

them.

*It is proved that organizational and economic modeling of interregional cooperation processes is a kind of economic modeling of economic processes, which involves the restoration of the organizational structure of different forms of cooperation at different taxonomic regional levels and the conditions of their realization taking into account the factors of the external environment.*

*It was noted that the object of organizational and economic modeling is interregional cooperation as a system of elements that have their economic characteristics, functional orientation and close connection with the external economic environment. The subject, in turn, is the interrelations and relationships between individual entities in this system. The presence of such object-subjective interconnections proves the systemic nature of the processes of interregional cooperation.*

*Key words: region, regional policy, modeling, economic modeling, organizational and economic modeling, interregional cooperation, model of cooperation, international regional competitiveness.*

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## **ENTREPRENEURSHIP AND INNOVATION BASED ON INTERNET**

*The basic purpose of the article is to present the new evolutionary trends regarding entrepreneurship and innovation in the Internet age. Evolution is a general-purpose algorithm for finding innovative solutions to complex problems. It is a learning algorithm that adapts to changing environments and accumulates knowledge over time. New companies, like Facebook, Uber, or Airbnb, are good examples of evolutionary paradigm in business of the Internet age. The article consists of four sections. In the first principles of evolutionary paradigm have been presented. The second section describes new trends and business models possible in Internet environment. In the third section competition based on sharing with competitors is presented. The fourth section discusses how contemporary companies use Internet for value creation.*

*Key words: entrepreneurship, innovation, value creation, Internet, business model, Moore's law, Kurzweil's law*

Globalization and digitalisation, are constantly shifting the sources of market advantage forcing companies to adapt. New technologies, products and services, are continuously appearing. They create new business models which replace the old ones, and contribute to new ways of corporate value creation. The basic aim of the article is to present the new evolutionary trends regarding entrepreneurship and innovation in the Internet era.

### **1. Entrepreneurship and evolutionary paradigm**

Civilization on our planet is the effect of long evolutionary processes in which people created an econosphere [Kauffman 2000, p.211]. The econosphere consists of all people and organizations creating development and wealth. According to Adam Smith, man is a part of

nature and the most socially developed representative of the animal world [Smith 1776/2003, pp.22, 112, 201]. He wrote it eight decades before the Darwinian revolution. Men, through their entrepreneurship, and social skills, and the ability to cooperate, built the econosphere.

The evolutionary framework integrates behavioral sciences: economics, psychology, sociology, anthropology, political science and biology [H.Gintis 2007]. There is a growing awareness that it is necessary to make efforts to integrate social science based on the theory of evolution. The same process that has driven the growing order and complexity of the biosphere has driven the growing order and complexity of the econosphere.

Evolution is a general-purpose algorithm for finding innovative solutions to complex problems. It is a learning algorithm that adapts to changing environment and accumulates knowledge over time. Evolution is a form of information processing. Modern evolutionary theorists believe that, like gravity, evolution is a universal phenomenon. No matter whether the algorithm is running in the substrate of biological DNA, or the economy, evolution will follow certain general laws in the behavior [Beinhocker 2007].

Evolution is all-purpose formula for innovation through trial-and-error process. It is a bottom-up process without a leader. It is recursive (cyclical): its output from one cycle is the input for the next round. The beginning and the end of one cycle are the contractual terms and the evolution is hard to spot. In fact, the evolution can be assessed only *ex post*. Evolution can be regarded as an equivalent of invisible hand by A.Smith [1776/2003].

Economic evolution is the result of two interlinked processes: physical technology (stone tools, steam engines, computers, etc.) and social technology (tribes, states, money, public company, etc.). The stories of the agricultural, industrial and information revolutions are all largely stories of the „reciprocal dance” between physical and social technologies [Beinhocker 2007].

Each new invention expands the space of possible projects. The process of evolution increases the econosphere potential in the development of welfare. Every invention is the combination of prior ideas. Therefore, every new technology expands the space of possible combinations of the following inventions. Simultaneously, each new technology reduces the earlier technologies by creative destruction [Schumpeter 1934, 1942].

