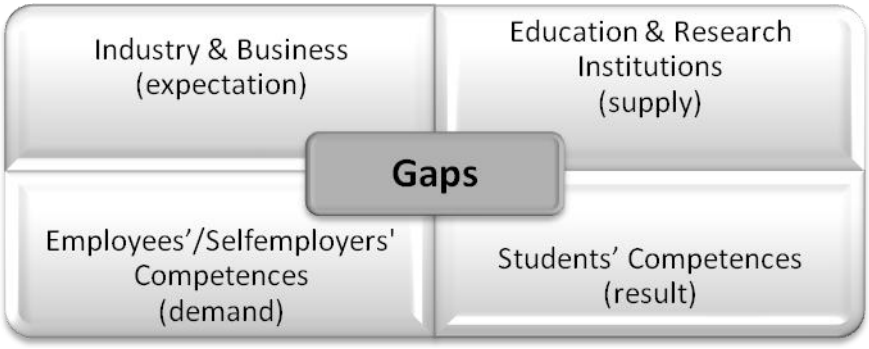

Figure 3: Interaction gaps between Knowledge Market players.

Digital technologies and innovations may eliminate gaps between business demands and students competences via web-conferences, webinars, practices and internships, business-integrated education, different innovation, knowledge portals, and etc.

Education's digital revolution which is based on the creation and development of the digital market for professional knowledge and skills allows improving the information interaction on the basis of cloud technology. This as a consequence leads to progress of the Knowledge Market via global knowledge exchange.

In the other hand, the Digital Knowledge Market gradually takes up its place among all forms of knowledge exchange. This market can be built as a global and can develop in a Digital World but with taking into account of regional particularities and possibilities of implementation of the regional centers of the Digital Knowledge Market.

Modern digital technologies give the opportunity to build the joint global knowledge space, which is open to all segments of the world's population regardless of nationality, social status, language of communication, place of residence.

Nowadays we can say already exactly that the world has been changed. World changed for employers and employees, trainers and trainees. Mainly, technologies, devices and interaction between users and devices are transformed. In this connection it is possible to say even the consumers of knowledge changed themselves moving to the digital world. This naturally leads and facilitating the movement of the learning services to digital world.

Digital technologies deeply transform people, societies, business models, business strategies, applying business technologies, services and devices. In this connection employees or consumers of knowledge should be adopted to this transformation as soon as possible and learning process should be transformed as well to build adequate competence and skills for employees' requests.

The revolution in the methods and tools of specialists is brewing today in many industries. The information progress allows to solve issues more efficiently and quickly and the learning process and knowledge transfer is no exclusion.

Digital transformation for Universities: problems, challenges, or opportunities?

Quite a lot discussion has been around virtual and digital learning or impact of digitalization to the education process and knowledge market interaction [Salminen et al, 2016]. It is very interesting to understand the point of view of lecturer/teacher and researchers concerning knowledge market development during digital transformation time. First of all, these specialists have to provide and accumulate the based knowledge on the knowledge market and to be interested in the promotion and implementation of this knowledge. In the same time it is known that university organization culture is one of the key elements for providing good education online.

The main question about digitalization in education is about whole change of the universities business environment and it is huge transition and change of organization culture and working environment. Professors should also feel comfortable with that change and to be involved to transformed knowledge market.

As know that the universities and colleges has not known always as most willing to make rapid changes in their culture and methods. Most of cases the driving force for changes are students than professors by themselves. Almost all students are actively in social media, but only a few percentages of lectures have active discussion in social media.

We can see that:

- lecturers are not able to use new technology (same equipment than student);
- lectures are unwilling to use technology;
- the language and values of young people to communicate has changed;
- students are able to check all what teachers talk in 10 seconds from internet.

Based on above mentioned we should focus on the question, how well we are able to communicate with students during digital transformation process, if we are not able to communicate and share that know-how to make good learning process.

What are drivers, which make universities to take use technologies in education? Most of cases it is just competition, imago, demand of students (especially adult students). Digitalization comes also because universities redesign their processes.

