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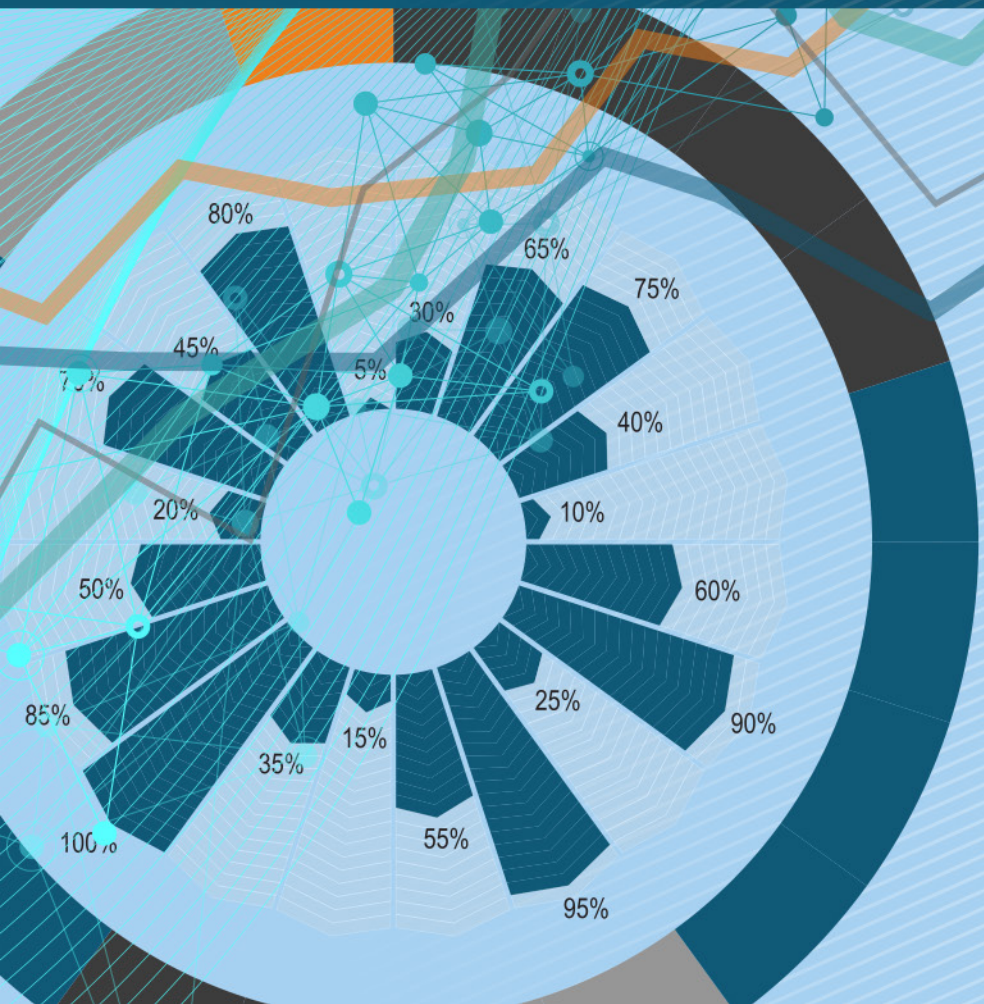

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Contents

Evolution and systematisation of competition theory

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Abstract. The article provides a brief historical and economic analysis of the concept of «competition». Also it attempts to systematize the conceptual and categorical structure of the general theory of competition. Paper reveals the «cell» structure of separate competitive economic relations and some factors of competitive relations development in modern conditions The following conclusions can be drawn: competitive relations as a real object, competition as a subject of research of world economic science have a centuries-long history. Competition is one of the universal driving forces and forms of development of human society, a concrete manifestation of universal laws of dialectics in social life, and first of all in the sphere of economy. The basic conceptual and categorical structure of the general theory of competition, consisting of the following concepts: competition – competitor(s) – competitiveness – competitive power – competitive will – competitive quality – competitive attitude(s) – competitive environment – competitive advantage – competitive factor – innovative competitive factor, structure of a separate competitive attitude with the author's definitions of each of them. The elementary structure of a separate competitive economic relation in the unity of competitive relations subjects (SCR) – people, economic structures and institutions; objects (subjects) of CER; economic interests (EI) of CER, economic contradictions (EC) of CER; laws (moral, economic, political, legal), regulating competitive economic relations and mechanisms of their contradictions resolution. The systematized conceptual and categorical apparatus of the general theory of competition and the developed structural model of a separate competitive economic relationship. It will allow further deepening of theoretical research of the phenomenon of competition, as well as their effective use in the implementation of government programs of a particular country, in this case the Republic of Kazakhstan on innovative development of national economy in the coordinates of modern and future world history, according to the authors. The dialectic of competition and monopoly is traced and the role of economic de-monopolization as an effective factor in the development of competitive relations in the modern economic system is revealed.

Keywords: competition, monopoly, competitor(s), competitiveness, competitive power, competitive will, competitive quality, competitive attitude(s), competitive environment, competitive advantage, competitive factor, innovative competitive factor, structure of competitive, economic relations, demonopolization of the economy.

JEL codes: B12, B41, D41

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Introduction

Competition as a subject of research of the world economic science has a long (300-year) history. The beginning of the research can be conventionally considered as a fundamental work of the outstanding Scotsman, a bright representative of the classical English political economy Adam Smith in his work "The Wealth of Nations" (1776).

We say "conditionally" because long before Adam Smith, Thomas Hobbes (1588-1679) tried to define it, describing "competition as a war of all against all". During this period in the world economic literature thousands of books, articles, and dissertations covering mainly different aspects of economic competition were published and defended.

As we know from the Latin language "competition" translates as "to clash", and in the beginning it meant the struggle of sellers for favourable conditions for the sale of their goods. But during the historical development of human society, the concept of competition has undergone a number of metamorphoses. Adam Smith already defined competition among producers, calling it the "invisible hand" ("the power of providence") that guides the subjective aspirations of entrepreneurs in the objective direction of progressive development.

He defined the economic freedom as a "free competition". Only free competition, by setting "natural price" and differentiating commodity producers, serves as a regulator of commodity production. Subsequently, K. Marx, describing the place and role of competition, wrote that no category of bourgeois economy, not even the very first one, such as the definition of value, becomes valid otherwise than through free competition.

However, the era of free competition was replaced by the phenomenon of "monopoly". It is a kind of antipode of competition, which is objectively generated by competition itself through concentration and centralization of capital and production. It allows V. I. Lenin to justify the necessity of the socialist revolution in the monopolistic phase of capitalism, which is the decaying stage of the socialist revolution. But the resulting socialist economy turned out to be totally monopolistic and led to stagnation.

During the Soviet period, Soviet economic science in general, and, within it, Russian economic science, followed by Kazakh economic science, fell out of the sphere of world economic thought on the subject, because the Bolsheviks managed to eliminate competition as a "subject" of research by changing the socio-economic system itself.

We think the English-speaking reader will be interested in the studies of competition in the period of the centrally planned socialist economy. The ideological (class) confrontation between two opposing socio-economic systems, the USSR and the Western counties, led to a new direction of research – the substitution of "competition" with so-called "competition" by socialist principles. Because under the conditions of a centrally planned economy based on public ownership of the means of production, which prohibited a system of private ownership and private enterprise, the real conditions for the existence of competitive relations disappeared.

Realizing that in the face of competition the USSR economy was losing its driving force and incentive to develop, Soviet science and ideology instead of competition in the 1930s proposed the idea of "socialist competition" with an organizational centre called the All-Union Organization of Socialist Competition, led by the CPSU Central Committee. However, the surrogate for competition could not sufficiently replace competition, which eventually led to the stagnation of the Soviet economy as early as the 1980s.

Since the above, the intermediate conclusion is that Soviet science could not participate in the general development of world competition science. Instead, hundreds of pseudo-scientific papers were written, defending scientific dissertations about the outstanding role and importance of socialist competition. Thus, because of the "opportunistic-political" regulation by the country's administrative-command leadership of humanitarian science in general and scientific research in the field of competition in particular, the Soviet science was eliminated from the world competition research process.

At the same time, it is an indisputable historical fact that the Soviet planned economy of the USSR achieved enormous successes in the development of science, space exploration, education, and health care, etc. It was the basis for the victory over Nazi Germany and Japan in World War II. The successes were axiomatic. But there were flaws in the administrative-command, centrally-planned system of economy of the Soviet period. The main flaw was the all-encompassing "state monopoly" not only in the economy, but in all spheres of social life. The undeniable truth is that any national economy is leading to the stagnation outside of competitive relations, which has been proven by historical reality. That was the lesson of the seventy-year experiment to create a classless society: without private initiative, without entrepreneurship, private property and, of course, competition.

The end of the free competition era, when "free competition" was the driving force, regulator and catalyst of progress, a real mechanism for ensuring economic efficiency and establishing general market equilibrium, was marked in Western economic thought by the Austrian economist and sociologist Johann Schumpeter's concept of "effective competition" and "effective monopoly".

Later research by E. Chamberlin (Chamberlin, 1996) and J. Robinson (Robinson, 1986) led to an understanding of the compatibility of the antipode's "monopoly" and "competition" in the market structure in the form of "monopolistic competition", and the division of competition itself into "perfect competition" and "imperfect competition".

As a result of a series of metamorphoses of competitive relations in a modern market-oriented or so-called "mixed economy", four models of the market system coexist relatively "peacefully": "perfect competition" or polypoly (free competition proper), "pure monopoly" (mainly in the form of "natural monopolies"), "oligopoly" (oligopsony) and "monopolistic competition". However, from the point of view of a modern economist, an attempt to restore the former classical economic functions of free competition would not be correct; they can only hypothetically take place in societies with emerging market relations.

At the same time, it would be incorrect to deny the objective role of the competition law as a real mechanism of manifestation of universal laws of dialectics in the development of human society (the law of unity and struggle of opposites, the law of negation, and the law of mutual transition of quantitative changes into qualitative ones). Therefore, at present, it would be more appropriate and scientifically correct to operate with the category of "competitive relation(s)". However, this category in itself is very complex, and we will therefore provide a more coherent conceptual and categorical apparatus for the whole system of competitive relations in which it has its real place.

Main Part

1. The theory and structure of the individual competitive relationship through the prism of the conceptual and categorical structure of the competition phenomenon

"Competitive attitude(s)" as both a concept and a reality is a highly complex phenomenon. As a real phenomenon, "competitive attitude(s)" is (are) inherent in both the biological, social, and scientific worlds (if only in interpreting the nature, structure, and function of "competition" as a basic component of any competitive attitude). Hence a separate "competitive attitude" (competition), despite the existence of a huge number of studies of the theory and practice of competitive relations, needs a systemic conceptual and categorical analysis in order to reach its proper structure which is subsequently the basis of deployment of the entire system of competitive relations as an immanent attribute of market economic relations in general.

We begin with a brief historical economic analysis of the background. In the Subject Index of Michael Porter's well-known book "Competition", he provides 20 concepts and expressions, including the basic concept of "competition". At the same time, not all of these concepts have an appropriate definition (Porter, 2005). It is typical for many foreign authors. The "Subject Index" of Russian economist Y.B. Rubin's monograph "Competition: Orderly Interaction in Professional Business" contains 198 concepts and expressions including the basic term "competition" and there is no definition of many basic, derived concepts and phrases related to competition theory (Rubin, 2008).

We know that one of the ways to define a concept is when "...first the concept to be defined is subsumed under a broader concept – the genus (usually the nearest genus is indicated), then the features distinguishing the defined concepts from other concepts that also belong to the same nearest genus are indicated" (Bohr, 1998). Let's see how the definitions of competition contained in economic and legal encyclopedias and dictionaries correspond to these recommendations.

V.A. Gordeev notes (2008) that among modern economic dictionaries and encyclopedias the most detailed definition of competition is given in the well-known economic encyclopedia IE RAS. It is stated there that the word "competition" comes from Latin "concurrentia" – to collide and it has two lexical meanings: 1) confrontation, competition between producers of goods and services for the opportunity to increase profit; 2) the existence on the market of a set of producers (sellers) and buyers and the possibility of their free entry to the market and exit from it. However, this second meaning of the term "competition" is close to the neo-classical theory which is widespread in modern "economics" textbooks. According to our understanding, this meaning of "competition" somewhat contradicts the characteristic of "imperfect competition", which is further correctly disclosed in the encyclopedia.

The other meaning of the term "competition" is also found in modern economic dictionaries and encyclopedias. It also corresponds to the definition given back in 1973 in the "Great Soviet Encyclopedia", except for the adjective "antagonistic". The recognition of antagonism, however, has not entirely disappeared from today's dictionaries. For example, L.I. Lopatnikov's definition (Lopatnikov, 1996) states that market participants pursue their goals (primarily – to sell goods with maximum profit or to buy goods with minimum costs) to the detriment of others, also pursuing similar goals; that is, in a sense, market participants pursue mutually exclusive goals.

"The Great Dictionary of Economics", ed. by A.N. Azrilian, besides the definition of unfair competition (such definition is also contained in the "Economic Encyclopedia" of the IE RAS), provides a detailed description of predatory competition. At the same time, a number of publications provide "antagonistic" features of competition. For example, B.A. Raizberg and L.Sh. Lozovsky's dictionary: Competition represents a civilized, legalized form of struggle for existence and one of the most effective mechanisms of selection and regulation in the market economy (Raizberg et al., 2001).

There are different methodological approaches and theoretical constructions to the analysis of competition, ranging from the well-known formula that competition is "war of all against all" (Hobbes) to the less-known use of the term "competition" as a special form of cooperation between rival firms.

To summarize the above, there are three methodological approaches to defining the economic content of this concept in the scientific literature: behavioral, structural, and functional.

1) Historically, the "behavioral" approach was the first to define competition. Neoclassical theory, adopting a behavioral approach, defines the content of competition as a struggle for "rare economic goods".

2) According to the "structural" approach, the content of competition is determined by the "type" of market and the conditions that prevail in it.

3) The "functional" approach shifts the examination of the economic essence of competition towards an examination of its place, purpose and role in economic development.

Regarding these methodological approaches, we should note that they do not contradict each other; they characterize competition at different stages and levels of its essential expression.

To comply with the "principle of consistency" of the further presentation of the subject we study – competition – it is necessary to disclose the basic range of conceptual and categorical apparatus of the theory of competition and competitive relations. The process of their cognition and research is provided with its help.

Therefore, "competition" in the sense of "to be equal to others", "to keep up with others", is an attributive property of "encounter" and a universal condition of survival of all living biological and social beings. It is the real process. This objective phenomenon gets its external expression in the behavior, structure, functioning of various organic and social systems. Hence the above-mentioned various approaches to the nature of competition, namely: behavioral, structural, functional, in our opinion, are nothing but specific forms of external expression of the unified essence of competition – an inherent attributive property of all biosocial and/or sociobiological "organism" to "collide" with each other.

"Competitor" – rival(s), i.e. personified bearers, subjects of competition, in this case economic entities (systems) of different levels of organization.

"Competitiveness" is an inherent property, an intrinsic attribute of competition as a real process, a phenomenon and of competitors as personified subjects (bearers) of competition.

"Competitiveness" is a measure (degree, level, acuteness) of expressed competitiveness of a system (entity) as an inherent property, an immanent attribute of competition as a process, phenomenon, and real competitors as the main subjects of this process, phenomenon. This measure, i.e. competitiveness, is in turn determined by the "competitive power" and "competitive will" of the competing systems and actors.

By "competitive strength" we mean the set of traits and parameters that make it possible, the willingness of a system (entity) to act actively in order to achieve greater benefits and advantages relative to others.

By "competitive will" we mean the highest manifestation of the universal, intellectual and spiritual-moral tension and orientation of action (entelechy) of the subject of competition in achieving the cherished desires and the ultimate goal of being the best, having more benefits and advantages over others.

The unity of competitive force and competitive will can be denoted by the notion of "competitive quality" or "competitive advantage" which consists of a set of specific quantitative and qualitative "force" and "will" features and parameters of the system (entity) inherent in it potentially and currently, naturally and artificially acquired, so necessary to achieve the goal sought and realized under certain conditions. The competitive quality (competitive advantage) is a kind of "hard core" of the competitor(s) and the competing system(s). In this status it is an internal (endogenous) factor of competition, competitiveness of this system.

Competitiveness is both potential, possible in principle, and actual, actualized competitiveness. Potential competitiveness of an entity is determined by a combination of competitive strength and competitive will i.e. the competitive quality of that entity, whereas its real, actual competitiveness is determined by comparing and contrasting its competitive quality with the competitive quality (competitive strength plus competitive will) of its counterpart or competitor. It is only when they actually meet (in person or in absentia) the criteria that competitiveness of both the former and the latter is determined in the process of their clash.

Thus, the final, realized, competitiveness is determined and depends on the competitive will of the counterparties. If their competitive strength is equal, the competition is won by the one who has a more pronounced, powerful and expressive will (calculation: tactics and strategy, patience, coolness, wisdom), i.e. the desired goal. In other words, the "winner" in competition is the one who has the most expressive competitive quality (competitive advantage) as the unity of competitive strength and competitive will.

