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**LAWS OF KNOWLEDGE-BASED ECONOMY:
 VERIFYING THE HYPOTHESES**

The research purpose is to provide evidence in favor of the hypothesis of the existence of new laws of knowledge-based economy, to reveal their contents and main manifestations. The results of this work show that these new laws regulate the processes of knowledge generation and dissemination, its filtration and innovation reduction. The methodology of the undertaken analysis is built upon general scientific methods, as well as interdisciplinary approaches. This research can serve as a reference point for further studies and a basis for the development of various control systems under new economic conditions.

Keywords: the law of knowledge reconfiguration; the law of knowledge valorization; the law of knowledge asymmetry; the law of uneven knowledge dispersion among economic subjects; the law of knowledge filtration; generation of new knowledge; knowledge transformation into innovations.

JEL classification: O011, O012, O015.

Тетяна Є. Степанова, Надія В. Манохіна
**ЗАКОНИ ЕКОНОМІКИ, ЗАСНОВАНОЇ НА ЗНАННЯХ:
 ДОВЕДЕННЯ ГІПОТЕЗ**

У статті продемонстровано, що новими законами економіки, заснованої на знаннях, є закони, що регулюють процеси генерації та розповсюдження знань, їх фільтрацію та редукцію до стану інновацій. Методологію проведеного аналізу розроблено за допомогою загальнонаукових методів, а також міждисциплінарного підходу. Дане дослідження може стати орієнтиром для подальших наукових пошуків та основою для створення різноманітних систем управління в нових економічних умовах.

Ключові слова: закон реконфігурації знань; закон валоризації знань; закон асиметричності знань; закон нерівномірності розповсюдження знань серед економічних суб'єктів; закон фільтрації знань; генерація нових знань.

Табл. 1. Рис. 1. Літ. 12.

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**ЗАКОНЫ ЭКОНОМИКИ, ОСНОВАННОЙ НА ЗНАНИЯХ:
 ДОКАЗАТЕЛЬНОСТЬ ГИПОТЕЗ**

В статье показано, что новыми законами экономики, основанной на знаниях, являются законы, регулирующие процессы генерации и распространения знаний, их фильтрации и редукции в инновации. Методология проведенного анализа разработана с помощью общенаучных методов, а также междисциплинарного подхода. Данное исследование может служить ориентиром для дальнейших научных поисков и основой для создания различных систем управления в новых экономических условиях.

Ключевые слова: закон реконфигурации знаний; закон валоризации знаний; закон асимметричности знаний; закон неравномерности распространения знаний среди экономических субъектов; закон фильтрации знаний; генерация новых знаний.

*Nothing in this world is a gift.
 Whatever must be learned must
 be learned the hard way.
 C. Castaneda*

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Problem statement. Formation and development of knowledge-based economy as one of the fundamental directions of economic science predetermines the increased requirements among which the necessity of the analysis of the laws inherent to knowledge-based economy.

Latest research and publications analysis. The authors of this article have been working on the research knowledge-based economy issues for a long time. T.E. Stepanova for the first time formulated 2 new laws, inherent to knowledge-based economy – the law of knowledge reconfiguration and the law of knowledge valorization (Stepanova, 2007: 36–44; Stepanova and Manokhina, 2008: 238; Stepanova, 2012: 3–8). The textbook on knowledge economy was also written by the authors. Besides, T. Stepanova successfully develops the theory of institutional vacuum directly related to the research subject (Manokhina, 2008: 16–18; Manokhina, 2011: 44–48; Manokhina and Juravleva, 2013: 12–18).

The law of knowledge reconfiguration is the general economic law, but it has peculiar features which are specific for knowledge-based economy. Reconfiguration is the reproduction of object in constantly changing environment connected with transformation of its forms of manifestation. In the traditional economy, knowledge was not considered as the resource involved in the market, as well as possessing the accelerating value and profitability. The essence of knowledge reconfiguration can be explained by the necessity of knowledge transition from one form to another. For example, from an implicit form to explicit, from not codified to codified etc. It is caused by the requirements of using knowledge as an economic resource in its own configurations, allowing to apply them along with other economic resources – labor, capital etc. The discrepancy between knowledge and other resources applied in economy can lead to disproportions, for example, to deficit of highly skilled workers, to "brain drain" etc.