Learning process key elements of the digital transformation in the HAMK University of Applied Sciences

HAMK University of Applied Sciences has taken long trip on the road of digitalization. First virtual courses took place more than years ago. But just last three year the bigger steps have taken place in whole organization and the work is still going on.

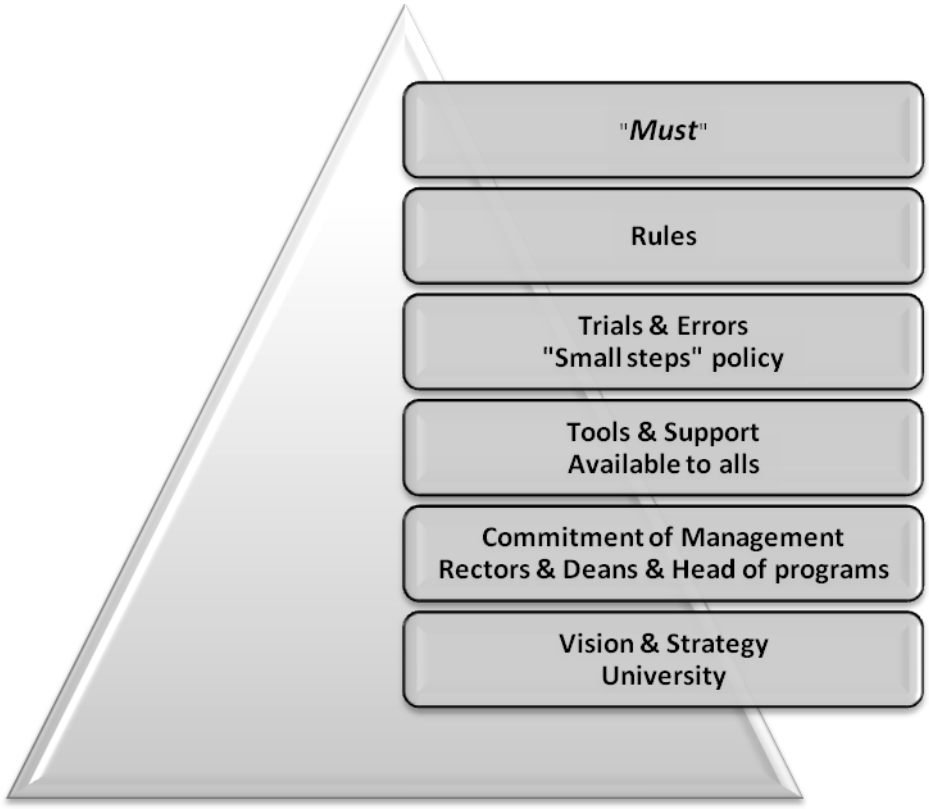

Figure 4: Main Steps and key elements

The learning process is new for the university and for the students, so the main issue to understand steps of the organization culture and that has to go through including. On the other hand it was needed to identify key elements of this process or steps that organization has to take when it has been moving to digitalization and to get understanding how it is possible to be involved to the transformed knowledge market (figure 4).

The main steps include consideration of the following elements:

- **Clear vision and strategy** is the fundament for all change. It is important that the goal is clear and so that this is commonly accepted among staff members. Digitalization is written down on strategy.
- **The commitment in the top management** of university is essential. That also means that top management takes actively use new technology and with their example makes pressure for whole organization. Like case of HAMK Rector is actively involved in social media and not any more give monthly information for staff in paper but on videos.
- **Tool & training**, the tools, platforms and programs have to be available, but also training and support have to be available when needed. In HAMK, every member of staff got smart phone for work and was trained to use digitalization. For instance, staff was trained to do videos and use it as teaching materials, etc. This was small step but every person in organization vas expected to be aware about future development.

- **Rules and instructions** have to be updated in universities. So, new rules and instructions for digitalization process have to be designed.
- **Must**. In the end, it seems that the change towards digitalization does not make progress just because of motivation, or given possibilities, but there have to be MUST. To force staff to use the opportunities of digitalization, it usually makes some resistance, but after staff has learned and used to use it, staff are quite happy.
- **Continuous process**. The process has not been easy, without problems. Process is still going on.