Thus, ultimate, real competitiveness is formed by the synergistic synthesis of competitive forces, competitive wills – "competitive qualities" (competitive advantages) of counterparties (actors) in their real, actual collision in a particular space and time, i.e. in their attitude and relationship with each other in the process of competitive interaction.

Competition as a process, as a phenomenon, as an attitude takes place only in a specific spatial and temporal environment, which can be called a "competitive environment". If "environment" is everything that surrounds the system and interacts with it in any way, then "competitive environment" refers to the totality of all geographical space external to the competing system, all sorts of conditions, factors and norms that predetermine its actual behaviour, structure and functions.

In other words, the competitiveness of a system depends not only on the internal competitive qualities of that system, but also on "external factors and conditions", i.e. other, more general systems and structures called, for the first system (entity), the "competitive environment" surrounding, enveloping and interacting with that system. At the same time, it is necessary to distinguish between "specific" potential competitive environment" and "actual competitive environment", i.e. actually affecting this system, as well as "general" competitive environment affecting all competing systems in the same way. The latter is formed, first of all, within the formal and informal institutional environment available, as well as a broad "social background" in the form of the system of social relations. Therefore, competition, competitiveness, competitive quality, respectively, are a competitive attitude, as a process, as an activity, as a form of discovering a certain phenomenon, thing. The phenomenon cannot be other than productive attitude(s) in the form of socioeconomic relations.

Thus, the competitiveness of a system (entity) consists of the internal (endogenous) competitive qualities of both this system and its competitor (counterpart) as well as the external (exogenous) factors arising from potential and actual relations and interactions between competing systems and entities which, in turn, are expressed in the notion of "competitive attitude" (competitive relations). The concept of "relation" is from the Latin "relatio" – relative. So "relation" is from "relative", from relating something to something, someone to someone on some "basis" (object, weight, condition, volume, norm, significance, degree, etc.). Consequently, "relation" is derived from the dependence and interdependence (objective and subjective) of the subjects on some correlated basis – the object, the attribute, behind which, ultimately, there is a universal connection. Although it should be emphasized that not every relation is a direct relation; it is, rather, a mediated relation, an "eventual relation".

Transferring this understanding of "attitude" to competition leads to the concept of "competitive attitude(s)". "Competitive attitude(s)" – is (are) the relationship(s) which occur between various like-minded (in this case business) entities in relation to a certain object (subject matter) of activity in order to achieve

certain advantages and benefits in relation to each other, i.e. "competitive advantage". In turn, the competitive advantage of a given economic entity (system) depends on many driving forces – competitive factors": subjective and objective, general and specific, internal (endogenous) and external (exogenous), intra- and extra-(inter)state.

The consideration by a business entity of all its competitive advantages and competitive factors must ultimately lead to the development of its 'competitive strategy' – whether to conduct a single, profitable business or a reasonable diversification activity across the time-space continuum: in the short, medium, long and ultra-long term. Here competitive strategy is implemented through 'competitive tactics' and is closely intertwined with the 'corporate strategy' of the firm, the company, the country's industry as a whole.

So, at this stage of the conceptual and categorical analysis of competition theory, the logic of the concepts discussed above is as follows: competition – competitor(s) – competitiveness – competitive ability – competitive power – competitive will – competitive quality – competitive attitude(s) – competitive environment – competitive advantage – competitive factor(s) – competitive strategy.

Therefore, there is no market without competition, but competition in its "primordial" form – as "rivalry", i.e. as "competition" will always be present, for example, sports competitions or cultural contests. But a market will only be a market if there is competition which, in turn, will only become stronger or weaker if there is a "competitive factor" or a whole system of "competitive factors" – geo-territorial, resource, political, social, legal, cultural, moral, and international.

Of the above system of conceptual and categorical frameworks, the key concept is that of "competitive relation(s)". The issue is the structure of the individual competitive economic relationship which is the starting point of the whole system of competitive relations in human society. We present the structure of an individual competitive economic relation of creatively using and developing the methodological approach by Professor O.Y. Mamedov to the structure of an individual industrial relation (Mamedov, 1997) as follows (Fig.1).

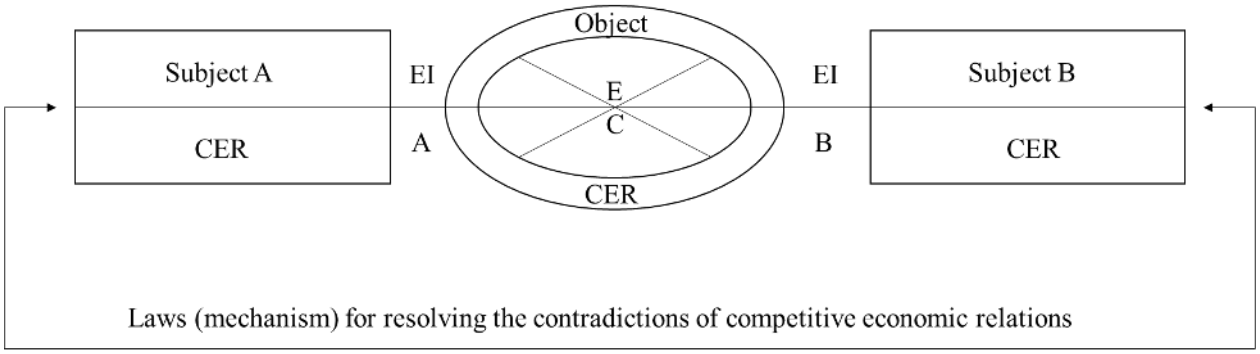

Figure 1. "Cellular" structure of a separate competitive economic relation
Source: composed by the authors

Competitive economic relations (CER) of people as a subject of market economy is an organic unity: subjects of competitive relations (SCR) – people, economic structures and institutions; objects (subjects) of CER; economic interests (EI) of CER, economic contradictions (EC) of CER; laws (moral, economic, political, legal), regulating competitive economic relations and mechanisms of their contradictions. This theoretical "structural-cell" model of an individual competitive economic relationship has not only an important gnoseological (cognitive), but also a huge practical-applied value, having the greatest "explanatory and solving power" in solving any specific socio-economic problem arising from the mismatch of economic interests of the subjects of competitive economic relations.

2. From the theory of competitive relations to the practice of competitive relations

The development of competitive relations is the establishment of optimal ratios between the various market models in a country's economy. The higher, other things being equal, the higher the proportion of perfectly competitive market structures and the lower the proportion of monopoly structures, the higher the degree of intensity of competitive relations in society.

However, the relationship between the different patterns of market structures in an economy depends

on many economic factors such as the aggregate of goods and services produced and sold the nature of the elasticity of demand for them, which is related to the availability of substitute goods, economies of scale in production, etc. They all derive from the specialization of the main branches of the national economy of a given country and the level of effective demand of its population.

The latter factor is also important because it is the result of consumer competition, which unfortunately has not received sufficient attention. But in a market economy, where the buyer-consumer "commands", their wishes and actions are in no small measure governed and counterbalanced by consumer competition as much as free competition fulfills its functions in production, exchange, and distribution.

Conceptually, the development of competitive relations in a country's economy should not be based on the classical or neoclassical constructs, but rather on the theoretical constructs of institutionalism.

The well-known neoclassical concept of comparative advantage, transformed into a model of "relative abundance of one of the factors of production" or Heckscher-Ohlin theory. Samuelson's theory that a policy of free-trade will lead to an international division of labour. Also there is a rational specialization for both the capital-intensive rich country and the labour-intensive poor country, an optimal allocation of resources at the world level maximizing national income for both partner countries, is no longer exist.

For example, statistics on the national income gap between traditionally rich and poor countries show that the gap is steadily widening. For example, the gap between "developed" and "developing" countries is steadily growing from century to century: if at the beginning of the 19th century the income level of these countries differed about twice, and in the middle of the 20th century it was already 17-25 times, then at the beginning of the new third millennium it was 60-70 times!

Thus, the objective automatism of universal world equilibrium is in interactions between different countries on the basis of their comparative advantages. In our view, of crucial importance in such partnership relations is the worst international specialization for poor countries, which excludes the necessary conditions for the development of competitive relations within the 'poor' economy and thus makes it uncompetitive. After all, the generally accepted criterion of economic competitiveness, developed by M. Porter, is productivity measured by the ratio of GNP per capita. And by this indicator, for example, the Republic of Kazakhstan lags far behind many foreign countries.

Consequently, in our opinion, the competitiveness of the economy of a certain country cannot take place spontaneously, on the basis of free world competition, without government intervention. This is evidenced by the experience of a number of economically advanced countries of the world.

Let us start with the UK's experience as reflected in its "White Paper". It notes that the UK government will play a key role in the economy. Thus, while British public policy in the 1960s and 1970s emphasized anticipation. Now, by mastering the appropriate tools and mechanisms for managing the economy, the government is creating a new model of public policy aimed at productivity growth and business efficiency, i.e. working towards a competitive (competitive quality) national economy as a whole. At the same time, one of the primary tasks for the government of this country is to gain business confidence, i.e. to create conditions for entrepreneurs to invest their capital for the long term without fear of losing it, and for business to become more productive.

The UK government also intends to influence the development of new ideas vertically – through local organizations and horizontally – by developing a supply chain of mutual benefit (clusters). In this way, it will play a significant role in the endorsement business alongside universities and benchmarking research institutes.

In the past post-Soviet period in Kazakhstan, following the Russian Federation, a large number of studies on various aspects of competition have been carried out. During this time there has been a growing demand for coverage of the problems of de-monopolization, understood not as a single regulatory action but as a global process of restoring the foundations of competition in the economy and in all spheres of social life.

But, unfortunately, de-monopolization by the existing authorities of Kazakhstan (and Russia, too), was perceived in a one-sided way and it referred only to the sphere of interaction of separate economic entities, mainly enterprises and companies. Because of it all carried out market reforms were at a level of performance

of Programs of privatization and denationalization. As a result, the task of creating a third class, i.e. a class of entrepreneurs, was carried out formally and was external in nature, without touching the inner structure of the economic system. Instead of real, active entrepreneurs, who have evolved over the centuries from people with entrepreneurial abilities, with the quality of competitiveness and enterprise, we have more entrepreneurs in form than in content, as well as such "businessmen", who were closer to the power structure – in fact, non-competitive entrepreneurs.

In addition, the tradition of "state monopolism" has proven to be stronger than anticipated. As a result, the monopoly of large state-owned enterprises persists, while small and medium-sized enterprises, unable to compete with large businesses, and cannot rise to the top. Large enterprises, on the other hand, enjoy the protection of the state, as they are national companies with significant state ownership in their assets. At the same time, the national large companies, without bothering to partner with small and medium-sized enterprises, have started to create new structures in the form of so-called "quasi-public enterprises". All this is currently hindering economic development and preventing the achievement of the required rates of economic growth and, moreover, economic development and the required economic proportions both between the various stages of the reproduction process and between the branches (spheres) of the economy as a result of competitive forces and factors.

In our opinion, the reason for these negative processes is primarily the lack of a common methodology in understanding by the authorities of the country of the essence of competition as a universal social phenomenon, as well as the essence of de-monopolization as a general effective reform of all aspects of social life that was especially important during the transition from a totalitarian system to the rails of a market economy. Of course, strategic objects of the national economy should remain in the orbit of state ownership and, consequently, state monopoly. In this respect, the policy of the leadership of modern Kazakhstan aimed, firstly, at de-monopolization of the economy and, secondly, at the governmentalization of a number of objects of strategic importance, we believe, will play a very positive role in establishing normal (healthy) competitive relations in various sectors, spheres and structures of the national economy as a whole. Let us then briefly consider the "de-monopolization policy" of the economy as a factor for strengthening competitive relations.

As we know, the antipode of competition is monopoly. The word "monopoly" in the "Etymological Dictionary of the Russian language" by M. Fasmer, from the Greek means monopoleo "a single right to sell". And the term "monopoly" has traditionally been closely associated with economic activities of people. Only in the "Dictionary of the Russian language" by S.I. Ozhegov the word "monopoly" is given in a broader interpretation, namely: "a preferential right, a special position of someone in comparison with others".

In our view, a monopoly is a dominant and exclusive right which provides someone (state, clan, firm, institution, organization, representatives of certain types of activity, etc.) with special prevailing, predominant (privileged) conditions in acquiring limited resources and goods.

We note that types and areas of competition are also characteristic of monopolies. The general philosophical and methodological basis, i.e. the dialectic of the theory of competition and monopoly in unity, is known to have been developed by K. Marx. In particular, he wrote: "In modern economic life you will find not only competition and monopoly, but also their synthesis, which is not a formula but a movement. Monopoly gives rise to competition, competition gives rise to monopoly" (Marx, 1968). Monopolists compete with each other, competitors become monopolists. The synthesis is that a monopoly can only hold on because it is constantly engaged in competitive struggle.

The dialectics of competition are such that it is unable to maintain itself in its "pure" form and leads to the emergence of monopoly. A monopoly in an economy, by breaking the mechanism of market self-regulation based on competition, paralyses its development and leads to stagnation. However, the power of monopoly in an open market economy is temporary and relatively limited. With world integration, a domestic monopoly competes with its counterparts on the external market, and with globalization and the formation of a single world market, monopolies are not particularly dangerous. Nevertheless, within a single country, the operation of monopoly significantly threatens the development of normal competitive relations between economic entities, reducing the productivity of social labour as an indicator of the country's international

competitiveness. Therefore, since a certain time individual countries of the world have started to develop and apply anti-monopoly measures.

Global historical antitrust practice dates back to the end of the US Civil War (1870-1880); the antitrust laws of Alabama (1883) and Kansas (1889); the first antitrust legislation in world history – the" Sherman Act" (1889); the second US law – the "Clayton Act" (1914). The main result of these laws was the recognition of monopoly and "limited trade", e.g. collusion in pricing, division of markets among competitors, certain types of mergers, and criminal offence against the federal government. In this way, the world of market economy has embarked on a civilized, legislative struggle against monopolization, for the development of competitive relations.

Whereas de-monopolization, as understood by economists in traditionally market economies, means only the unbundling, reorganization or splitting up of individual large monopolistic enterprises with a large market share, for post-socialist countries, which had a command economy in the past, the meaning and significance of de-monopolization is much broader and deeper. De-monopolization in the transitional economies of the post-Soviet countries means deep fundamental changes in the economic system as a whole, affecting the essence of all ongoing market transformations. In the course of such de-monopolization all the prerequisites of the necessary conditions are created and objective factors emerge for the formation and development of a system of competitive relations in the economy.

The institutional transformation of the economy, including de-monopolization, with the exception of state monopoly on certain strategic objects and occupations, primarily involves the establishment of a genuine meritocratic regime as the basis for the development of competition in all spheres of social life. Competition and meritocracy presuppose each other. Multiparty system, rule of law, free expression of will within the framework of accepted public morality, equality of all before legal laws, open the way for the development of competition in political, ideological, economic, cultural, educational, scientific and informational spheres of life.

De-monopolization of the economy should contribute to the formation of a competitive structure of social production; there should be a sufficient number of producers of different kinds of goods on the market to ensure full competition in the course of their production and sale. The freedom of competing economic subjects is impossible without their full responsibility for the results of their economic activity, based on the equality of all forms and types of ownership. After all, the meaning of ownership is to clearly define who bears property responsibility for the results of economic activity.

Meanwhile, the social, economic, moral, and even elementary legal responsibility for the final results of activity of owners – subjects of state, quasi-state and private property in the Republic of Kazakhstan in the post-Soviet period was, unfortunately, a complete mess, if not chaos. All this could not but play a negative role in the formation of effective competitive relations and competitiveness of the country's national economy both domestically and internationally, for example, within the framework of the EEU. At the same time, there is hope that the new top leadership of our country will make every effort to revitalize and transform Kazakhstan's society under the slogan of a new economic course and a fair social policy.

Conclusions

Concluding this analysis, the following conclusions can be drawn:

1. Competitive relations as a real object, competition as a subject of research of world economic science have a centuries-long history. Competition is one of the universal driving forces and forms of development of human society, a concrete manifestation of universal laws of dialectics in social life, and first of all in the sphere of economy.

2. The basic conceptual and categorical structure of the general theory of competition, consisting of the following concepts: competition – competitor(s) – competitiveness – competitive power – competitive will – competitive quality – competitive attitude(s) – competitive environment – competitive advantage – competitive factor – innovative competitive factor, structure of a separate competitive attitude with the author's definitions of each of them.

3. The elementary structure of a separate competitive economic relation in the unity of competitive relations subjects (SCR) – people, economic structures and institutions; objects (subjects) of CER; economic interests (EI) of CER, economic contradictions (EC) of CER; laws (moral, economic, political, legal), regulating competitive economic relations and mechanisms of their contradictions resolution.

4. The systematized conceptual and categorical apparatus of the general theory of competition and the developed structural model of a separate competitive economic relationship. It will allow further deepening of theoretical research of the phenomenon of competition, as well as their effective use in the implementation of government programs of a particular country, in this case the Republic of Kazakhstan on innovative development of national economy in the coordinates of modern and future world history, according to the authors.

5. The dialectic of competition and monopoly is traced and the role of economic de-monopolization as an effective factor in the development of competitive relations in the modern economic system is revealed.