Evolutionary algorithm consists of three general phases: differentiation (mutation, search), selection, and amplification (replication). Phase of differentiation concerns the search for new solutions, or new combinations of existing projects. It is equivalent to a mutation in the evolution of nature. Innovation can be the result of organized exploration and experimentation, but can also be the result of different cases, coincidences or secondary activities. It is typically made within companies (within the hierarchical structures).

The second (selection) phase involves choosing to implement the best projects. Then they are assigned to resources (including financial). This phase is carried out on the border between business and the environment. The third (amplification, replication) phase consists of activities supporting distribution of selected projects. These activities take place outside of the company, in its market environment.

According to Austrian school of economics the basic engine of the civilization progress is entrepreneurship. The aim of entrepreneur is not only a desire to gain material benefits for themselves and meet his/her consumption needs, but also achieving a satisfying social position, a sense of power and independence. The desire to show his superiority over others, to winning not for its fruit, but for the satisfaction. Finally, there is the joy of creation, to do something or just practicing his energy and ingenuity [Schumpeter 1934].

## **2. Innovative technologies and new business models**

The initial infrastructure of both the first and second industrial revolutions in America and Europe occurred 30 years and matured in another 20. The first (steam power-based)

industrial revolution peaked in the last two decades of 19<sup>th</sup> century. The second industrial revolution was taking place at that time in America and Europe. The discovery of oil, the invention of the combustion engine and the introduction of the telephone started a new communication/energy complex that would dominate the 20<sup>th</sup> century.

The foundation of the first and second industrial revolutions was a high concentration of economic power. Vertically integrated companies were the most efficient means of organizing the production and distribution of mass produced goods and services. They reduced transaction costs, increased productivity, lowered the marginal costs of production and distribution, and lowered the price of goods and services, allowing the economy to flourish.

The third industrial revolution is based on Internet and digital technologies. It has brought exponential increase in productivity and in the growth of GDP per capita at the end of 20<sup>th</sup> century. This phenomenon can be explained in a big part by the Moore's law. It is the observation that, over the history of computing hardware, the number of transistors on integrated circuits doubles approximately every two years. The law is named after Intel co-founder Gordon E. Moore, who described the trend in 1965. His prediction has proven to be accurate for 50 years, and the Moore's law is now used in the semiconductor industry to guide long-term planning and to set targets for research and development [Bauer, Veira and Weig 2013].

The capabilities of many digital electronic devices are strongly linked to Moore's law: processing speed, memory capacity, the number and size of pixels in digital cameras, etc. This exponential improvement has dramatically enhanced the impact of digital electronics in nearly every segment of the world economy. Moore's law describes a driving force of technological and social change in the late 20th and early 21st centuries.

The further improvement in productivity will be possible because the emerging Internet of Things is the first smart infrastructure in history. In future it will connect every machine, vehicle, residence and business in an intelligent network comprised of a Communications Internet, Energy Internet and Logistic Internet. According to Rifkin [2014], before 2040 most of the energy to heat houses, power plants and drive vehicles, will be nearly free.

Simultaneously, after a century of dominance, the model of public company is showing signs of decline. A public listing has become burdensome. Regulations have been complicated after the Enron scandal of 2001-02 and the financial crisis of 2007-08. Many managers feel that their jobs depend upon producing good quarterly results for shareholders, instead of the long term, sustainable growth for all stakeholders.

Complicated regulation and short-termism impose costs. That is a great problem at a time when public companies are struggling to create profits on their operations. Profits of big American companies in the S&P 500 index have grown by 8% per year during the last 30 years. In 2015, they are expected to fall, by about 5%. The number of companies listed on America's stock exchanges has decreased by half since 1996, partly because of mergers and acquisitions, but also because the most talented managers set up their own private companies.