Staff which should be involved to process of digitalization

A huge role in the process of digitalization should play a staff which must be involved to new strategy implementation and be active on the knowledge market in the same time. For example, even if the students are ready to use new technology and approach, the groups are always heterogeneous, so the individual support is needed in first months at least in order to learn new programs and to habit to new education interaction and getting the knowledge. On the other hand, the teachers use different kinds of approaches to use e-learning in their courses and may confuse students. In this connection there is reason to discuss what kind of platforms will be used during digital transformation process. This is also means that teachers can support each other with different question related to platforms.

Practically, the students force lecturers and professors to use new technology in their studies but adult students are more motivated to get and update the knowledge and skills also. In many cases, when the question is about adult students and their technical skills to use programs and e-learning platforms, these skills are very different. That is the reason why, first of all, students groups have to be trained to use same systems and platforms and to adopt habits for using these new learning interactions. But, if it is clear how is it possible to be harmonized the technical skills for the student groups then it is not clear still how is it better to use and harmonize already existing pedagogical approaches and best pedagogical experiences to set mind of the students.

Anyhow, the digitalization establishes new advantages for creating data from learning process itself and storing it to databases. By collecting data, it gives a material for mining data and analyzing it for further improving the learning process.

Focus on adult students during the moving of the learning process to on-line.

Adult student usually have worked and have already quite of experience about working life, business and knowledge market. They also have huge interest to find knowledge on the knowledge market, to learn new things and to use that know-how in they work or just to have more confidence in their work. Adult students are more motivated to study comparing with the other students who could cancel his studies at any moment. Ideal situation would be that the employer would see the benefits of their studies for company and thereby support their studies. One possible way to motivate students and their employers is to create learning projects in which students analyze the company

processes in the frame of the learning material which they acquired in the concrete learning course.

In case of contact learning, students meet each other, they have visit at university regularly. It helps them to create new friendships, which will support them in their studies. Since there are many students in groups, so there is also lot of experience, which could be useful for the other students. Having face to face meetings a huge amount of understanding has shared to the group members. These discussions are also very important for new innovations. Informal discussing during the breaks and sharing experiences is very important among adult students. During these discussions many cases in job has considered and learning take place. HAMK has experience that there is less drop out, if student have face to face meeting and if they are forced to communicate face to face and spend time together. Another reason is connected with the fact that adult students are working and they are busy in the work, and have their routines in home and work, so students should get into environment where there is not many disruption.

On the other hand, online learning gives lot of flexibility, which is highly valuated among busy people.

Let's mention that the generations in adult peoples are also different – the young one's are already from the so called Google generation. For these peoples is more naturally to be in different virtual communities and contact channels, which practically replace the necessity of face-to-face meetings. The other distinctive feature is the tendency of losing analytical skills – the study for British Library and JISC [Rowlands et al, 2008] showed that although young people demonstrate an apparent ease and familiarity with computers, they rely heavily on search engines, view rather than read and do not possess the critical and analytical skills to assess the information. The learning process should take account of this fact and to strengthen efforts on the construction of analytical thinking.

Platform as important issue for the digital knowledge market development

It is very important to find solution how it is possible to unite the professional knowledge portals or Knowledge Virtual Environments to the unit integrator of science, technology and education for different spheres of knowledge. Every such Knowledge Virtual Environment has to define:

- functions;
- groups of users;
- structure of information (content);
- organizational structure for support and control.