The law of knowledge valorization. Due to the exhaustion of traditional (natural) resources, that are scarce and limited, the importance of knowledge as an inexhaustible resource has significantly increased. It is objectively driven by the requirements of current socioeconomic development, modernization and shifting to new high-tech path of economic development as well as growing sophistication of economic relations between different actors. In innovation economy knowledge acts in a variety of forms – as a direct product of economic activity and final consumption; as a resource to be applied in production process; as a resource and a product of market distribution and transactions; an instrument of hoarding; measures of stimulating management processes and society consolidation. The process of knowledge valorization in economic activity can be confirmed by the following facts:

- development of educational services, increase of their volume and price in different countries;
- expansion of educational service export, that has become an important income item for a country-exporter;
- existence of direct dependency between the level of education and gained income (both in developed and developing countries);
- increase of labor costs, including training and obtaining qualification, professional competences;
- expansion of knowledge and economic sectors reliant on knowledge. By the end of the ninetieth of the 1990s the share of knowledge-intensive sectors was not less

than 60% of GDP in the USA (Kolchugina, 2003: 42–53). In 2009 the contribution of high-tech industries amounted to 7.6% of the US GDP (according to CeBit). Moreover, the processes of knowledge creation have been extremely intensified. So, 90% of knowledge (by quantity) were created during the last 30 years, 95% of scientists and engineers are living now. American scientist J.R. Flynn estimated that IQ of all planet inhabitants increased by approximately 20 points during the second half of the XXth century.

Research purpose. The authors find it possible to state a set of hypotheses and provide evidence supporting the existence of economic laws as well as focusing on their role in generation and reproduction of knowledge.

Key research findings.

Hypothesis No. 1. The law of knowledge, which is asymmetry relevant to the knowledge-based economy says: the extraordinary progress and expansion of information, as the main source of knowledge generation, coupled with knowledge, which is substantially personified for each economic agent, leads to growing and amplifying knowledge asymmetry.

Evidence of the authors' hypothesis. According to genetics all people (even before becoming an economic entity) as the representatives of the most developed species, possess a set of inherited qualities. Intelligence is one of these qualities. There are some signs of intelligence: speed of thinking, ability to think logically, memory, vocabulary, mathematical abilities, diligence, and other brain features. The fact that intelligence can be inherited is proven. Nevertheless, scientists have different points of view on the share of intelligence, that can be inherited. Australian scientists from Queensland, studying genes and testing IQ level of 18000 children at the age of 6 to 18 years from 4 countries: Australia, the Netherlands, Great Britain and the USA, found out that the child can inherit not more than 20% (and rarely – 40%) of parents' intelligence. However, there are results that are even more impressive. According to Dieter E. Zimmer's research, at least 75% of mental abilities can be inherited (Debus, 2012). He provides the results of the research project "Twins" of the American Research Institution, that studied uniovular twins (separated right after the birth) for more than 30 years. In spite of the fact that almost identical twins (from the genetic point of view) grew up in different social environments, they demonstrated amazing similarity.

The law of knowledge asymmetry does not exclude existence of the "common platform" of knowledge for all economic agents that can be caused by unified education system and macroeconomic environment in the country as well as identical global valuable knowledge.

The second argument in favor of knowledge asymmetry law. Knowledge is polymorphous. According to various criteria, developed by foreign and domestic scientists, knowledge is divided into explicit and implicit, theoretical and practical, personal and collective, scientific and common, reflexive and intuitive knowledge etc. (Stepanova and Manokhina, 2008: 238). Moreover, all people possess the unique system of knowledge, that is generated and reproduced as an exclusive specific resource and that does not have a complete analog. The process of knowledge generation is a private process and everyone can face some acquisitions and losses in this process. It's well-known D. Mendeleev's prophetic dream, that helped him discover the peri-

odic system and an apple falling on Newton and facilitating the discovery of the gravitation law. Courses are becoming popular teaching students some methods on how acquired in a dream skills can be applied in real life. Overall, the asymmetry and the discrepancy of knowledge can be explained by different factors, such as belonging to a particular professional group, gender characteristics, individual abilities, and the main thing is intelligence.

What does knowledge asymmetry as an economic law mean for the society?