In result of above mentioned issues business people are experimenting with "hybrids" that enter public markets while remaining privately held. Thousands of young people are creating new firms in temporary office spaces. Their companies are pioneering new organisational forms. The main difference lies in ownership. At the beginning of company's life, the founders and first employees own a majority stake—and they motivate people with ownership stakes or performance-related rewards. That has always been a practice in startups, but today the rights and responsibilities are precisely defined in contracts. This aligns interests and creates a culture of hard work and friendship.

Startups used to face difficult choices about how to invest in large assets such as property and computer systems. Currently young companies exploit new technology, which enables them to be global without having big assets. They can develop very fast by buying in

services as and when they need them: „*They can incorporate online for a few hundred dollars, raise money from crowdsourcing sites such as Kickstarter, hire programmers from Upwork, rent computer-processing power from Amazon, find manufacturers on Alibaba, arrange payments systems at Square, etc.*” [Reinventing the company 2015].

New business models applied by innovative companies are based on principles of wkinomics. It is the new internet business approach. Wkinomics is the new art and science of peer production. The idea was introduced by D.Tapscott and A.Williams in their book „*Wkinomics. How Mass Collaboration Changes Everything*” [2006]. The new art and science of wkinomics is based on four important ideas: openness, peering, sharing and acting globally.

### **3. Coopetition: sharing with competitors**

Sharing, openness and transparency become new business rules. For example Tesla Motors, Silicon Valley’s electric carmaker, in the spirit of the “open source” movement, shares patents that cover its electric vehicles technology for free. Tesla believes that applying the open source philosophy to its patents will strengthen rather than diminish its position. E.Musk, Tesla founder and CEO, is convinced that other companies making electric cars will benefit from a common, rapidly-evolving technology platform. Technology leadership is not defined by patents but rather by the ability to attract and motivate the world’s most talented engineers.

Tesla’s strategy is imitated by more „traditional” carmaker Toyota. Toyota is focused on making longer-range hydrogen-fuel-cell vehicles, the future standard for clean transportation, and is working with the Japanese government to build a fueling infrastructure for hydrogen. Toyota shares its 5,680 patents related to its new Mirai car for free to promote hydrogen-powered vehicle technology. This is the first time the Japanese carmaker has released patents to competitors without charging a royalty fee.

Sharing and openness are present in many very different industries, like: gold mines (the case of Goldcorp) [Tapscott and Williams 2006], software (the case of Microsoft and Kinect technology) [Meyer and Kirby 2012], or robotics [Special Report: Robots, 2014]. The Open Source Robotics Foundation (OSRF) has been created and it supports development of Robot Open Source (ROS). ROS is free to use and easily customised, and is being taken up by more and more researchers, many of whom happily share their ideas. Using a ROS navigation and a Kinect, it is now relatively easy to build a simple robot.

### **4. Value creation in the Internet age**

R.Kurzweil [2006], American inventor and key Google’s manager, identified fundamental property of new technology: when a company shifts to an information-based environment, the pace of development jumps onto an exponential growth path and price/performance doubles every year or two. Exponentially growing technologies are „riding on the back of Moore’s law”. Kurzweil took Moore’s law several steps further, noting that every information-based paradigm operates in the same way, and he formulated the law of accelerating returns (LOAR).

There is a growing recognition that the exponential pace of change formerly seen in computing is now present into other technologies with the similar effect. We are seeing accelerating cost reduction in many technologies, including: 3D printing, industrial robots, drones, solar, sensors, biotech, neurotech and medicine.

The most valuable American company of the newest generation has become **Uber**, taxi operator. It is a private company and its capitalization is estimated on level of \$50 billions. That is higher than 80% of the firms in the S&P 500 index, many of which are decades old. Uber’s value has grown faster than those of Facebook and Twitter in their early years.

In 2015 Uber operates in above 300 cities in about 60 countries, providing more than 1 million rides each day. Consumers like Uber because its cars are cheaper than conventional taxis, clean and reliable. Uber's freelance drivers, who typically pay it around 20% of their fares, enjoy flexible working hours and are spared the formalities of qualifying as a conventional taxi drivers. Uber has an advantage that most transport firms lack: it does not have the cost of maintaining and insurance its own fleet of vehicles, because its drivers supply their own.