In summary, this article examines the most general issues of competition and monopoly theory and competitive relations as a kind of introduction to these fundamental categories of market economics.

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Sectoral analysis of the possibility of strengthening the position of developing countries in the global financial market

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Abstract. The dollar-centric framework of the modern global monetary and financial system (GMFS) is the cause of increasing global imbalances. These imbalances formed both between individual actors of the world economy, and between groups of countries in the sphere of international monetary and financial relations and financial markets. The strengthening of the position of developing countries in the global economy raises the question of the need to strengthen the competitive position of their currencies. The aim of the research is to identify the key points, the impact on which can strengthen the position of developing countries in the global financial market. The authors' hypothesis was to substantiate the possibilities of strengthening the positions of developing countries in the global financial market (GFM) within the trend of currency polycentricity through targeted influence of interested actors on certain parameters of GFM sectoral development. The study objectives are to analyze trends in these segments of the international financial market and build an econometric model of its sectoral development. We aimed the analysis of peculiarities and trends of development of the main segments of the GFM at identifying factors of sectoral development capable of ensuring the strengthening of the position of currencies of developing countries in the existing macroeconomic conditions. As a result of the study, we define the key factors, the impact on which is able to ensure the growth of the international financial market and the expansion of the use of currencies of developing countries. Testing of the model showed the expected growth of 8% GFM. We revealed that the global financial market is the most sensitive to changes in the share of non-dealer financial institutions in the foreign exchange market, foreign exchange market turnover, and the share of technological innovation. The results of the study became especially relevant in conditions of Russia's isolation from the GMFS and may be in demand, given the need to develop the target sectors of regional and national financial markets.

Keywords: global financial market, sectoral development, developing countries, currency polycentrism.

JEL codes: G15, G17

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Introduction

The loss of the U.S. leading positions in global exports and foreign direct investments indicates the unhealthy dominance of the U.S. dollar in various segments of the global financial market (GFM) in particular and in the GMFS in general (Eichengreen, 2013). Confidence in the U.S. currency is undermined by political manipulation in the financial sphere, disagreements with partners (Timofeev, 2019), a growing public debt (Timofeev, 2019). At the same time, emerging market policies have an unconditional stabilizing effect on the GMFS. For example, the expansion of China's fiscal and monetary policies has been the single largest source of growth in global output and trade since the collapse of Lehman Brothers (Temin & Vines, 2015). An empirical analysis (using a panel vector autoregression model) of the experience of emerging market countries proves the positive effect of capital controls on monetary and exchange rate policy and does not hinder the accumulation of international reserves (Zehri, 2020). The internationalization of the renminbi (RMB, ¥) generally reduces asymmetries in international trade and exchange rate volatility (Bénassy-Quéré & Forouheshfar, 2015). After the inclusion of the renminbi in the SDR basket, China's influence in the GMFS increased (Wang, 2018). In particular, this is confirmed by a new large-scale SDR distribution in August 2021 worth the equivalent of $650 bn. (IMF, 2021). This decision was supported by the G20 in order to provide developing countries with international liquidity and prevent a pandemic-induced international debt market crisis (Lukash, 2021). According to former Bank of England Governor Mark Carney, a multipolar world economy needs a new GMFS to realize its full potential (Carney, 2019). However, the transformation of the GMFS in the direction of currency polycentrism and regionalization is extremely inert and largely dependent on changes in the global financial market. The integral model of sectoral development of the global financial market proposed in this study can serve as a tool for assessing these developments.

The authors' hypothesis is to justify the possibility of strengthening the position of developing countries in the GFM and in the international monetary and financial system within the trend of currency polycentricity through the targeted influence of interested actors on certain parameters of sectoral development of the GFM.

The purpose of the study was to identify key points in the major sectors of the GFM – foreign exchange, equity, credit, investment, and insurance. The impact on these sectors could strengthen the position of developing countries in the GFM. The objectives of the study were to analyze trends in these segments of the GFM and construct an econometric model of its sectoral development. The analysis of the characteristics and trends of the GFM main segments tends to identify sectoral development factors that can strengthen the position of developing country currencies in the current macroeconomic environment. The relevance of this study increases in the conditions of Russia's isolation from the global financial system. Russia needs to develop targeted sectors for regional and national financial markets. The analysis was conducted on statistics up to and including 2019 in order to avoid specific impacts on the results of the coronary crisis and geopolitics study.

Methods

The study of financial markets using econometric models was conducted by M. Capinski and E. Kopp (2012) in the context of pricing and hedging in derivatives markets. H. Xie and S. Wang (2013) considered the use of price information to model financial markets. B. Betz (2016) studied the use of computer algorithms in the framework of fundamental models of financial transactions Keynes-Minsky, price disequilibrium state of the financial market, international capital flows, a number of other factors. A. Kryzanowski, L. Zhang and R. Zhong (2017) studied the relationships between bond markets, stock markets, and currency forwards in developed and developing countries during quantitative easing (QE) programmes launched by the US Federal Reserve. D. Kenourgios, I. Drakonaki, and D. Dimitriou (2019) used dynamic conditional correlation analysis and robustness tests to identify differences in correlations between bond, equity, and currency forward

markets in the context of the impact of unconventional monetary policy introduced by the European Central Bank. G. Gospodarchuk and E. Suchkova (2019) proposed a system of financial sustainability indicators to address inter-level and inter-sectoral equilibrium problems in the choice of monetary and prudential policy instruments.

Among Russian researchers, the issues of financial market modelling have been studied by E. V. Strelnikov (2017) in terms of probabilistic behavior of institutional market participants. Domestic literature mainly presents descriptive models of financial market development in institutional and functional terms, as well as forecasting models. But the development and substantiation of an integral model of sectoral development and the impact of major segments on the dynamics of the entire financial market is the scientific contribution of the authors of this study.

Econometric models quantify the mutual influence of global financial market factors using integral measures. The models of equilibrium random processes in the economy show the significance of factors in terms of the insufficient information.

To build a model of sectoral development of the global financial market under current conditions of polycentrism and regionalization of the GMFS, the following methods were used: expert assessments consisting of expert ranking, expert ranking of alternative factors, expert forecasting; a priori methods consisting of determining the integral indicator and its value, as well as signs and values of coefficients at fictitious variables based on theoretical hypotheses about the essence of the economic phenomenon or process under study; factor analysis, the application of which has been problematic, in particular the difficulty of accurately quantifying most of the factors affecting the GFM.

The application of such diverse methods of model building was based on a methodological concept (Zvonova, ed., 2018). The model developed has the formal application. It identifies impact reference points to strengthen the position of developing countries while quantifying the cumulative impact of integral indicators on the GFM.

The system of fictitious variables can be further expanded to provide a more accurate assessment of sectoral development. The model can also be supplemented with coefficients that characterize the specific features of each sector's development in terms of the regionalization of developing countries, as well as other external and internal factors that affect the sectoral development of the financial market.

Trend analysis on key sectors of the GFM

The development of the global foreign exchange market as a segment of the MFR in recent decades has been determined by a number of factors.

1. Rising international business volumes with a trend towards investing in riskier emerging market assets. It requires an increased focus on risk management, in particular diversification of currency portfolios and hedging.

2. The growing global importance of emerging market currencies. The share of key emerging market currencies in total turnover rose from 12% in 2007 up to 25% in 2019. Transaction costs in emerging market currencies, as measured by bid-ask spreads, have steadily declined and have reached developed country currency levels. The largest increase in foreign exchange turnover from 2016 to 2019 was observed with transactions in emerging market currencies such as the Indian and Indonesian rupiah, the Philippine peso and the Mexican peso (BIS, 2019a, 10).

3. Increased participation of non-dealer financial institutions (small banks, hedge funds, institutional investors, high-frequency traders) in the FX market through the use of execution platforms and services that can reduce trading costs, increase transaction speed and transparency. Dealers' trading with these financial institutions amounted to USD $3.6 trillion in 2019, USD $3.6 trillion per day, or 55% of global trading volume. Electronic trading in foreign exchange markets is playing an increasingly important role, accounting for up to 70% of daily foreign exchange market turnover compared to 30% a decade ago (BIS, 2019a, 6).

4. The growth in IFEM turnover associated with a widespread carry trade strategy, which is borrowing money in a low-yielding currency and investing in a high-yielding currency.

A characteristic feature of global stock market development is its following to the trend of regionalization. Among emerging markets, China is the new segment of business activity, with the high potential for stock market development.

At the end of 2020, global equity market capitalization surpassed USD $109.21 trillion. This represents an increase of 19.7% compared with the end of 2019 (WFE, 2020). All regions recorded capitalization growth compared to 2019: 21.7% in the Americas, 24.3% in Asia Pacific and 9.7% in Europe, the Middle East and Africa.

The main reasons for the increase in capitalization and stock market turnover in recent years can be attributed to the following circumstances:

– pumping GMFS with foreign exchange liquidity as part of quantitative easing policies in various countries;

– the growing number of emerging market companies which shares are designed to attract a wide range of investors;

– liberalization of financial markets and removal of barriers to cross-border capital movements;

– an automation of stock market trading through the introduction of electronic trading systems on stock exchanges.

The main way to raise fixed-rate financial resources is through the issuance of bonds. The total amount of outstanding bonds in 2019 was USD $105 trillion. The cumulative volume of outstanding bonds was USD $105 trillion in 2019. The US bond market is the largest in the world, accounting for 38.9% of global volume, which is 1.9 times larger than the EU market (excluding the UK) (SIFMA, 2020; BIS, 2020).

Corporate bond markets are larger than the government securities markets in most developed countries, but they are almost identical in size in many emerging markets. The main bond issuers in the world are financial companies (BIS, 2019b, 62).

The global credit market continues to be dominated by developed countries due to the following factors. Firstly, the accumulation by developed countries of the most of the net national savings of both their own economies and those of developing countries serve as a source of international credit. Secondly, the formation of reserve currencies serves as the basis for international payments for goods and services, foreign investment and debt financing. Thirdly, the structure of the global credit market, with most institutions assuming international financial centres has (UK, Switzerland, US) to host them.

Developing countries in the debt finance market compensate for the acute shortage of national savings, particularly in the public sector, with external resources. As a result of their increasing external debt burden, they are shifting to the periphery of the global credit market, attracting resources on the least favourable terms and facing a permanent need for debt refinancing.

The external debt dynamics of developing countries have been stable over the period 2010-2020. Debt accumulation was most dynamic in South-East Asia. The Middle East showed a smaller increase. At the same time the debt of Latin American countries has been relatively stable, while the debt of emerging markets in Europe is virtually unchanged (WEO, 2020).

The model of debt financing based on the banking sector is the most characteristic of the European Economic and Monetary Union (EMU) countries, where the share of borrowings from banks in total debt is 30.1%, in France – 49.5%, in Germany – 33.1%. The involvement of banks as the main actors of external borrowing is due both to the dominance of the banking sector in European countries and their role as intermediaries in filling the channels of international monetary circulation with reserve currencies.

The share of bank borrowings in developing countries is lower: in India – 28.1%, in Brazil – 17.9%, in South Africa – 16.5%, and in Saudi Arabia – 19.6%. In Russia the share of bank liabilities in the structure of external debt is 13.9%. The main reason for this is underdevelopment of banking institutions and their inadequate creditworthiness. This prevents them from entering foreign markets with attractive terms and conditions of borrowings. The exception among the emerging markets is China with a share of bank borrowings of 46.6%.

In the currency structure of global debt, the national currencies of developing countries have a low

position. India's national currency share in total debt is 31.6%, Mexico's is 17.7%, Argentina's is 5.1% and Turkey's is 5.4%. Russia's share of the ruble in the debt structure is 29.9%.

The main market niche for direct investment in the global capital flows system is the construction of vertically and horizontally integrated production chains of TNC. Therefore, the main movement of direct investment occurs between developed countries, which are both major donors and recipients of global investment.

The second important area of direct investment flows is the investment of capital by the region's leading countries in dependent economies in order to gain additional control over the financial and physical assets of the recipient countries (North-South). Thus, excluding its main trading partners, the United States and the EMU (which each account for a third of total long-term investments), Japan's direct investment has been concentrated in the Asian region (Bank of Japan, 2005, 2009). Over the past decade, Germany has also channeled on average about 2/3 of its total direct investment into Central and Eastern Europe (Deutsche Bundesbank, 2020).

Indeed, developing countries received between USD $500 bn and USD $700 bn annually in direct investment over the past decade. The figure only dropped significantly during the pandemic in 2020 (World Bank, 2020).

The direct investment destinations of the major global banks coincide fairly closely with the borders of the former colonies, with the share of foreign-owned banking sector capital in the dependent countries reaching up to 50% or more.

A significant phenomenon of direct investment flows is the phenomenon of round tripping. Its essence is the export of national capital through legal and illegal channels abroad for subsequent investment at domestic, but on behalf of non-resident companies.

A relatively new feature of the direct investment movement is that it is increasingly less dependent on a country's role and place as a creditor to the rest of the world. The main private equity investors from developed countries are not using their own national savings to fund them, but the resources of other countries, conducting a kind of «global arbitrage», borrowing capital at low rates, and converting it into direct investment. It allows them to gain the control over investment-attractive foreign assets.

The neo-liberal doctrine of cross-border capital flows, according to which the removal of barriers to the movement of direct investment allows the efficient redistribution of savings in the global economy, providing capital to growing markets and thereby contributing to global economic growth, is also does not work.

As a result, a fundamental imbalance is deepening in the global marketplace: between countries that are oversaturated with capital that is not used in the reproductive process and leads to asset bubbles, and the so-called «investment ghettos» (small and least developed countries) where foreign capital hardly reaches.

The global insurance market (GIM) was over USD $5.1 trillion in 2018, or 6.1% of global GDP. Although this is a historic high, growth has since slowed as a result of shrinking life insurance markets in China, Europe, and Latin America (IAIS, 2019). The largest market shares in OECD countries were held by US insurers (56.1%). As the insurance market expanded, the amount of claims paid also continued to grow. The Chinese insurance market grew by more than 20% in 2019, and China became the second-largest life insurance market after the US. It was accounting for more than 50% of premiums collected in emerging markets, or 11% of total premiums globally (OECD, 2020). The growth of the main indicator of insurance activity – premiums – has been a global trend in recent years.

The largest insurance market in the world in 2018, with more than USD $2.8 trillion, or 28% of GDP premiums, was the US. The other largest markets among developed countries were the UK (USD $500bn), Germany (USD $203bn) and France (USD $347bn).

The UK is the largest European insurance market and the second largest in the world. Emerging markets accounted for 43% of insurance industry growth between 2010 and 2017 (EY, 2019, p.6). Since the 2007-2008 global financial crisis, developing Asia, led by China, has been the biggest driver of growth in the GDP. Since its accession to the WTO, China has been forced to open its insurance market to foreign companies, which has brought leading multinational insurers such as AIG, Allianz, AXA, Aviva and others here.

Like other sectors in the GFM, the insurance market is in line with general macroeconomic trends. Volatile financial markets, low inflation, low interest rates, stagnant growth and the increasing likelihood of a global recession define a challenging economic reality for insurers around the world.

An important feature of the development of the GDP is its following the trend of regionalization. Thus, we can talk about the formation of a common insurance segment of the EU financial market through the harmonization of national insurance legislation, regulatory, and supervisory regimes. An example of the creation of a single insurance market in the EU is the implementation of insurance control within the framework of the EU methodology of supervision over solvency of insurers, named Solvency I and Solvency II. The processes of regionalization of the global insurance market are also taking place in other parts of the world.

Results

Our model is based on the theory of equilibrium random processes in economics (Lichtenstein & Ross, 2015). The model is developed in accordance with the evolution-simulation methodology (ESM). The main ideas were proposed in (Lichtenstein, 1973; Lichtenstein, 1979). The model's integral indicators show the degree of a particular sector influence on the GFM as a whole. Its estimate is a weighted value that takes into account the impact of the entire set of the most significant factors on the sector under study. The degree of influence of each factor is assessed by an expert and the obtained values are ranked according to the level of significance.

The concept of expert assessment also allows us to predict a scenario analysis of sectoral development. We can assess the direction and degree of change in the impact factors on financial market sectors in a given direction according to the scenario and at the anticipated research horizon through the expert approach. This make it possible to identify the most probable directions of changes in the GFM and substantiate the conditions for implementation of the optimal scenario of its development. Thus, this model has great potential for further research into the possibilities of strengthening the position of developing countries and their currencies in the global financial market and its individual sectors.

The optimization calculations are performed in the R environment using the Equilibrium programme. The following ESM structural designations are used in the models:

PL is the expected impact of factors on the international financial market, hereafter referred to as the plan;

Fa is the actual influence of the factors, hereafter referred to as the fact;

R_1 is the size of the cost of overestimating the plan arising when PL> Fa;

R_2 is the size of the underestimation cost of the plan arising when PL <Fa.

The value of PL is set before the plan period and remains unchanged throughout the plan period. At the same time, the actual impact of Fa as well as the costs R_1, R_2 are unknown at the time of making the plan. They depend on random factors and are therefore random variables whose values can only be estimated probabilistically. Thus, the risk of overestimating (underestimating) the plan is the expected size of the costs arising from the mismatch between the PL plan and the Fa fact.