It means:

- diversity of individual judgments and opinions, as well as solutions for one or another economic problem – the variation of such opinions can be significant;
- growing sophistication of the process of making a choice and a decision, finding consensus;
- increase in imputed costs (opportunity cost of choice), that refer to the value of a preferable alternative choice;
- growth of transaction costs related to the new type of economic relations in the field of property rights, in particular, on intellectual resources and economic freedoms.

Hypothesis No. 2. The law of uneven knowledge dispersion (distribution, diffusion) among economic actors refers to the existence of a set of channels for knowledge dispersion and their differentiation for certain individuals, groups, firms, enterprises, organizations, industries, regions, countries, global spaces.

This law explains why new ideas and knowledge, the part of which is realized in various innovations (technologies), extend with various speed and effect along vertical dimension of economic development, and along horizontal dimension of homogeneous (according to their economic development) economic actors, but essentially different (according to their content and the nature).

At the individual level, knowledge dispersion can be explained by personal mental abilities, cognitive abilities, status in society, and such noneconomic characteristics, as gender, age, and environment. Individuals, taking into account his/her own purposes and tasks, can choose a certain form of knowledge dispersion and combine it with other forms of knowledge dispersion in various combinations. For example, in addition to education at high school it is possible to choose home education, in institution – full time or distance forms of education. Today's generation prefers knowledge dispersion in network structures, in the Internet.

At the firm and organizational level knowledge dispersion (diffusion) also happens unevenly as knowledge generation is cyclical within this structure, and the process of knowledge dispersion is wavelike, covering gradually more and more wide range of individuals, their groups, employees of separate divisions etc. Knowledge dispersion happens unevenly even when equal access to knowledge (in appropriate form) is ensured by the firm or organization to its staff and that can be explained by the fact that at the level of the individual the process of knowledge assimilation is completely different due to different personal knowledge matrices and personal intelligence. So the law of knowledge asymmetry proves its coherent properties, that can affect the processes of new knowledge incorporation.

The law of uneven knowledge dispersion (distribution, diffusion) is relevant to similar processes in innovations diffusion. Innovation diffusion, because of new

knowledge dispersion, assumes the distribution of already implemented innovation in other firms, organizations, economic industries and sectors. It is the process of cumulative increase in number of simulators (followers) reimplementing innovation and trying to get higher profits. Diffusion of innovations is a part of the process oriented on technological systems development within economy, as well as an essential factor of economic growth and structural changes in economy. The growth of diffusion is related to market development, efficiency, and type of innovative policy, provided by the government. The speed of innovation diffusion depends on the level of IT development, innovative culture and methods chosen for information transfer. Taking into account all these factors it becomes obvious that innovation diffusion is a inhomogeneous process.

Knowledge dispersion takes place through different channels, both legal, and illegal. (Illegal channels are usually referred to as the violation of the existing legislation).

Knowledge dispersion through legal channels includes:

- learning in a family, in specialized childcare facilities (kindergarten, children's studios, development centers etc.);
- studying in various educational institutions (school, college, lyceum, higher education institution, corporate universities etc.);
- professional development, training etc.;
- exchange program in vocational training;
- self-education and transfer of gained knowledge to other specialists;
- learning through social networks with these, who have access to information on a particular intellectual or innovative product;
- immigration of researchers (brain drain);
- learning through social and business networks.

Knowledge dispersion is a self-regulating process (in many respects), which can take place even without government participation. Meanwhile, knowledge dispersion can occur from copyright owners and from individuals without these rights, but participating in the process of knowledge transfer on the legal cause (a tutor, a coacher).

Knowledge dispersion is the essential and constructive phenomenon in the national economy focused on wealthy future and economic development. It provides high-quality generation of knowledge as a basic resource, its effective use in different economic spheres and industries, society as a whole; it also provides high competitiveness of economic entities and national economy and strengthening its intellectual and innovative components.

Knowledge dispersion can occur through illegal channels. For the party receiving disseminated knowledge without legal author's rights, i.e. illegal way, this process manages much cheaper, than official acquisition and registration of these rights. Use of the rights acquired by an illegal way on intellectual property in the long term can cause serious organizational and administrative problems, for example, passing of any scientific work on anti-plagiarism and its removal at non-performance of the established parameters, giving to an indisputable fact of plagiarism of publicity and presentation of the rights from the valid owner on intellectual assets.

Knowledge dispersion is the process closely connected with other processes of knowledge reproduction, for example, integration of knowledge. The main charac-

teristics of knowledge integration and knowledge dispersion, including innovative knowledge as opposite are presented in Table 1.