Such Knowledge Virtual Environment has to provide economy beneficial information, organizational support and coordination for creation, dissemination and commercial application of innovation and knowledge and to be oriented for provision of information needs and requirements for different groups of the knowledge market:

- Users **ordering** development of innovation and knowledge (for example enterprises, organizations or persons in need of certain innovation and knowledge);
- Users **creating** the innovation and knowledge (organizations performing research and development (R&D); universities, high schools and training centers exercising research; enterprises; scientists and experts);
- Users **exercising** the expertise and evaluation of the innovational characteristics of scientific products and knowledge (International, state, public and business scientific societies, units and organizations, experts, scientists and specialists providing the expertise and evaluation of the innovational proposals and projects);
- Users **applying** the innovation and knowledge (Organizations providing professional education of specialists for research, design and implementation, teachers, students and post-graduate students of High schools);
- Users in **sale and purchase** of the innovation and knowledge (Enterprises, organizations and private persons participating in sale and purchase of innovation and knowledge);
- Users **providing** education and consultation on applying of innovation and knowledge in different specific techniques and technologies area (Specialized educational organization consulting firms);
- Users **supporting** the processes of creation of the perspective innovational R&D and obtaining the knowledge and technologies (international, state, public research funds societies and units including private persons and business structures).

Interface of portal for users should be realized in different languages. The structure has to include the following sections necessary for systematization of portal content (information material)[1]. The main part of such Portal should include e-learning environment network for distance education and consulting about technology of innovation application in chosen sectors. General information and rules for operation are:

- Technical characteristics of the network e-learning environment for distance education;
- Rules of operation of learning environment network;
- Organizations providing the informational safety and technical service of the learning environment network;
- Requirements to the telecommunication and computer techniques of learning environment network users.

Conclusion

Looking retrospectively after 20 years of knowledge market development we can observe that proposed scheme of the basic structure of the knowledge market functioning (Figure 1) in the frame of the open educational environment is still valid and the same knowledge market players still exist. But mentioned players and interactions between them are moved into the virtual space. The new technological and information capabilities supply a wide scope of digital services that

[1] It is understood, that the users may see one and the same material in several sections of the content

support the learning process. Because digitalization step by step changes the business environment of the knowledge market, the organization culture and also the ways to educate people and knowledge distribution as well.

The new behavior of knowledge consumers will influence on the knowledge market development, player's behavior and their technology of interaction. Since the very basic tools like smartphones which are available for everyone will influence and change the players interaction in the knowledge market, availability to knowledge, different information and ways of communicate. It will be lead to technological changes and transformation of process of interaction too. It will force of the knowledge experts to have a look on the knowledge market from different perspective, not only from point of view of communication process improving, but also from point of view of speed-up of the new information and knowledge production and transformation through digitalization.

The digitalization in education will facilitate to changes in business environment of universities and it is huge transition and change for organization culture and working environment.

On the basis of the above mentioned we could say that digital transformation determines new challenges and new opportunities for the education, the information interaction changes and the knowledge market development.

References

Ivanova Kr., N. Ivanova, A. Danilov, I. Mitov, Kr. Markov, 2006, "Basic Interactions between Members of the Knowledge Market", Int. Journal "Information Theories and Applications", 13(1), 19-30.

Ivanova N., Kr. Ivanova, Kr. Markov, A. Danilov, K. Boikatchev, 2001, "The Open Education Environment on the Threshold of the Global Information Society", Int. Journal "Information Theories and Applications", 8(1), 3-12.

Markov Kr., Kr. Ivanova, I. Mitov, 2006, "The Staple Commodities of the Knowledge Market", Int. Journal "Information Theories and Applications", 13(1), 11-18.

Markov Kr., Kr. Ivanova, I. Mitov, N. Ivanova, A. Danilov, K. Boikatchev, 2002, "Basic Structure of the Knowledge Market", Int. Journal "Information Theories and Applications", 9(4), 123-134.

Rowlands I., D. Nicholas, P. Williams, P. Huntington, M. Fieldhouse, B. Gunter, R. Withey, H. Jamali, T. Dobrowolski, C. Tenopir, 2008, "The Google generation: the information behaviour of the researcher of the future", Aslib Proceedings, 60(4), 290-310

Salminen V., H. Ruohomaa, J. Kantola, 2016, "Digitalization and Big Data Supporting Responsible Business Co-Evolution", Proc. of 7th Int. Conf. of Applied Human Factors and Ergonomic, to appear.