The expected sizes R_1 and R_2 can be estimated using the expectation measures $M[R_1]$ and $M[R_2]$, respectively. In Equilibrium these measures are calculated based on the statistical testing method (Lichtenstein and Ross, 2008).

The following must be taken into account when drawing up an optimization planning model:

1. At the end of the planning period, i.e. after the adopted plan PL has been implemented and the actual impact of Fa is known; comparing PL with Fa will result in only one of the expected risks being actually realised: either the risk of overestimating the plan $\bar{R}_1$, or the risk of underestimating the plan $\bar{R}_2$. But not both risks together. In such cases the theory of decision making in conditions of uncertainty recommends to apply minimax strategy of behavior. To act so that at the worst concourse of circumstances to incur the least losses. It should minimize the greatest of the risks. The optimal plan is that balances the risk of overestimating and the risk of underestimating the plan.

2. In calculating the optimal plan, PL_{opt} the values of the random variable Fa, as well as the random costs R_1 and R_2, depending on the difference |PL-Fa|. They are generated using a random number sensor and simulation models (hereinafter IM).

In Equilibrium, three simulation models are used for this purpose – IM_0, IM_1, IM_2. By these models, IM_0 the random values of the actual influence of the factors on the GFM are generated Fa_i. The models IM_1 and IM_2 are used to calculate the random costs R_1 and R_2, respectively: IM_1 is used in the case of $PL>Fa_i$, IM_2 – in the case of $PL<Fa_i$. In this case, the random values generated from the whole series of statistical tests R_1 and R_2 form two non-overlapping sets:

$$\{R_1\} \cap \{R_2\} = \emptyset$$

The risk of overestimating the plan R_1 is calculated by averaging the random costs over the set $\{R_1\}$; the risk of underestimating the plan R_2 by averaging over the set $\{R_2\}$.

3. Whatever the PL plan, if it is realistic, it must be comparable with the generated random facts Fa_i, i.e. the condition must be met

$$PL \in \{Fa_i\},$$

where $\{Fa_i\}$ is the set of all generated random values of Fa.

The model of sectoral development of the international financial market can be represented in general terms by the following system of relations:

$$\bar{f} = f_1, f_2, \dots, f_n;$$
$$\bar{p} = p_1, p_2, \dots, p_m;$$
$$Fa = IM_0(\bar{f}, \bar{p});$$
$$R_1 = IM_1(PL, Fa, \bar{f}, \bar{p});$$
$$R_2 = IM_2(PL, Fa, \bar{f}, \bar{p});$$
$$S(PL, Fa) = \begin{cases} R_1, \text{если } PL > Fa \\ R_2, \text{если } PL < Fa \end{cases};$$
$$min_{PL}\{max_i\{M[S(PL, Fa_i)]\}\}.$$

For each factor $f_k \in \bar{f}$, specify the minimum and maximum value within which its value varies when generating random facts Fa_i: $f_k \in [f_k^{min}; f_k^{max}]$. Unlike factors, each indicator $p_k \in \bar{p}$ has only one defined value that remains constant (fixed) throughout the calculation PL_{opt} for a given set of inputs $\bar{f}$, $\bar{p}$.

The actual value of Fa depends on random factors $\bar{f}$ and fixed values $\bar{p}$. Predicted (random) values Fa_i are obtained using a simulation model IM_0.

The magnitude of the overestimation cost R_1 and the underestimation cost R_2 depends on the plan PL, the actual influence of factors on the international financial market Fa, random factors $\bar{f}$, the fixed values of the input indicators $\bar{p}$. R_1 and R_2 are calculated using simulation models IM_1 and IM_2, respectively.

The last condition is an optimality criterion for the plan, expressing a minimax strategy for market behavior. It amounts to a condition that the risks of over- and underestimating the plan are equal.

In Equilibrium optimization calculations of the influence of factors on the MFR performed by the Equilibrium programme an unacceptably large initial error ΔFa_{out} is repeatedly reduced to a given permissible error ΔF_{add}. As a result, the optimal plan calculated by the package has 1-2 orders of magnitude less error (Orlova et al., 2019) than the initial one. To calculate the GFM sectoral development model, a system of factors that, according to experts, have the most significant impact on the development of each of the sectors was determined. We note, the impact of a particular factor on the studied segment can be both positive (with a «+» sign) and negative (with a «-» sign). The significance of a factor is determined by its specific weight in the range from 0 to 1, the sum of the specific weights of all the selected factors equals 1. The factors are ranked by the intensity of influence.

The results of the expert assessment of the factors affecting the financial market sectors studied and their possible deviations are shown in Tables 1-5.

Table 1 – Importance Factors of Currencies of Developing Countries

Factors that increase the importance of currencies of developing countries in the GMF	Significance level of the factor	Minimum deviation, %	Maximum deviation, %
Volume of investments in international assets requiring more hedging of currency risks	+ 0.29	5	15
Share of key currencies of emerging markets in the total turnover on the world foreign exchange market	+0.2125	0	10
Share of participation of non-dealer financial institutions in the foreign exchange market	+ 0.1875	5	10
Share of technological innovation in the market	+0.185	10	20
Currency market turnover	0.125	20	30

Source: composed by authors

Table 2 – Factors of the international stock market during the COVID-19 pandemic

Factors affecting the international stock market during the COVID-19 pandemic	Significance level of the factor	Minimum deviation, %	Maximum deviation, %
Global stock market capitalization	+0.55	25	75
Volume of outstanding bonds in circulation	+0.45	0	0

Source: composed by authors

Table 3 – Factors of domination of developed countries in the international credit market

Factors influencing the dominance of developed countries in the international credit market	Significance level of the factor	Minimum deviation, %	Maximum deviation, %
Share of loans provided by banks of developed countries	- 0.1875	5	10
The share of the U.S. dollar on the international market of credit resources	- 0.1125	0	5
Share of the euro on the international market of credit resources	- 0.0775	0	5
Share of the yen in the international loan market	- 0.0215	without deviation	without deviation
Share of the pound on the international market of credit resources	-0.0185	without deviation	without deviation
Share of the non-banking sector in debt financing	+ 0.152	0	10
Share of external borrowing in the form of debt securities	+ 0.1515	0	5
Share of cash currency and deposits	+ 0.15	10	20
Share of loans as an instrument of external debt	-0.05	without deviation	without deviation

Source: composed by authors

Table 4 – Factors of persistence of interregional imbalances in the international investment market

Factors of interregional imbalances in the international investment market	Significance level of the factor	Minimum deviation, %	Maximum deviation, %
Volume of accumulated direct investments of major donor countries	-0.308	5	10
Capital investment by the region's leading countries in dependent economies	+ 0.3125	0	5
Direct Investment from developed to developing countries	+ 0.2895	without deviation	without deviation
Direct investment through roundtripping	+0.09	15	25

Source: composed by authors

Table 5 – Factors affecting the development of the international insurance market

Factors in the international insurance market	Significance level of the factor	Minimum deviation, %	Maximum deviation, %
Volume of the global insurance market	+0.29	0	5
Global insurance premiums	-0.2125	5	10
Share of emerging markets in the insurance industry	+0.1875	without deviation	without deviation
General macroeconomic trends	-0.185	0	5
Demographic changes	-0.125	0	5

Source: composed by authors

Model: (SectorMFM)
value
Plan (optimum) 0.07975
Norm (optimum) 0.07325
--- Calculated indicators
value
Expected influence, % 7.975113

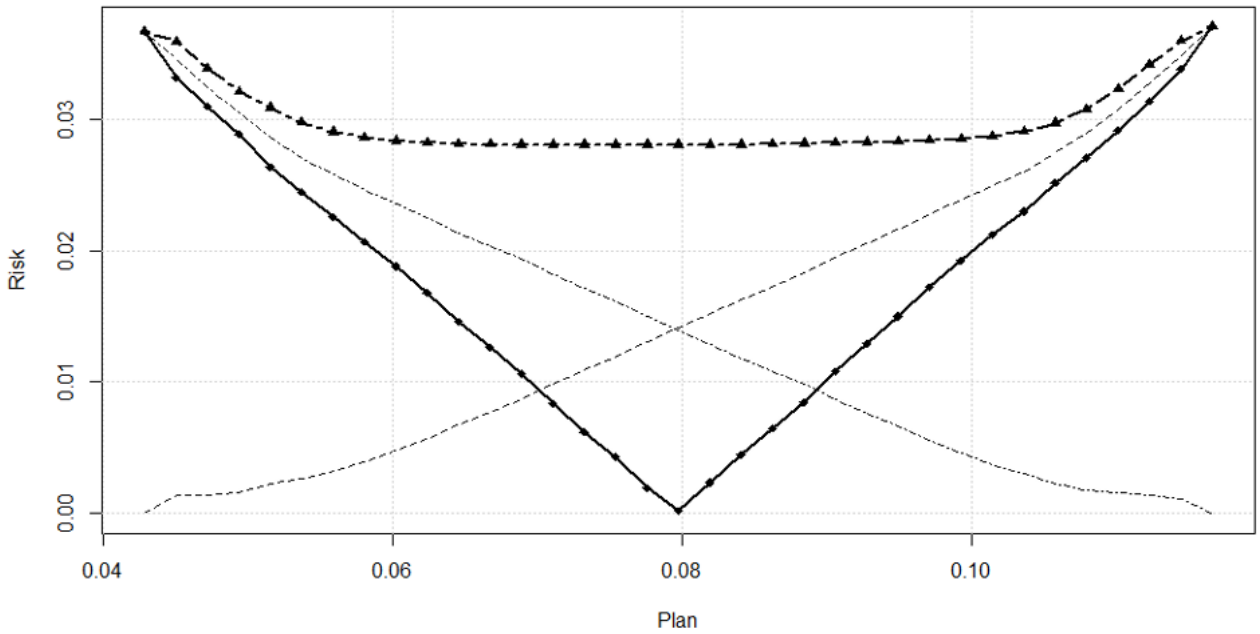

Figure 1. Chart Risks

Source: composed by authors

Conclusion

An analysis of the main developments in the GFM sectors under the influence of the development of monetary polycentrism and regionalization has highlighted a number of factors constraining the internationalization of developing country currencies. Testing of the model based on expert estimates of the sectoral development factors of the GFM under a currency polycentric environment showed an expected growth rate of 8%. The GFM is most sensitive to changes in: (1) the share of non-dealer financial institutions in the FX market; (2) FX market turnover; and (3) the share of technological innovation in the IFEM.

Not all of the factors identified can be changed quickly through targeted interventions to strengthen the position of developing countries or the development of key sectors of the national financial market. However, the results of the research enable them to be differentiated into manageable and unmanageable (objective). Thus, developing and adopting measures at the level of international organizations – G20, IFEM – managed by the controlling and regulating capital movements. Also, they are encouraging the increased use of developing country currencies in the various sectors of the GFM which is the relevant challenge. Further research in this area will help us to concretize existing proposals (Golovnin, 2021; Krylova, 2021) and develop new measures to reduce currency volatility and stabilize and develop financial markets in Russia and emerging countries.

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On overcoming of the low competitiveness factor of developing economies

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Abstract. The liberal concept of neoclassicism cannot be a fundamental construct for the new economic thought being revived in our country. It does not take into account the interests of those economic entities and people who find themselves unable to compete, also for objective reasons, with their more powerful rivals. According to the liberal conception, the fate of the uncompetitive people is death from poverty, hunger, disease, disasters, etc. In order to improve this issues in the world economy, the author proposes measures to improve global economic policy in favour of enhancing the competitiveness of developing countries. The future of Russian society largely depends on an objective reflection of reality in scientific generalizations, concepts and theories, including those of domestic economic science, so the demand for the latter is beyond any doubt. It will happen the sooner the top leadership of our country understands that the theories of economic regulation created in the USA and Western European countries are not suitable for Russia. It is because the position of Russia among the countries of the world economy ranked by production costs is worse, «lagging» than that of the USA and Western European countries.

Keywords: competitiveness, liberalism, neoclassicism, extinction psychology, non-equilibrium approach, non-equilibrium model, pricing, law of large numbers, inter-country differential rent, trailing country, World Rent Redistribution Fund.

JEL codes: B12, F12, D41

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Introduction

The liberal concept of neoclassicism cannot be a fundamental construct for the new economic thought being revived in our country. It does not take into account the interests of those economic entities and people who find themselves unable to compete, also for objective reasons, with their more powerful rivals. The ideological founders of liberalism do not answer the question of how to deal effectively with immigration issues related to the deterioration of some peoples' living conditions compared to others due to the liberalization of economic relations between countries. "Obviously," writes L. Mises, "the hostility of most people towards members of other nationalities, especially those of other races, is too great to suggest that a peaceful settlement of these antagonisms is possible" (Mises, 2001). And further, he prompts in an Aesopian style: "When considered from this perspective, the conflict seems to allow for no other solution than war. In that case we should expect the smaller nation to be defeated and, for example, the people of Asia, numbering in the hundreds of millions, to achieve the expulsion of the descendants of the white race from Australia. But we do not want to engage in such speculation. For there is no doubt that such wars – and we have to assume that a world problem of such a vast scale cannot be solved once and for all by a single war – would have catastrophic consequences for civilization" (Mises, 2001).

According to the liberal conception, the fate of the uncompetitive people is death from poverty, hunger, disease, disasters, etc. "In terms of public policy measures to regulate the labour market, the neoclassical position is quite close to Neo-Malthusianism. Representatives of this direction see the benefit in the onset of wars, epidemics, mass disasters, increasing the mortality rate and thus eliminating the surplus population in comparison to its limited means of subsistence. Thus, as some theorists believe, the surplus supply in the labor market is also eliminated..." (Nizhegorodtsev, 2004). According to the ultra-radical concepts of "liberals", the non-competitive people are five-sixths of the world's population.

However, the weakness of the liberal conception of economic development is evident not only in relation to the people of economically inefficient countries, but also in relation to the populations of developed ones. The concept of unsatisfied consumerism, imposed by "neoclassic" on Western society, has degenerated into a deliberate social psychosis in the form of the spread of a general psychology of extinction. The latter is the result of placing the population of civilized countries, through the massive brainwashing of public consciousness, into the artificial situation of having to choose one of only two alternatives. To live for pleasure in anticipation of the inevitable and imminent exhaustion of non-renewable resources (because nothing can be done) and the end of human civilization or stagnate in attempts at intellectual and physical development in the same conditions of an inevitable, but slightly more distant death of humanity.

Obviously, the development of human civilization cannot be limited by these alternatives. The possibilities of human intelligence to solve the problems of providing the world community with resources are enormous, may be infinite.

Main Part

A.P. Parshev (2001) in his book clearly shows the place of each country in ranking in terms of production costs changes and consequently the formation of economic profit. This place is stable and has a close connection with the economic and geographical position of each country. This suggests that the world economy is essentially rent-based, where the efficiency of a country's economy is determined by the rent factors of its location, and the quality of its productive forces. In addition, by the centuries-long use of natural, climatic, financial, and economic advantages, developed countries also have high levels of technological and intellectual rents, which are now also persistent and increasingly widen the gap of income per capita between countries.

Therefore, the use both of the non-equilibrium approach and model to analyze the world economy on a country-by-country basis seems very promising (Nusratullin & Nusratullin, 2020). Such a long-run analysis would help us to identify the ranking of each country in terms of the relative average country production cost and the level of economic profit per unit cost. It would be particularly necessary and important to inform future-oriented economic policy within individual states and the global community as a whole.

In this regard, the founders of non-equilibrium economic theory, Nusratullin V.K. and Nusratullin I.V. can answer the question of A.P. Parshev: "Why don't we compare national economies of Russia and other countries by the same criterion of costs, the same way individual firms are compared?" (Nusratullin & Nusratullin, 2020).

The unequal financial and economic position of individual countries are very different, both in terms of individual industries and inter-industry complexes, and across economies as a whole. This is primarily a consequence of the world market price in terms of individual products, which is formed mainly in accordance with the law of large numbers . It causes it to tend towards the price of production of the greatest volume of output produced by a country or group of countries with the lowest-cost conditions of production. If so, it is obvious that the market price cannot be determined in any way, as theorists of classical political economy wrongly wrote about it. Tending to the production price of the "lagging" country, to which group Russia belongs in many types of goods due to natural, climatic, and economic-geographical conditions of production. This can be shown as in Figure 1. With the liberalization of the world economy, and as a result of this market pricing, countries that produce goods at a price above the market price have an unavoidable sustainable loss – a global negative rent. In a free market of perfect competition, the chronic losses of the enterprises of the "lagging" country, does not allow them to reach a normal level of production price. Of course, in the absence of any financial and economic assistance from the state or the international community, the enterprises of the "lagging" country must perish in the abyss of competition, i.e. go bankrupt.

This statement is not new. The theoretical and practical interest are the rented branches of the economy, when it is necessary to provide goods for the population needs. By the objective reasons, it is the inefficient, because "lagging" producers are subsidized and supported by the state. If the goods produced by the "lagging" producers are not needed by the state, these enterprises go bankrupt, the staff is retrained, and leaved for

other sectors (if there is a place to go). This is the law of the unregulated market. According to it, only efficient producers thrive on the market and this can be seen in the non-equilibrium model of the economy.