Table 1. Main characteristics of knowledge integration and dispersion, author's construction

Knowledge integration	Knowledge dispersion
Strengthening of communications of horizontal, vertical type, intercountry knowledge	Lack of communication of horizontal, vertical type, intercountry knowledge in sector
Accurate, formal organization of activity in the sector of knowledge (educational process) within special establishments (school, higher education institutions)	Informal organization of activity in the sector of knowledge (self-education), carried out individually and/or collectively (at a workplace, at home, in the course of communication etc.)
Formal channels of communications between subjects (e.g., teacher-student)	Informal channels of communications between subjects (network societies)
Mutually advantageous cooperation of participants of process of knowledge integration (generators of knowledge, producers of new knowledge, translators of knowledge, consumers of knowledge etc.)	Personified benefits for participants of the process of knowledge dispersion – generation and translation of knowledge as a way of self-affirmation, self-expression, assignment of ideas, their commercialization etc.
Aiming at receiving positive economic result for all subjects of knowledge integration at present and in the future	Absence of accuracy aiming at obtaining benefits, intellectual rent from the processes of knowledge dispersion, when receiving this rent – disproportionality in its distribution between participants of knowledge dispersion

At present effective massive dispersion of information and knowledge through telecommunications, for specific subjects has already replaced traditional newspapers and magazines. Thus, practically dispersion is hidden in any written message, for example, in allocating words with a different size or font type, specific color, a special badge etc. Hidden instructions into telecasts are entered by means of "running line", conversation "off-screen", fast alternation of shots ect. In our country dispersion of knowledge by means of mass influence as promotion of certain ideological belief impacts the social consciousness and since there is no immunity to subconscious manipulations the effect from their application to subjects is considerable.

Hypothesis No. 3. Law of knowledge filtration. In the course of knowledge use by subjects their ranging on demanded and unclaimed, necessary and unnecessary, codified and not codified is made independently. F. Makh lup developed the classification of knowledge, the criteria for which was subjective allocating inter alia the special category of "unnecessary knowledge" (Mahlup, 1966: 462). The amount of knowledge, of course, influences the quality of mind, but knowledge orientation and depth have the main impact. Parameters of intellectual activity are diverse and include: speed of processes, analysis, synthesis, generalization, abstraction and others.

In the course of professional and other activity each subject consciously performs knowledge filtration, as shown in Figure 1. The filter for knowledge is the selection of knowledge and data in certain parameters. It is carried out according to a matrix of knowledge. Matrix of knowledge is the multidimensional system of knowledge, skills, abilities and experience of specific subjects in various areas. Matrix of knowledge is not abstract, but quite real object which can be designed and used in practice (www.gudok.ru, 18.06.2013).

The tricky question here is: to whom unnecessary knowledge is necessary? How to block access to useless, senseless knowledge and whether it is worth doing it – these

questions are open. Individuals quite often get unnecessary education as they do not work according to diploma and therefore such knowledge does not bring them any benefit or income. The person is trained the first 20+ years in various institutions, gets access to huge information flow which should be transformed into knowledge. Thus, scanty percent of received information and only a part of this generated stream of knowledge really helps in everyday and professional life, gives useful material.

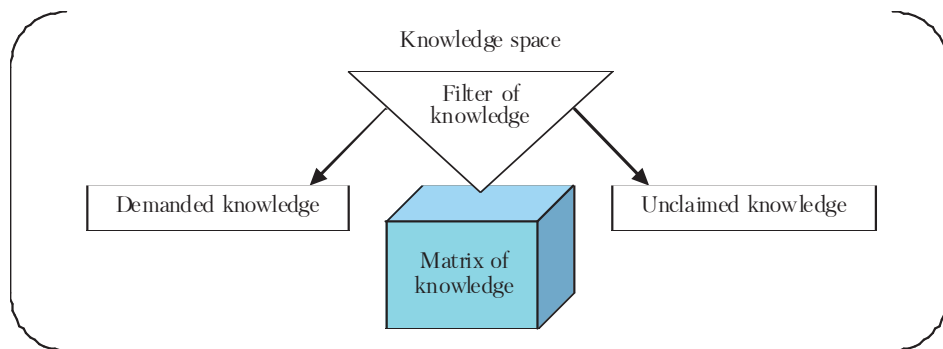


Figure 1. **Filtration and stratification of knowledge**, developed by the authors