Uber can be a case study presenting how to construct a platform for a digital service on top of which other businesses can be built. As it arrives in a city, it launches a vigorous recruiting programme for drivers, offering them incentives to sign up. Its fares are flexible - they undercut conventional taxis most of the time, but go up when it is snowing, or when there is some other reason why demand for rides is growing.

Uber can be a perfect exemplification of Kurzweil's law of accelerating return. There are two fundamental drivers that enable firms to achieve results of LOAR. The first is that some aspect of the company's product has been information-enabled and thus, following Moore's Law, can take on the doubling characteristics of information growth. The second is that, thanks to the fact that information is essentially liquid, some business functions can be transferred outside of the organization – to users, fans, partners or the general public.

**Airbnb**, internet holiday accommodation company, founded in 2008, currently has about 1400 employees and operates 1,5 million listings in 33,000 cities and 190 countries. Airbnb owns no physical assets and is worth almost \$20 billions. That is more than the value of Hyatt Hotels, which has 45,000 employees spread across 549 properties. And while Hyatt's business is comparatively flat, Airbnb's activity indicators are growing exponentially.

The story of Airbnb versus Hyatt Hotels presents fundamental difference in the approaches to ownership. Hyatt Hotels spent enormous resources to purchase and own billions of dollars in physical assets, while Airbnb connects users with property to rent (hosts) with users looking to rent the space (guests). Airbnb runs its business without owning any rooms itself. Such platforms disrupt traditional industries by creating new sources of supply and relying on curation for developing quality. Unlike traditional hotels, Airbnb develops not by scaling assets but by increasing the hosts and travelers and matching them with each other using Internet tools.

In each of these above technologies, at least one aspect is being information-enabled, which then catapults it onto the bullet train of Moore's law as the pace of development accelerates into a doubling pattern. In 2004 we had 500 millions Internet-connected devices. In 2014 we had about 8 billions. By 2020 there will be ca. 50 billions such devices [Ismail, Malone and van Geest 2014].

Typical company from the „Fortune 500” ranking needed 20 years to reach a market value of \$1billion, Google needed 8 years, Facebook 5 years, Uber only 2 years, and Snapchat even less. We are witnessing a new breed of organization that is scaling and generating value at a pace never before seen in business. The above described process shows the accelerating metabolism of the economy [Ismail, Malone and van Geest 2014].

### **Conclusions**

Entrepreneurship can be treated as the basic engine of the civilization progress and innovativeness. New technologies support competition. Sharing, openness and transparency have become foundations of new business models. Breakthrough technologies will enrich and diversify opportunities for new businesses and new ways of value creation. Internet technologies, according to evolutionary algorithm, create new combinations of products, services, and business models, and step-by-step replace the old technologies and traditional business dogmas.



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### ПІДПРИЄМНИЦТВО ТА ІННОВАЦІЙНІ ЗАСОБИ НА ІНТЕРНЕТІ

Основна мета статті - представити нові еволюційні тенденції щодо підприємництва та інновацій в епоху Інтернету. Еволюція - це алгоритм загального призначення для пошуку інноваційних рішень складних проблем. Це алгоритм навчання, який адаптується до змін середовища та накопичує знання з часом. Нові компанії, такі як Facebook, Uber або Airbnb, є хорошими прикладами еволюційної парадигми у бізнесі вікової мережі Інтернет. Стаття складається з чотирьох розділів. У першому представлено принципи еволюційної парадигми. Другий розділ описує нові тенденції та бізнес-моделі можливі в Інтернет-середовищі. У третьому розділі представлено кооперацію, що базується на обміні з конкурентами. У четвертому розділі обговорюється, як сучасні компанії використовують Інтернет для створення цінностей.

**Ключові слова:** підприємництво, інновації, створення вартості, Інтернет, бізнес-модель, закон Мура, закон Курцевейла