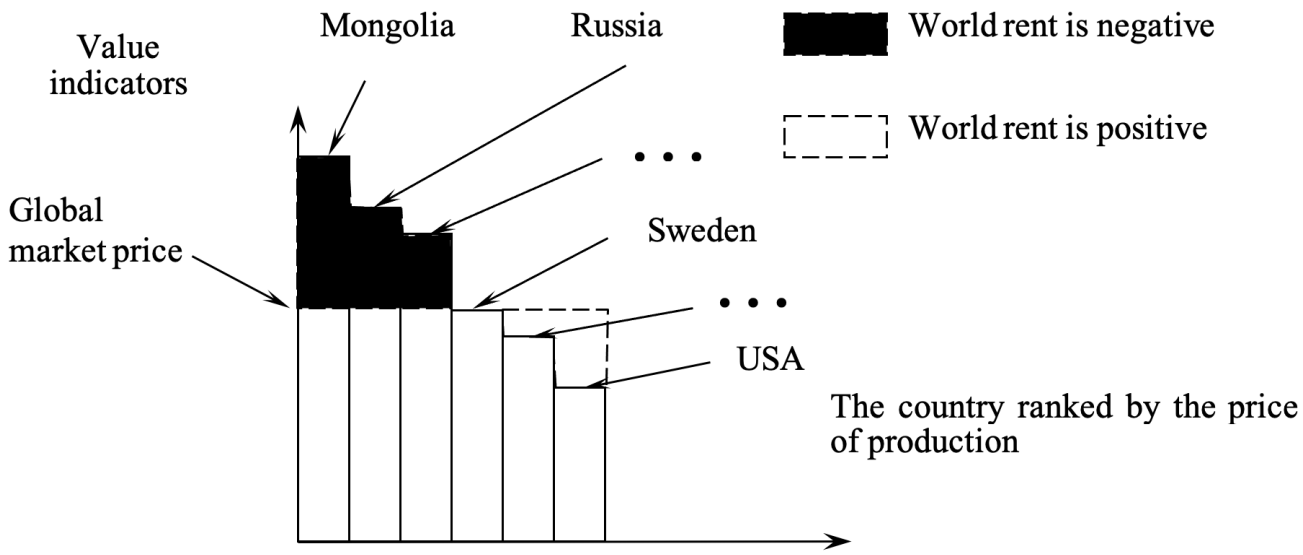

Figure 1. Approximate location of individual countries in a rented world economy
Source: composed by author

What happens in the case of a whole country is "lagging" in terms of the planet? If world prices do not cover the costs of that country? Who is trying to maintain production there, the standard of living of the population of that country? Nobody does. If we consider the UN, NATO, IMF, WTO, etc. organizations, we can see that their purpose is exactly the opposite – to give priority to efficient countries. This is the whole point of the liberalization policy of the world economy which underpins the international structures today. "Rather than the original focus on supporting state action to compensate the market 'failures' and market stimulation due to the lessons of the Great Depression, in line with the so-called new Washington consensus (between the IMF, IBRD and the US Treasury) on the 'right' policy towards developing countries, the IMF has focused on shaping privatization, liberalization, and stabilization processes there" (Elyanov, 2004).

In accordance with this purpose, the IMF imposes bonded loans on inefficient countries, which ultimately leads to the ruin of the country and the extinction of its population. At the moment, the WTO creates the conditions of global conduits providing for the cheapest goods produced by efficient countries. "It is well known that Russian reforms are led by the International Monetary Fund (IMF). Their effectiveness is quite critically assessed by the global community. As M. Pebro states, for example, "in recent years, the terms of the fund (meaning the IMF) have been the subject of increasingly fierce criticism. Firstly, governments and public opinion are more and more reluctant to accept the interference of a "technocratic" and even "Western" organization in their internal affairs"; secondly, the IMF "is often seen as responsible for the increase in poverty, unemployment, inequality"; thirdly, the fund "is seen as a vehicle of purely liberal ideology, not adapted to developing countries" (Dubyanskaya, 2004).

In other words, the system of the world economy regulation is not aimed at supporting inefficient countries, which are inefficient due to the objective conditions of the country's location and the quality of productive forces, but rather at ruining them. The world has not yet created structures taking into account the rent conditions of the individual countries economic activity and the living conditions of the population in these countries. Moreover, on the contrary, such economic policy schemes are imposed, which degrade the "lagging" countries in terms of production efficiency. This policy is certainly anti-human, because humanity in relations between people and their communities has always prevailed and involved supporting the weak and aggrieved, helping the disadvantaged and the backward.

Therefore, it is clear that "the IMF's ultra-liberal experiment in Russia led only to negative macroeconomic results... The collapsing price liberalization did not contribute to the growth of production, the development

of competitive market relations and the domestic market. Instead, production degraded, the domestic market shrank, monopolistic diktat – state and corporate – constantly strengthened, which led to high inflation, price imbalances, a sharp decline in both domestic demand and production" (Dubyanskaya, 2004).

Thus, under the worst rent conditions of the Russian national economy, the "ultra-liberal experiment" conducted in Russia was wrong in the very beginning, from the penetration of the very idea of liberalizing the economy into its government structures.

The miserable socio-economic results of reform in Russia were the result of the "negative benevolence" of the IMF (that "typhoid Mary", to quote Jeffrey Sachs) and other world institutions which support the existing world economic order and have no regard for the rent-based nature of the world economy. Academician D.S. Lvov says: "... A rather serious reason for the weak impact of economic science on the progress of reforms in Russia was the active imposition of standard approaches to economic reforms by influential scientific and governmental circles in the West on the country's leadership (among which there were many representatives of the economic elite). The Washington Consensus doctrine, developed among international financial institutions and the US economic establishment, is a case in point. Its political formulation is the ideology of radical liberalism. This system of views "proceeds from the presence of free competition, absolute rationality and full awareness of economic actors. These elements form a mechanism for establishing a market equilibrium ensuring the achievement of maximum production efficiency" (Lvov, 1999).

Actually, the result of the policy of radical liberalism pursued by Russian reformers under the supervision of the mentioned world structures was "permanently high inflation, a drop in all macroeconomic indicators, marginalization of the national reproduction system, degradation of microeconomic structures, destruction of the mass domestic market" (Dubyanskaya, 2004).

How can the countries of the world community be satisfied with the principles of free competition imposed by the IMF and other similar structures of the world order in international economic relations, when the efficient countries are automatically on the most favourable conditions on the world market according to their ranking scale of rents? These favourable conditions are not achieved by the labour force of these countries, but by the conditions of an absolute monopoly on their resources as property and, often, as an object of economic management.

If, as a result of increased scientific and technological progress and higher factor productivity, production increases more rapidly in countries primarily located in better natural and climatic conditions than in the "lagging countries", it is clear that the world average market price, which the world regulatory agencies are striving to liberalize, will increasingly tend towards the price of production in the efficient countries. The lagging countries are automatically relegated to a low-income trap because of objective climatic conditions, despite their best efforts to improve production efficiency. This is one of the most important reasons for the stratification of countries in terms of per capita income.

The status quo in the pace of economic development of the world's different countries is increasingly leading to the exacerbation of contradictions between them. Maurice Strong, Secretary-General of the Rio Conference, stated: "Economic growth processes that generate unprecedented levels of wealth and power for a rich minority lead simultaneously to risks and imbalances that threaten rich and poor alike. This pattern of development, production and consumption is unsustainable for the rich and cannot be replicated by the poor. Following this way may lead to the destruction of our civilization".

Conclusions

Considering the rent nature of the world economy, we would propose the following as the basis for world economic policy, the mechanism of world socio-economic regulation:

1) the financial, economic, social policy of the world community, led by the world regulatory structures, should take into account the cross-country specificity of the states. This specificity should be based on the recognition of the rent nature of the world economy and social conditions of the individual countries population, as a consequence of cross-country heterogeneity of natural, climatic, and spatial aspects of the world states location;

2) developing countries' debts must be cancelled unconditionally within the global community. The financial mechanism we have described above for enslaving them to developed countries must be eliminated. In addition, the distribution of "Special Drawing Rights" to all countries must be regulated in direct proportion to GNP growth;

3) a reasonable system of differentiated global support for different types of countries according to the objective conditions of their location and possession of production factors from the "World Rent Redistribution Fund" (Lvov, 1999) should be adopted. This system should be created with the functions of supporting underdeveloped states of the world community at the expense of accumulated monetary allocations mainly from countries with a high rate of rent incomes. These payments could be completely optimal for rent-accumulating countries if their level were determined by a percentage of the multi-year average annual rent, for example, as shown by the EC2D2 triangle on Figure 2;

4) the lagging countries should develop their own integrated development system based on targeted global support programmes, subsidized by the "World Rent Redistribution Fund" (shown schematically as triangle D1EC1 on the figure), with priority given to local economic and living conditions. The redistribution of world rents in favour of the trailing countries will have no tangible effect on the development of production in the efficient countries, since the majority of the rents shifts from productive use to the private investors. But even if production does stall, it will be a deterrent to the accelerated depletion of non-renewable natural resources, and hence to increased longevity of human life on Earth;

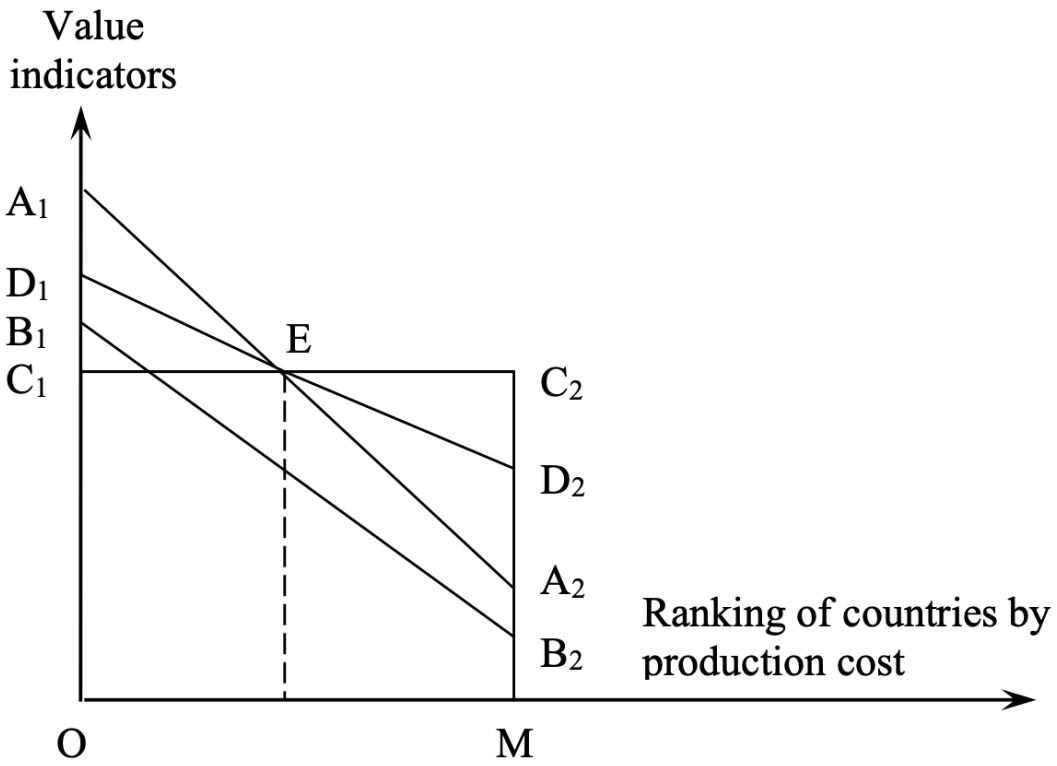

Figure 2. Variant of payments to the "World Rent Redistribution Fund" and subsidies from it to developing countries

(A1A2 – line of multi-year production prices in the world economy; B1B2 – the same at multi-year production costs; D1D2 – line of multi-year sales prices in the world economy; C1C2 – multi-year equilibrium market price line of sales of products on the world market; triangle EC2D2 – the value of total payments from rent incomes of countries to the "World Rent Redistribution Fund"; triangle D1EC1 – the value of total subsidies to developing countries from the "World Rent Redistribution Fund")

Source: composed by author

5) the political problems of the global community should be solved in terms of eliminating inter-country socio-economic disparities and contradictions, focusing on the national interests of each country. In

particular, the global practice of establishing comprador regimes in developing countries must be eliminated. The world structures should institutionalize the nationally oriented governments in such countries so that the majority of the world community's responsibility for the socio-economic situation in these countries can be transferred to them.

From our point of view, there is no other alternative for restoring relatively just socio-economic relations in the world than those we have mentioned, for the other alternatives are: 1) wars for the possession of better resources and lands while the lands with severe natural and climatic living conditions, ecologically contaminated lands depopulated; 2) immigration and expansion providing by the peoples of other countries into the territories of states with efficient economies, with aggravation of socio-economic, demographic, political and other problems within and between them. "It is easy to understand," wrote academician D.S. Lvov, "that unless the process of globalization continues without at least a partial redistribution of world income from the 'golden billion' countries in favour of backward and developing countries, social contradictions on a global scale will sharply worsen, and the world will move rapidly to the brink of disaster" (Lvov, 1999).

On the basis of the conditions for world socio-economic regulation we have listed, the planetary community of countries would be able to get on the path of socially oriented world development in the interests of all peoples and nations of the world. The theoretical economy would develop on the basis of an objective overview of the position of countries in the world economic coordinate system, which is largely determined by the rent nature of the international economy.

This kind of scientific development is not yet demanded by the Russian government. It relies mostly on instructions from the IMF and similar organizations from abroad, which are designed to promote the competitive advantage of the US and other highly rented, and therefore highly competitive, economies, i.e. to provide a theoretical framework that serves the interests of only Western countries.

Therefore, it must be said that the frequent accusations against the Russian government about its comprador nature are not unfounded at all. Its socio-economic policies have sometimes been more oriented towards the satisfaction of foreign interests than national ones. For Russians, on the other hand, the Russian government is often idly working, while at the same time being a dependant of the Russian people. However, we believe that the time for the comprador policy in the domestic economy is over. At the highest level of the Russian leadership there comes an understanding that national guidelines should prevail in public policy, based on the specifics of the national economy as one of the "lagging" in the world "rank" by the height of rent income per unit of cost in the production of goods.

The liberal policy will accordingly be replaced by a regulated strategy of a strong state, a strong government concerned about national interests. Although today a regulated strategy in Russia's economic policy is not enough. The crisis of the Russian economy can only be overcome by a mobilization strategy. Of course, in this case the people will again have to overcome these problems. However, this would be better than the demoralized state in which Russians are currently to some extent in. Of course, domestic developments to overcome the crisis of the Russian economy, will be demanded by the government. Therefore, it is too early to bury domestic science, as S.V. Svetlov does in his pessimistic prognosis: "... In general, the developed system of domestic science is coming to an end. This system, having proved unnecessary to domestic leaders and unable to organize itself in the new economic conditions, is doomed to self-shrink and self-destruct. The development vector of modern Russia, at least in this projection, has been quite clearly defined" (Svetlov, 2004).

The future of Russian society largely depends on an objective reflection of reality in scientific generalizations, concepts and theories, including those of domestic economic science, so the demand for the latter is beyond any doubt. It will happen the sooner the top leadership of our country understands that the theories of economic regulation created in the USA and Western European countries are not suitable for Russia. It is because the position of Russia among the countries of the world economy ranked by production costs is worse, "lagging" than that of the USA and Western European countries. Our government will understand this sooner or later, as it did, for example, maybe not quite consciously. According to former World Bank chief economist J. Stiglitz, "Markets do not necessarily have advantages. The Washington consensus silently

assumes that governments are worse off than markets ... I don't think so" (Lvov, 1999).

We believe that J. Stiglitz was not entirely conscious, because he does not explain that the "Washington Consensus" is based on the interests of efficient countries, especially the US. Therefore, the market mechanism for regulating the international economy is the best regulator of relations in an open world market for these countries. Every kind of regulation by nationally oriented governments is always cause the detriment of developed countries in the global market self-regulatory processes, as it stifles their competitive advantage. The best regulator of relations with the global market, as mentioned above, is a nationally oriented state, or government, that protects the interests of domestic producers.

Therefore, the market is better for the economic growth of some countries and their illuminators from their point of view. For the others, already from opposing positions, the government is better. The market policy adherents develop their theories of economic regulation, including international regulation. Different regulatory theories are accordingly often contradictory, as they are developed without sufficient theoretical and methodological justification, taking into account the rent status of countries. It leads to instability of the public administration of different countries' economies as well. This is often the result of unquestioning adherence to theoretical recipes from abroad which are contrary to the interests of the national economy. Of course, the experience and rational calculation of nationally oriented officials could find the best way out and ways to ensure higher competitiveness of the economy even in the absence of the economic growth theory in their own country. But there is an issue of the nationally oriented leaders, who are not always in the leadership of states.