We share the opinion of our colleague, A.P. Kolyadin, the author of the monograph "A fictitious component of human capital: conditions of formation and ways of minimization" (Kolyadin, 2011: 251), which has discovered the main form of a fictitious component of human capital in domestic educational and scientific sectors:

- insufficient level of general theoretical preparation and professional competences of many university graduates;
- irrational structure of graduated specialists group, which is not reflecting real market demands and a public sector of employment (distortion of professional education as a whole towards higher education, and within higher school – towards the humanities preferences);
- low readiness of university graduates for creative innovative activity;
- rather low economic return from fundamental and applied science expressed in weak commercialization of results.

The existence of a fictitious component in human capital confirms the existence of the law of knowledge filtration. We can add here the classical expression "Woe from Wit". Excessive competence can turn back against the expert: first, if in a company there is no possibility for development (professionally), unclaimed knowledge and abilities "will quickly burn" out a gifted employee. Secondly, the role of "ne-man band" working for three, sometimes threatens the very employer. And thirdly, "clever men" are not insured from the "star" illness which in a group obviously is never welcomed. Knowledge can turn back against the expert in case he instead of performing direct duties, for example, starts pointing out persistently the defects of colleagues' work in other departments and busily advise. On the other hand, initiatives and suggestions are, as a rule, welcomed if an employee is engaged in their development in off-duty time, with management approval, and behind them there is a real desire to optimize this or that process.

Hypothesis No. 4. The discretization law (discontinuity and irregularity) generation of new knowledge and their reduction into an innovation.

Discretization (discontinuity and irregularity) of new knowledge generation and its reduction into an innovation is caused by a variety of reasons:

- objectivity of transition processes of quantitative changes into qualitative ones (expansion of categorial tools and methods of scientific analysis to noneconomic spheres, for example, biology, (genes, the theory of natural selection, thermodynamics laws etc.) leads to the emergence of new theories and concepts, for example, quantum economy, Darwin economy etc.;

- objectivity of the processes of new knowledge generation in time and space where coordinates are, variables, and communication between them can be nonlinear (the non-Euclidean space time bent by gravitation);

- existence of the expenses connected directly with the process of new knowledge creation, development and distribution of new knowledge, its update and materialization in different innovations, growth of transactional expenses connected with the interaction of subjects, personifying processes of knowledge reproduction at its various stages of the innovative cycle etc.;

- existence in each structure (firm, organization) of the continuous movement (flow) of information and available knowledge. Along with these continuous streams far not in each structure there is an objective process of new knowledge institutionalization. It should be carried within scientific, educational structures, engaged in innovative activity. Any research is initiated by a specific scientific problem, received scientific results and ideas pass discussion at seminars, conferences, are stated in master's and doctoral theses etc. Codified and verified scientific knowledge in the form of monographs, articles, theses (printed or in electronic form) becomes available to a more wide range of researchers. Further, the process of new scientific knowledge creation assumes generalization and analysis of available scientific knowledge in this direction of research, definition of development prospects in this scientific course, development of hypotheses, systems of proofs for put-forward provisions, planning and carrying out experiments, interpretation of the obtained data, creation of theories and concepts, check of the received results, distribution of new knowledge and its acceptance in the science world.

This law visually is confirmed by global scientists and realities. J. Horgan's private judgment is reduced to the following: "If you trust in science, has to acknowledge the possibility – even probability – that the era of great discoveries ended... Further researches will not give great discoveries or revolutions, but only small insignificant return". Today's scientists were born too late. For ambitions contemporary scientists there remains, according to J. Horgan, only one opportunity: "to pursue science of speculative, post-modernist type (Horgan, 2001: 479). In this work some reasons which can stop science development in the long term are allocated:

- a gap between natural sciences and humanities as a result of which natural sciences know "how to do", but do not know "that" (as meanings and values appeared out of their field of vision), and humanitarian disciplines, in the majority, remain sciences about opinions;

- differentiation as a result of which scientists even working in adjacent areas, lose common language;

- decreased returns from fundamental sciences. Often, new technologies and new types of social organization do not give great effects.

Conclusions. Laws of knowledge-based economy are a peculiar compass and have to be the basis for economic strategy of innovative development. They can be used in knowledge management in corporations and various other professional areas.

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