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Spatial and functional localisation of innovation development in Russian regions: analysis and forecast

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Abstract. Purpose: To identify features of spatial and functional localization of innovation activity of Russian regions, it is necessary to forecast its dynamics, development, and justification of directions and tools of regional innovation policy in the medium term. Research methods: comparative analysis; structuring of the information dataset – virtual clustering method; correlation and regression analysis. Results: we have proposed five indicators characterizing spatial and functional localization of regional innovation development. On the base of them, we formed virtual clusters, including regions with similar values of the parameters under study. We identified the closest representative region to its center for each cluster. Also we used the example of the Yaroslavl Region (region-representative of cluster B) to identify trends by the studied indicators and draw conclusions about the region's forecasting and development prospects in terms of the basic parameters of innovative development.

Keywords: cluster analysis, k-means method, virtual clusters, Russian regions, innovation development, representative regions, trends.

JEL codes: B41, O30, R11

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Introduction

The contemporary development of the country and its regions is closely connected with innovation, which is reflected in the relevant normative documents and legislative acts. Thus, the purposes and main directions of modernization and innovative development of the Russian economy are presented in the Decree of the President of the Russian Federation of May 7, 2018 «On the national purposes and strategic objectives of the development of the Russian Federation for the period until 2024». The transition of the Russian economy to an innovative path of development by 2020 was declared as the main objective of the Strategy for Innovative Development of the Russian Federation for the period until 2020 (adopted in December 2014). The «big challenges» to the Russian economy, formulated back in 2016, have not lost their relevance today, and many of them have become significantly more acute. These include:

1) Threats to national security, increased regional as well as global instability; increased problem of import substitution.

2) The need for global economy technological change associated with the fourth industrial revolution and digital transformation.

3) The ageing of the population, causing corresponding changes on the health, social, and labour market.

4) The spread of epidemics, which is linked to economic and social risks.

5) Environmental problems, including climate and environmental change, and the depletion of natural

resources.

6) Provision of safe food products to the population of the country.

7) Radical changes of the energy systems (Center for Strategic Research, 2016).

A constructive response to these challenges is the innovative development of the country and its administrative-territorial entities. At the same time, the regions should try to maximize their development potential, design and use tools appropriate to their position and capabilities to increase the level of innovation activity and innovation performance. For this purpose, it is necessary to identify the spatial distribution of innovation development parameters of the country's regions, which allows us to focus on the study of a limited range of typical administrative-territorial entities, representing large enough groups, so as predict their dynamics.

Numerous studies of the regions innovation development level presented in the modern scientific literature traditionally rely on ranking methods, econometric methods, the use of various indices, and integral analysis techniques.

Nowadays, the following ratings are widely known: Rating of Innovation Development of the Constituent Entities of the Russian Federation (Institute of Statistical Research and Knowledge Economics, National Research University Higher School of Economics, 2012), National Rating of Investment Climate in the Constituent Entities of the Russian Federation (Agency for Strategic Initiatives, 2014), Rating of Innovative Regions of Russia (Association of Innovative Regions of Russia & Ministry of Economic Development of the Russian Federation, 2012), etc.

The authors' approaches to assessing the innovative development of regions are quite diverse. Thus, S.N. Mityakov et al. (2021) conduct a ranking of regions in dynamics and identify the leading and outsider regions based on various criteria of innovation activity.

E.V. Emelyanova and N.V. Kharchikova (Emelyanova & Kharchikova, 2019) allocate the regions of the Central Federal District into five groups, depending on the values of their innovation activity aggregate index. This index is integral. It is calculated on the basis of three indices: innovation activity, innovation products, and costs of technological innovation.

E.A. Polina and I.A. Solovieva (2020) propose an integral index of innovation development. Its partial indices are calculated by categories of innovation environment (climate, potential, activity) for socio-economic, industrial-technological, scientific, financial, human resources, and investment areas of innovation activity, which allowed them to classify regions of the country into four groups: «alpha» and «beta» are high index values, «gamma» is medium one, and «delta» is low one.

Yu.I. Treshchevsky and M.V. Litovkin (2017) define the prospects for regional innovation development depending on the institutional characteristics of socio-economic systems and types of economic behaviour (ascetic and hedonistic).

Methods

We propose the distribution of regions into virtual groups, including administrative-territorial entities similar by the basic parameters of innovation activity, as a promising research option. The grouping of regions was made by the clustering method. This method was proposed by I. Hartigan and M. Wong (1979) and developed by M. Oldenderfer and R. Blashfield (1989), I. Mandel (1988). The method is now widely used by Russian scientists and allows them to analyze various socio-economic processes at the regional and other levels. It is provided by the development of information and big data technologies.

V.A. Gordeev and M.I. Markin (2022) applied virtual clustering to study regional competitiveness; L.M. Nikitina and V.A. Kurkin (2020) assessed the level of development of the regional digital economy. E.I. Piskun and V.V. Khokhlov (2019) use exploratory factor analysis to assess the regions of the Central, Northwestern, and Southern Federal Districts and identify eight clusters distinguished by the nature of the influence of natural, production factors, and the factor constraining the development of regional economy.

T.I. Gulyaeva and E.V. Takmakova (2021), use the k-means method, estimate the living standards of the population by 13 indicators and group the regions into 5 clusters with living standards from low to high one.

I.G. Abysheva, P.B. Akmarov, E.S. Tretiakova and O.P. Knyazeva (Abysheva et al., 2021) assess the impact of production specialization on the socio-economic development of regions, identifying clusters of highly specialized and multi-specialized regions, and assessing their development potential.

The authors of this paper in co-authorship with other scientists use virtual clustering method to study environmental and economic activity (Treshchevsky et al., 2021), foreign economic activity (Kosobutskaya et al., 2021), spatial and functional differentiation of road infrastructure (Kosobutskaya et al., 2020), and spatial and functional localization of educational subsystems of Russian regions (Endovitsky, 2019), etc.

We suggest that the virtual clustering method has significant research potential for the analysis and forecasting of innovation processes taking place in the country and regions. Therefore, we share the position of L.S. Valinurova and T.R. Tlyavlin (2022) that combining Russian regions into virtual clusters by level of innovation development allows not only comparative assessment and intergroup rankings, but also highlights similar characteristics of regions forming relevant clusters.

The grouping of regions into virtual clusters also allows each group of regions to identify and solve typical problems, intensify socio-economic processes, and improve management efficiency by concentrating resources on priority areas. It is possible to identify model regions (regions – cluster representatives) that have the shortest distance from the centre of their respective clusters, to assess differences in the studied parameters, trace the reasons why individual regions lag behind the leading ones, determine the place and role of individual regions in the innovation system of the country.

In fact, the results of regional clustering can be used to study best regional practices and assist in the development of strategic planning documents, programmes, and regional innovation policies.

Numerous indicators are now being used to assess the innovative development of regions and their innovation activity. For example, the Institute for Statistical Studies and Knowledge Economy (ISSEK) and the Russian Cluster Observatory used 53 indicators aggregated into 16 groups and related to 5 sub-indices: socio-economic conditions of innovation; scientific and technological potential; innovation activity; export activity; and innovation policy quality (Abashkin et al., 2021) to rank Russian regions' innovation development (from 2012 to 2021).

In November 2022, the Ministry of Education and Science released the first national ranking of the regional scientific and technological development, which uses 33 indicators combined into 3 blocks: environment for knowledge-intensive business, environment for the researchers and for the authorities. The indicators were calculated based on official statistical data from Rosstat, the Ministry of Industry and Trade, Rospatent, as well as official internet portals of core organizations and development institutions.

However, when conducting research at the regional level, there is a problem of access to relevant statistical data. For example, for the indicators «Volume of innovative goods, works, services», «Advanced production technologies developed», data for a number of regions are not published in some periods in order to ensure the confidentiality of primary statistical data. The indicator «Specific ratio of innovative goods, works and services in the total volume of goods shipped, works performed and services rendered by organizations» does not provide data for all periods studied.

Statistical data from different sources (e.g. federal and regional statistics) may not correspond, and in some cases the discrepancies may be substantial.

There is also a loss of cross-period comparability as a result of changes in the methodology for calculating the relevant indicators, making comparative analysis impossible and making it difficult to assess the dynamics of the socio-economic process under study.

In order to eliminate the influence of cost factors on innovation performance of this study, we have proposed a simple model including 5 indicators, taking into account the problems mentioned above:

– level of innovation activity of organizations, % (var1);

– proportion of organizations that implemented technological innovation in the total number of organizations under study, % (var2);

– proportion of innovative goods, works and services in the total volume of shipped goods, works and services, % (var3);

– proportion of innovation activities costs in the total volume of goods shipped, work performed and services rendered, % (var4);

– advanced manufacturing technologies used, units (var5).

Three of the proposed indicators reflect the process function, the other two reflect the resource function and the output function.

The proposed model differs fundamentally from the mentioned above because it does not involve a ranking of regions. But it is aimed at solving the problem of grouping regions with similar innovation parameters.

The use of predominantly relative indicators made it possible to include the data on Moscow and St. Petersburg, which absolute values of innovation indicators differ significantly from those of the other regions. To avoid double counting, the included larger regions (Nenets Autonomous District within the Arkhangelsk region, Khanty-Mansi and Yamal-Nenets Autonomous Districts within the Tyumen region) were not separately identified. As a result, 82 regions were included in the study.

In order to make the indicators with different units comparable, the standardized values of the parameters under study were calculated based on the maximum and minimum values of each indicator in the sample. We should note that all the indicators included in the model have the same vector – the higher the values of the indicator, the better the result.

The analyzed time period – eight years (from 2014 to 2021) – passes through different phases of the economic cycle. The years 2014 and 2015 are distinguished by a wide range of crisis phenomena (the global financial crisis, the introduction of anti-Russian sanctions, the depreciation of the rouble). The years 2016-2019 provided the relative stabilization and normalization of the economy. 2020 is the pandemic year of Covid-19 coronavirus infection. 2021 is the year of recovery from the pandemic and the last year for which the necessary statistics were available at the time of the study.

We used the average values of the indicators for the analyzed period for each region, as well as the values of the indicators by year and by phase of the period under study. The resulting dataset is a matrix of 5 x 82 (five indicators for each of the 82 regions).

We used clustering and k-means methods to cluster the regions. The k-means method (according to M.S. Oldenderfer) implies performing a certain sequence of actions that will allow us to divide the initial data array into a predetermined number of groups that are homogeneous according to the selected criteria.

The process is iterative. We separate the raw data into a number of clusters (5 in our case); for each cluster we define an 'economic power center'; place each point in the cluster with the nearest economic power center; calculate new 'economic power centers' of the clusters. In this way we look through all the array data without replacing clusters with new ones. The iterations take place until the composition of the clusters no longer changes. According to M.S. Oldenderfer, this procedure minimizes the variance within clusters.

We grouped the regions into clusters using MS Excel and Statistics 12.

Results

The analysis allowed for statistically significant identification of five virtual clusters, which were named «A», «B», «C», «D», «E». The clusters are distinguished by a decrease in the overall value of the results calculated using standardized indicators.

An F-criterion was used to assess the homogeneity of the clusters, and a p-criterion was used to assess the significance of the mean values (Table 1).

Table 1 – Cluster analysis of variance (for the period 2014-2021)

Indicators	Between	cc	Inside	cc	F-criterion	Relevance
Var1	2.187589	4	0.872277	77	48.27722	0.000000
Var2	2.466732	4	0.671443	77	70.72017	0.000000
Var3	1.818610	4	1.116050	77	31.36800	0.000000
Var4	2.298859	4	1.068980	77	41.39743	0.000000

Indicators	Between	cc	Inside	cc	F-criterion	Relevance
Var5	1.614624	4	1.586666	77	19.58919	0.000000

Source: calculated by authors

As can be seen, the statistical characteristics of the clusters satisfy the requirements of homogeneity and significance.

The values of the standardized cluster indicators are shown in Table 2 and their graphical interpretation is in Figure 1.

Table 2 – Average standardized values of indicators of innovation activity of virtual clusters of regions (for the period 2014-2021)

Indicators	Clusters				
	A	B	C	D	E
Var 1	0.774990	0.527671	0.310176	0.389125	0.194303
Var 2	0.823853	0.544738	0.321333	0.416223	0.199217
Var 3	0.562187	0.347433	0.164270	0.144382	0.052773
Var 4	0.589178	0.371734	0.347811	0.101433	0.073995
Var 5	0.538206	0.263024	0.167730	0.076829	0.042457

Source: calculated by authors according to Rosstat (2014-2021)

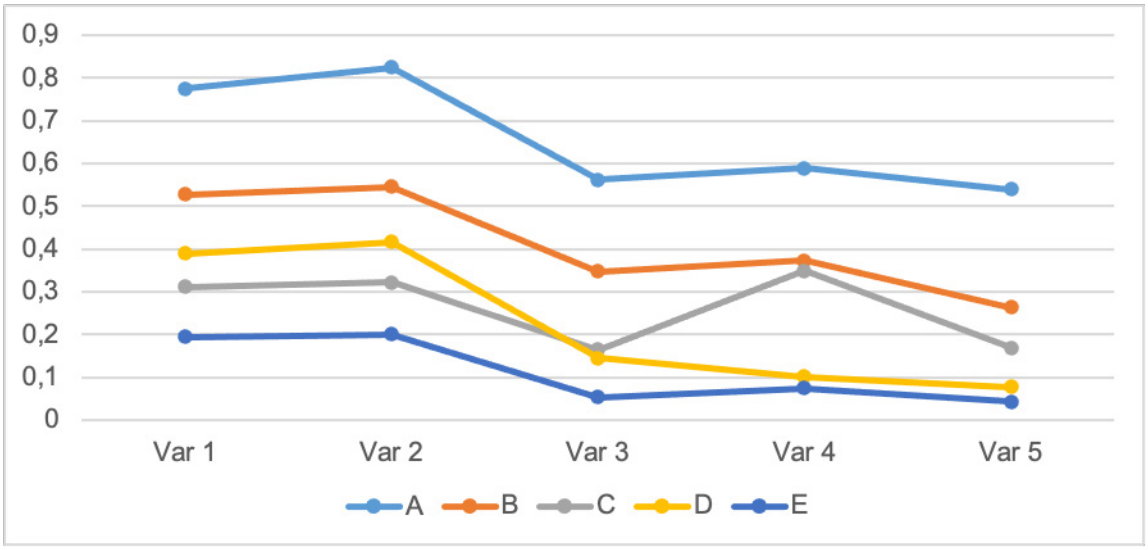


Figure 1. Main characteristics of cluster innovation development, (horizontally – Indicators; vertically – their average standardized values)

Source: calculated by authors according to Rosstat (2014-2021)

It should be noted that the clusters differ significantly by the parameters of innovative development studied.

Cluster «A» includes: Moscow and the Moscow Region, St. Petersburg, the Republic of Mordovia, the Republic of Tatarstan, the Chuvash Republic and the Nizhny Novgorod Region.

Cluster A is almost six times ahead of the weakest cluster E in terms of total standardized indicators. It is the undisputed leader for all indicators investigated. Nevertheless, the overall level of innovative development of the cluster is low. Even according to the normalized value of the parameter maximum for the cluster (0.83), it is still quite far from the maximum possible value of 1.0.

Cluster «A» is rather «amorphous». The distance of the representative region (St. Petersburg) to the cluster centre is 0.10.

Cluster B includes 20 regions, including eight regions in the Central Federal District (the Belgorod, Vladimir, Voronezh, Lipetsk, Ryazan, Tver, Tula and Yaroslavl regions), one region in the Southern Federal

District – the Rostov region, seven regions in the Volga Federal District (the Republic of Bashkortostan, Udmurt Republic, Perm Krai, Kirov, Penza, Samara and Ulyanovsk regions), two regions of the Ural Federal District (Sverdlovsk and Chelyabinsk regions), and one region each of the Siberian (Tomsk region) and Far Eastern (Khabarovsk Krai) autonomous districts.

It is more than 1.5 times behind the leader's cluster in terms of the total value of parameters. This lag is evenly distributed across all the studied parameters.

The representative region of the cluster is the Yaroslavl region.

Cluster C consists of 14 regions: Tambov (CFD) and Leningrad (NWFD) regions; Krasnodar Krai and Volgograd region (SFD); Stavropol Krai (NCFD); the Orenburg and Saratov regions (PFD); Tyumen region (UrFD); Altai Republic, Krasnoyarsk Krai, Irkutsk and Omsk regions (SFD) and the Republic of Buryatia and Sakhalin region (FDD).

The representative region of the cluster is the Volgograd region.

Cluster C is 2.5 times behind the leading cluster. The parameters of the cluster are developed unevenly. In terms of indicators var3 – var5, it ranks in the middle third position, and in the first two var1 and var2, it lags significantly behind even the generally weaker innovation cluster «D». At the same time, the cluster's strongest position is the specific ratio of expenditure on innovative activities to the total volume of goods shipped, work performed, and services rendered. The value of this cluster parameter is insignificantly lower than the corresponding parameter of cluster B.

Cluster «D» is the most numerous. It includes 23 regions, namely the Bryansk, Ivanovo, Kaluga, Kursk, Orel and Smolensk regions (CFD); the Vologda, Murmansk, Novgorod and Pskov regions (NWFD); the Republic of Adygea (Adygeya), Astrakhan region and Sevastopol city (SFD); the Republic of Ingushetia (North Caucasus); the Republic of Mari El (PFD); Kurgan region (UrFD); and the Altai Republic (Ural). Sevastopol city (SFD); Republic of Ingushetia (SFD), Republic of Mari El (PFD); Kurgan region (SFD); Altai Krai and Novosibirsk region (SFD), Republic of Sakha (Yakutia), Kamchatka and Primorsky Krai, Magadan region and Chukotka Autonomous District (FDD).

The representative region is Murmansk region.

Cluster «D» holds an average position by indicators var1 and var2, and by indicators var3 – var5 it loses to cluster «C», while by the specific ratio of innovative goods, works and services to the total volume of shipped goods, works and services the gap is quite insignificant.

The most powerful cluster position is the share of organizations that have implemented technological innovations in the total number of organizations under study.

Cluster E, consisting of 18 territories, is an innovative outsider. Kaliningrad region is its representative region.

Since cluster representative regions characterize the respective clusters in the best possible way, they can be used to predict the indicators under study. We will conduct trend analysis based on correlation and regression analysis using the example of the Yaroslavl region. We will use the capabilities of MS Excel to calculate the dynamics of indicators by five functions integrated into the program: linear, polynomial, power, logarithmic and exponential.

Table 3 and Figures 2-6 present the values and graphical representation of innovation development indicators for the Yaroslavl region.

Table 3 – Indicators of innovation development in the Yaroslavl region in 2010-2021

Indicators	Years											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Var1, %	10.0	12.0	12.3	11.0	10.3	8.7	7.1	8.3	14.2	10.6	10.7	12.8
Var2, %	8.7	10.7	11.2	9.8	9.6	7.5	6.4	7.1	25.6	24.6	23.6	24.1
Var3, %	12.1	11.4	15.1	9.3	10.5	7.0	14.9	12.2	12.8	6.0	5.4	5.0
Var4, %	6.3	6.7	6.6	5.4	6.3	4.5	1.8	1.5	1.2	1.3	1.6	2.1

Indicators	Years											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Var5, units.	3267	2642	2675	2841	2889	2815	2962	2874	2851	3132	3235	3511

Source: composed by authors according to Rosstat (2010-2021)

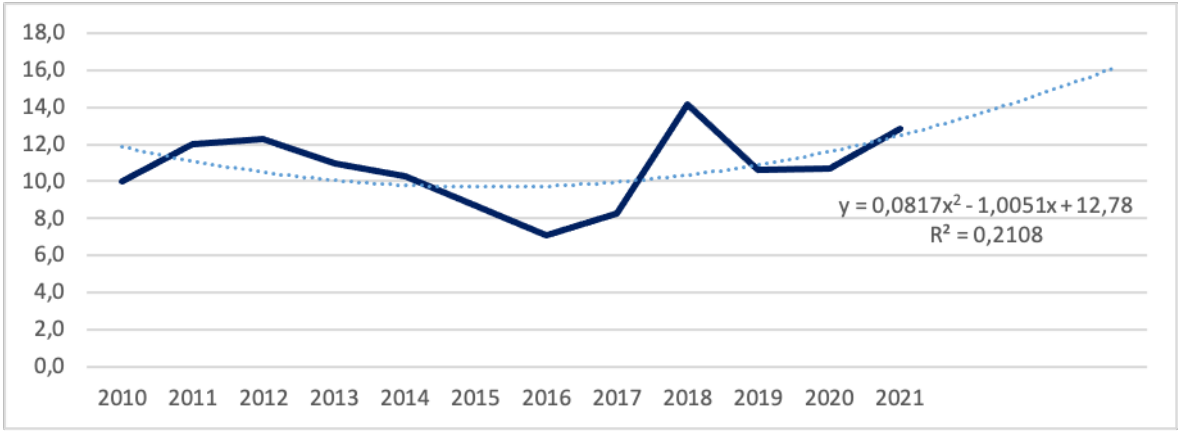
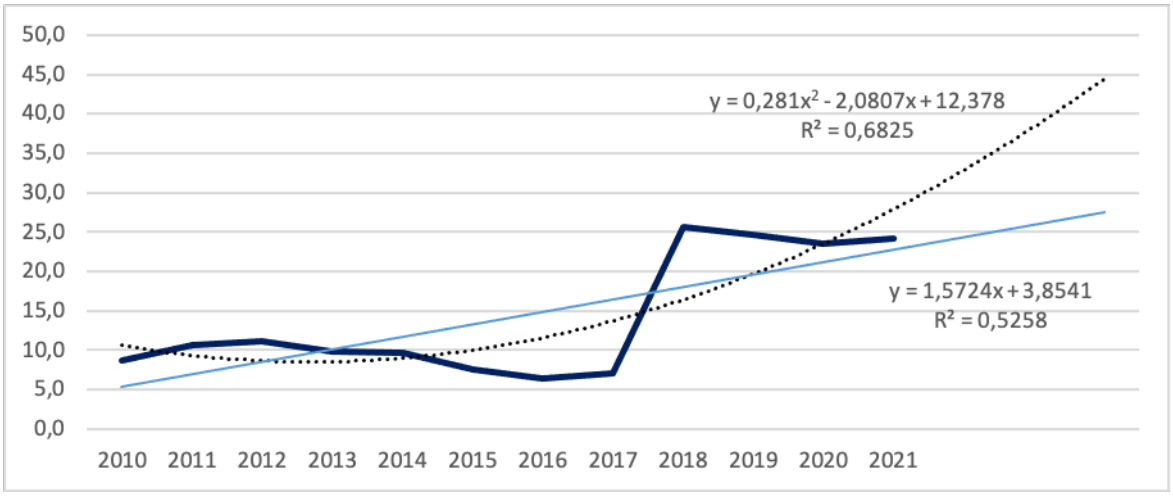


Figure 2. Level of organizations innovation activity in Yaroslavl region in 2010-2021, %
Source: composed by authors according to Rosstat (2010-2021)

The dynamics of the level of organizations innovation activity in the Yaroslavl region are highly variable. The polynomial (second-degree) function has the highest coefficient of determination. $R^2 = 0.2108$, which indicates that the function is unstable and does not allow predictions to be made with sufficient reliability.



—— linear, ····· polynomial

Figure 3. Specific ratio of organizations that implemented technological innovations to the total number of surveyed organizations in the Yaroslavl region in 2010-2021, %
Source: composed by authors according to Rosstat (2010-2021)

Throughout 2010-2017, the share of organizations engaged in technological innovation in the Yaroslavl region was relatively stable with a slight downward trend. However, in 2018 there was a dramatic jump (almost 5 times) followed by a gradual slight decrease of the indicator.

The dynamics of var2 can be reliably described by polynomial and linear functions. The other functions have a low coefficient of determination.

Figure 3 shows that the var2 forecast based on the polynomial function is more optimistic than the linear forecast. In this case, the forecast based on the polynomial function can be considered more reliable ($R^2 = 0.6825$).

The actual and forecasted dynamics of the specific ratio of innovative goods, works and services to the total volume of shipped goods, works and services (var3) are presented on Figure 4. According to the

polynomial function equation, the indicator value will be 32.8% in 2022, 38.3% in 2023, and will reach 44.4% in 2024. The linear forecast is 24.3%; 25.9% and 27.4%, respectively.

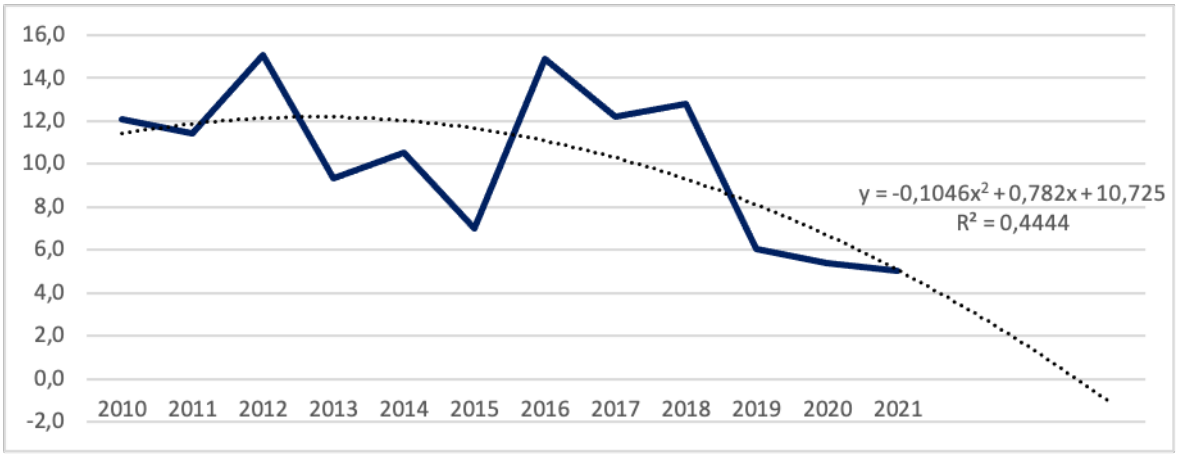


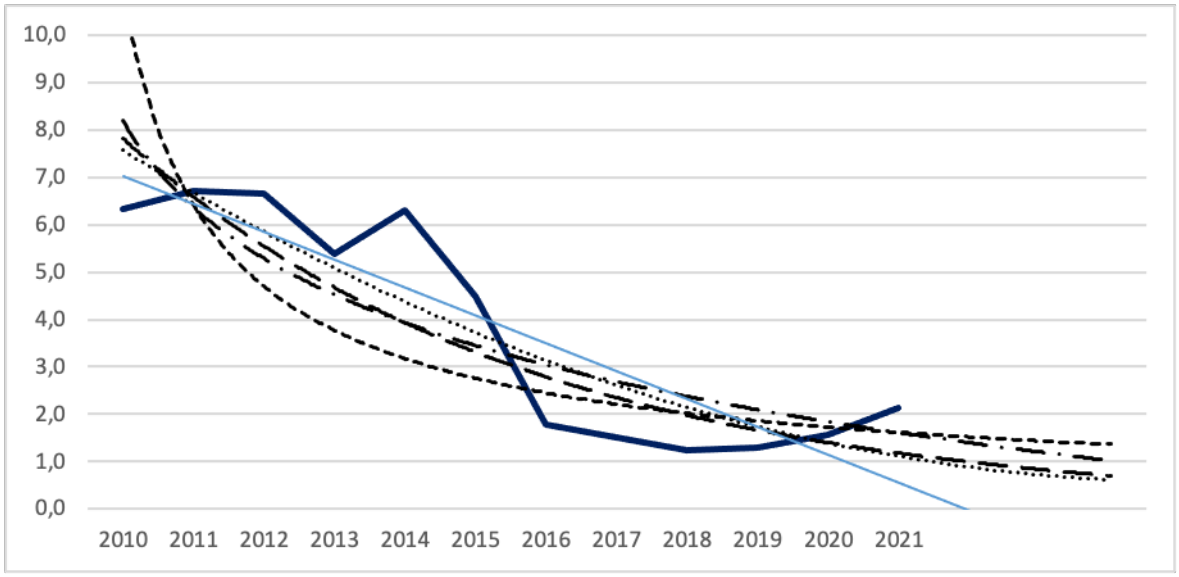
Figure 4. Specific ratio of innovative goods, works and services to total volume of shipped goods, works and services in Yaroslavl region in 2010-2021, %

Source: composed by authors according to Rosstat (2010-2021)

The Var3 indicator has shown a dramatic jump over the period under study. From 2012 to 2015, the indicator dropped by more than half, from 15.1% to 7.0%, and in 2016 it practically returned to the 2012 value. Thereafter, it decreased again. The overall decline was from 12.1% in 2010 to 5.0% in 2021.

The polynomial function has a maximum R2 value, but this is insufficient to make reliable forecasts even in the short term.

The dynamics of the specific ratio of expenditure on innovative activities in the total volume of goods shipped, work performed and services rendered in the Yaroslavl region (var 4) is shown on Figure 5.



— linear, – – – exponential, - - - -power, ····· polynomial,
– – Logarithmic function

Figure 5. Specific ratio of expenditure on innovation in the total volume of goods shipped, work performed and services rendered in the Yaroslavl region in 2010-2021, %

Source: composed by authors according to Rosstat (2010-2021)

The var4 indicator showed an unstable trend between 2010 and 2014, and has been declining since 2014, reaching a critical low of 1% by 2018-2019. In the last two years, the value of the indicator has increased marginally.

The dynamics of var4 can be described with a high degree of confidence by all five functions.

Linear: $y = -0.5872x + 7.5989$; $R^2 = 0.7927$;
Exponential: $y = 9.845e^{-0,172x}$; $R^2 = 0.7446$;
Logarithmic: $y = -2.649\ln(x) + 8.1943$; $R^2 = 0.709$;
Polynomial: $y = 0.0303x^2 - 0.9807x + 8.5173$; $R^2 = 0.8124$;
Power: $y = 10.928x^{-0,769}$; $R^2 = 0.6544$;

All functions give a forecast with the various degrees of pessimism. The least pessimistic are the power and logarithmic functions, the most pessimistic are the exponential and polynomial functions (Table 3). The polynomial function has the highest coefficient of determination, which allows us to consider polynomial development as the most probable.

Despite the high value of the coefficient of determination of the linear function in this case it cannot be used, as it gives negative values.

Table 3 – Estimated forecast values of var4, %

Function	Years		
	2022	2023	2024
Power function	1.520261	1.436046	1.361841
Logarithmic function	1.399749	1.203437	1.020675
Exponential function	0.992376	0.83556	0.703524
Polynomial function	0.8889	0.7263	0.6243

Source: calculated by authors according to Rosstat (2010-2021)

The actual and forecasted dynamics of advanced production technologies (var6) in use in the Yaroslavl region are shown in Figure 6.

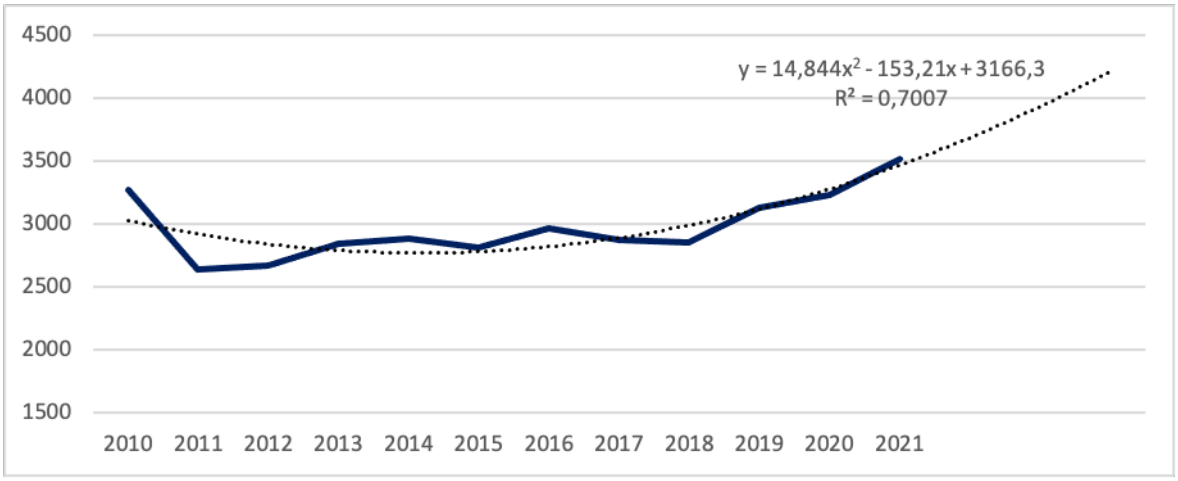


Figure 6. Advanced manufacturing technologies in use in Yaroslavl region in 2010-2021, units
Source: composed by authors according to Rosstat (2010-2021)

The var5 indicator shows an unstable increase throughout the study period. Only the polynomial function has a sufficient level of reliability (R2 = 0.7007).

The number of advanced manufacturing technologies in use is forecast to reach 3,683.2 units in 2022, 3,930.8 units in 2023 and 4,208.0 units in 2024.

As can be seen, of the five indicators examined, only two can give a positive prognosis with a sufficient degree of certainty.

Conclusions

The results of this analysis suggest that despite the elaboration and implementation of strategic documents aimed at ensuring innovative development, the level of innovative development of the country's regions is still rather low.

The virtual clustering method allowed us to identify five clusters with similar innovation development

parameters over the period 2014-2021. The most innovation-active cluster «A» includes only eight regions. The other clusters lag many times behind the leader in the studied parameters. Thus, the gap between Cluster A and Cluster B (which includes 20 regions) is 1.6 times, Cluster C (14 regions) lags behind Cluster A 2.5 times, while Cluster D (23 regions) lags behind almost 3 times and Cluster E (18 regions) lags behind 6 times.

All clusters (except for «C») have the highest values of the indicator «specific ratio of organizations that implemented technological innovations in the total number of surveyed organizations». For cluster «C», the most developed indicator is «the specific ratio of expenditures on innovation activities to the total volume of shipped goods, performed works and services».

The following representative regions were selected for the clusters: St. Petersburg (cluster A), Yaroslavl region (cluster B), Volgograd region (cluster C), Murmansk region (cluster D), and Kaliningrad region (cluster E).

Analysis of the model region of cluster B – Yaroslavl region – allowed us to conclude that the region failed to achieve sustainable positive dynamics for the studied indicators over the period of 2010-2021. We revealed the positive trends in the share of organizations that implemented technological innovation in the total number of organizations surveyed and the number of advanced production technologies used. The forecast of changes corresponding to the specific ratio of expenditures on innovation activities in the total volume of shipped goods, performed works and services is pessimistic. For the other indicators, reliable forecasting of the dynamics is impossible due to the significant variability of their values during the period under study.

We should note that for the successful implementation of innovative development of the regions (especially those that are not innovatively active), it is necessary to develop a mechanism for supporting the innovative activities aimed at the production and implementation of innovations both at the federal and regional levels.

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Digital transformation of public administration as a factor of regional competitiveness increasing

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Abstract. Digitalization of public administration became the one of the important modern factors in the formation of competitive advantages of the regions. The increasing of the area competitiveness largely depends on the quality and timeliness of public decisions. At the same time, digitalization of public administration besets a number of challenges at the regional level. They include the digital inequality due to irregular access to broadband Internet access, the high labor costs of data collection, low efficiency of data distribution. Also they include the psychological inability of some officials and citizens themselves to provide and access government services in digital form. Nevertheless, today digitalization is the most promising way to most effectively provide public services to citizens and businesses. Its implementation requires public administration authorities to understand the digital transformation trends, its stages, objectives, and legal and financial solutions. This study aims to analyze the processes of digitalization of public administration in the Yaroslavl region, identify the provision of these processes by the adopted legislative decisions and assess their implementation. Digitalization is a new stage of building an information society, contributing to the realization of the constitutional right of citizens to freely seek, receive, transmit, produce and disseminate information in any lawful way. Information resources of public authorities, local self-government bodies, organizations, and public associations are formed to achieve this goal. Digitalization is designed to provide a new level of quality and efficiency in different subject areas. The effects of digitalization (digital transformation) have a major impact on the development of the regional economy. The digital transformation of the region as a whole, and regional public administration in particular, should strengthen the economic and social components of the competitiveness of the territory. The mechanism of this process is the intensification of state-society interaction in electronic form by achieving «digital maturity» of the economy and social sphere, i.e. the use of domestic digital solutions to solve economic and social problems. It is shown that in the Yaroslavl region consistently and systematically solve the problems of digital transformation, providing competitive development of the territory.

Keywords: digitalization of regional management processes, digital transformation of public administration, legal and financial support of digital transformation processes.

JEL codes: G38, H70, H83, R58

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Introduction

Digitalization is the use of digital tools. At the beginning of the XXI century, technological progress gave rise to a new stage of evolution. It is associated with new tools in the form of information and communication and digital technologies, with a completely different way of social interaction, the emergence of homo digital – digital man (Vasilenko & Meshcheryakova, 2021).

Digitalization of regional management processes is the one of the important modern conditions for the formation of competitive advantages of areas. Modern level of public administration technical equipment largely determines the quality and timeliness of decisions taken.

Undoubtedly, the digitalization of public administration entails many positive social and economic effects. It affects the competitiveness of the region in terms of:

1) Reducing the number of officials. The most of the services performed by the people will process automatically. It will reduce the cost of the state apparatus maintaining;

2) Reducing corruption. The digitalization increases the transparency of public administration;

3) Increasing the convenience of public services for citizens. It also will increase the public satisfaction with the quality of government services, etc.

At the same time, especially at the regional level, digitalization of public administration is challenged with:

– the digital divide due to the uneven access to broadband Internet access, as well as insufficient financial support for the purchase of appropriate technology (Alexandrova, 2019);

– the high labor costs on collecting and posting data with low efficiency of their use. The information posted in the public domain is not always in use (Rajkhlina, 2021);

– the psychological unpreparedness of some officials and citizens to provide and receive public services in digital form. The low digital skills level (digital behavior) (Pogozhina et al., 2020).

Nevertheless, digitalization is the most productive interaction between authorities, citizens, and businesses through the digital environment. It is relevant due to the significant expansion of functions performed by the public authorities (Patrusheva & Rajkhlina, 2021), the increasing complexity of the regional economy attracting investment practice in order to increase the competitiveness of the area (Rajkhlina et al., 2020). In accordance with these trends, the state system is reorganized and operated with digital tools. This process is also called «digital transformation».

Methods

The concept of «digitalization» does not have an unique definition. It is a scientific and technical phenomenon (Patrusheva et al., 2021). There is an opinion that the term can be interpreted as «the process of introducing information and communication and digital technologies into the citizens, organizations and public authorities activities, the result of which is a fundamental change in the practice of obtaining, processing, and sharing information» (Kabytov & Starodubova, 2020). These technologies are «artificial intelligence,» «big data,» «robotics,» «sensorics», etc.

The digital transformation of public administration is a series of systemic transformations. It aims to reach a qualitatively new level of the public services efficiency through the use of digital technologies (Rajkhlina, 2019). Thus, digital transformation is defined by experts as the sum of the effects resulting from digitalization.

The management of the digital transformation processes requires the understanding of public authorities representatives the fact that these processes must be decomposed into several components, each of which has its own importance for regional development. The Presidential Decree of 21.07.2020 No. 474 considers the digital transformation as the national development goal until 2030, and identified several of its components (Figure 1).

In accordance with Decree, the objectives of the regional are:

1. Approaching «digital maturity» or the infill of individual sectors of the regional economy and public administration with embraced digital technologies.
2. Increase the number of available digital services.
3. Expand the digital infrastructure for Internet access throughout the region.
4. Attract investment in regional IT projects and purchase domestic IT solutions.

The government supports these objectives achieving by special budget funding as a part of the projects implementation. For example, the structure of the national programme «Digital Economy of the Russian Federation» (National projects) is presented in Table 1.

The Russian Federation Ministry of Digital Development, Communications and Mass Media provides the functions related to digitalization and digital transformation of the public administration. It also coordinates the relevant work in the regions through the project offices established specifically for this purpose. All executive authorities of the Russian Federation regions have those who responsible for the digital

transformation. This study analyzes the achievements of the Yaroslavl region in this area.

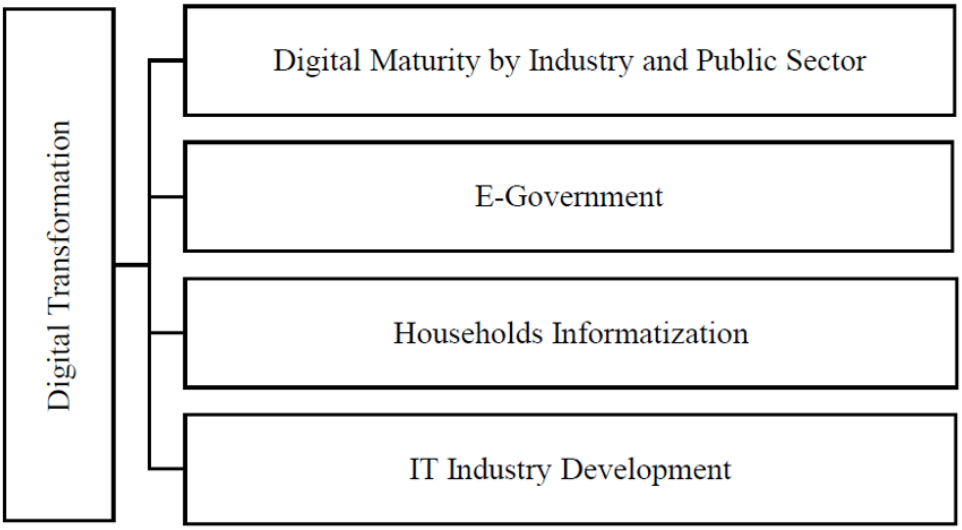

Figure 1. Components of Digital Transformation as the national development goal of the Russian Federation

Source: composed by the authors and based on the requirements of Presidential Decree No. 474 of 21 July 2020 «On the National Development Goals of the Russian Federation for the period until 2030».

Table 1 – Funding for the national programme «Digital Economy» until 2024 inclusive

Federal project	Funding, million rubles
Information infrastructure	772,401
Digital technologies	451,809
Digital Public Administration	235,705
Personnel for the Digital Economy	143,088
Cybersecurity	30,204
Regulation of the digital environment	1697

Source: composed by authors based on the passport of the national programme «Digital Economy».

Results

There are several important decisions on digitalization and digital transformation of public administration in the Yaroslavl region. They can be systematized according to the objectives of digital transformation.

The first objective – to approach the «digital maturity» of the individual sectors of the regional economy and public administration – approved in March 2020. The state programme «Information Society» in the Yaroslavl region in 2020-2024 includes a regional special-purpose programme «Digital Economy» (Resolution № 227-r). It includes a regional project «Digital Public Administration». The project passport contains 18 proprietary technologies on the implementation of digital technologies and platform solutions (Passport). But, funding of 9.8 million rubles from the regional budget was allocated only for 2019.

The state programme "Development of public administration system in Yaroslavl region" for 2021-2025 (Resolution № 76-r) contains the issues of increasing the transparency of the public administration through ICT. The total financing of its subprogramme «Development of State Civil and Municipal Service in the Yaroslavl region» amounts to 36.91 million rubles. These funds will be used for:

- providing an automated assessment of personnel;
- updating data on the region in the Unified Information System for the Management of Personnel of the Civil Service of the Russian Federation;
- development of electronic training courses, manuals for state civil servants, and other tasks.

In August 2021, the Governor of the region approved the Strategy for Digital Transformation of the

Economy, Social Sphere, and Public Administration of the Yaroslavl region (Strategy, 2021). It provides the following projects under the Public Administration section:

1) Conversion of mass socially important state and municipal services into the digital form;
2) Feedback platform;
3) Digitalization of magistrate courts;
4) Digital transformation of control (supervisory) activity;
5) Creation of a digital "Gostech" platform;
6) Development of electronic document management systems for the region's state authorities and local authorities of the region's municipalities.

Decree of the Government of the region from 28.12.2021 No. 990-p adopted a programme of digital transformation of the Yaroslavl region for 2022-2024 (Decree No. 990-p). The Decree, as well as the Strategy, considers the objective of digital transformation as the achievement of the «digital maturity» of the main sectors. They include the economy, social sphere, and public administration in order to provide quality public services to the population and businesses, form a quality and safe environment for life and development, ensure accessibility and quality of education, health and social support. The Programme formulates the following objectives for the digital transformation of public administration in the Yaroslavl region until 2024:

– increasing social services available in digital form up to 95%;
– achieving «digital maturity» in key sectors of the economy, social sphere, healthcare, and education, as well as public administration – up to 32%;
– increase the share of the Yaroslavl region households with Internet access up to 79.6%;
– achieve the share of the design construction documentation in digital form up to 10%;
– increase the share of regional social safety net mechanisms. The application of these mechanisms allows to the Yaroslavl region citizens to submit on the portal of public services up to 100%;
– increase the attendance rate of the Golden Ring 2.0 digital platform up to 65,000 visitors;
– achieve the share of the Yaroslavl region large and medium-sized enterprises with digital passports on the platform of the state information system of industry up to 85%.

The second objective – to increase the number of services available in digital form – was implemented in the Yaroslavl region in the project «E-government». 85 socially important services in the Yaroslavl region converted into digital form and presented on the Unified Portal of Public Services (UPPS). Totally 123 regional services are available in digital form on the UPPS. The Unified System of Identification and Authentication (USIA) – the Federal SIS – allows citizens to use a single login and password on various portals and sites to obtain public and municipal services in digital form – 811,129 citizens with a confirmed account and a certain location – Yaroslavl region («E-government», 2023) were registered.

All executive authorities of the Yaroslavl region and local authorities of municipalities in the region are connected to the system of interdepartmental electronic interaction (SIEI). The Department of Informatization and Communications of the Yaroslavl region (DIC, 2023) is responsible for the implementation of these projects and for the publication of all related materials. As for the objective of the infrastructural capacity expanding to Internet access to citizens throughout the region, it is successfully achieved (Table 2).

Table 2 – The number of mobile broadband Internet access of subscribers per 100 people

Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
RF	47.8	52.6	59.8	64.5	68.1	71.1	79.9	86.2	96.4	99.6	107.5
CFD	52.8	57.9	64.8	73.5	79.2	83	92.1	97.4	109.5	110.7	120.2
YR	51.6	52.9	60.5	66.5	69.1	68.5	73.9	78.5	97.2	107.7	116.9

Source: composed by authors. Based on «Selective Federal statistical observation on the use of information technologies and information and telecommunication networks by the population of the RF»

The Federal State Statistics Service data the expanding of the availability of high quality Internet service in the region. The highest level of expand was in 2019 compared to 2018. At the same period the number of subscribers to mobile broadband Internet access per 100 people in the Yaroslavl region (YR) was slightly

higher than the average for the Russian Federation (RF), but remains below the Central Federal District (CFD).

As a part of the fourth objective of digital transformation – to attract investment into regional IT-projects and acquire domestic IT-solutions – the Ministry of Digital Development of Russia recommends to the Russian Federation regions be guided by the National Strategy for Artificial Intelligence until 2030 (The Order No. 490) and the Strategy for the Development of the Electronic Industry of the Russian Federation until 2030 (Decree No. 20-r). In accordance with their provisions, Yaroslavl region public administration provides mechanisms to support the IT-industry. They can be classified as follows:

I. Contest conduct.

This includes the projects selection on development of Russian IT solutions; providing competitive grants for domestic software promotion; competitive admission of the residents for accelerating.

II. Support mechanisms for companies – IT solutions developers.

1) application of zero income tax rate for accredited organizations;

2) accredited organizations exemption of tax, currency control, and other types of state and municipal control;

3) providing grants for the domestic IT solutions development;

4) selection of Russian software licensors;

5) startups support for the early stages of development as part of the «Start – Digital Technologies» programme;

6) support for companies with experience in the development and sale of science-intensive products under the «Development – Digital Technologies» programme;

7) support for enterprises planning to present their own products to foreign markets as part of the « Export – Digital Technology» programme;

8) support for enterprises planning to refine and scale their own digital solutions, products, or platforms as part of the «Commercialization – Digital Technologies» programme;

9) supporting businesses developing open source code, creating, and developing open-source library as part of the «Code to Digital» programme;

10) concessional lending to IT companies.

III. Support mechanisms for companies implementing IT solutions imply concessional lending for the introduction of domestic software; grants for projects of digital business transformation, for pilot implementation of Russian software, platform solutions, services, or software and hardware complexes based on artificial intelligence technologies. As part of the «Digitalization – Digital Technologies» programme, support is provided to small businesses planning to implement Russian digital solutions.

IV. Support mechanisms for IT professionals include privileged mortgages for employees of accredited IT companies, as well as getting occupational deferment from military service.

Thus, the public administration of Yaroslavl region provides the processes of digital transformation by expanding the range of digital public services and increasing the transparency of public administration through ICT. In addition, they act as subjects of digital transformation in terms of the development of the information infrastructure in the region, as well as the implementation of mechanisms to support the IT industry.

Discussion

There are various approaches to the defining of the processes of public administration digitalization in the scientific literature. Thus, in (Kochetkova, 2022) there is a description of the constants determining the regional economic systems qualitative change in terms of digitalization. Regions digital maturity is a tool of public administration digital transformation in (Bannykh et al., 2022). The impact of digitalization on the interaction between the authorities and regional development institutions is considered in (Patrusheva & Rajkhlina, 2021a). The paper (Dobrolyubova et al., 2019) dwells on the challenges of digital transformation is impossible without greater efficiency, expediency, and therefore a new quality of public authorities and

governance, as well as providing greater validity of public intervention. Many studies emphasize that the pandemic was a major challenge to driving digital transformation processes into public administration worldwide (e.g., Gangneux & Joss, 2022). Researchers also pay attention to the national specifics of these processes (Battisti, 2020; Rusu et al., 2020). It emphasizes the digital transformation of public administration causes multiplicative socio-economic effects (Kitsios et al., 2021). Also it requires new technologies in knowledge management (Alvarenga et al., 2020). In general, this phenomenon is still developing, and its understanding is just being built up (Verhoefa et al., 2021). Therefore, the scientific understanding of this phenomenon demands the implementation of the interdisciplinary approach.

Conclusions

Thus, digitalization is a new stage of building an information society, contributing to the realization of the constitutional right of citizens to freely seek, receive, transmit, produce and disseminate information in any lawful way. Information resources of public authorities, local self-government bodies, organizations, and public associations are formed to achieve this goal. Digitalization is designed to provide a new level of quality and efficiency in different subject areas. The effects of digitalization (digital transformation) have a major impact on the development of the regional economy.

The digital transformation of the region as a whole, and regional public administration in particular, should strengthen the economic and social components of the competitiveness of the territory. The mechanism of this process is the intensification of state-society interaction in electronic form by achieving «digital maturity» of the economy and social sphere, i.e. the use of domestic digital solutions to solve economic and social problems. It is shown that in the Yaroslavl region consistently and systematically solve the problems of digital transformation, providing competitive development of the territory.

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Assessing the impact of digitalization on regions of Russia competitiveness

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Abstract. Current trends in the social-economic development of the regional economy are based on the application of advances in digitalization. The digital transformation of regions does not lose its relevance. It results by the emergence of new approaches and models of sustainable development based on information technology, which in turn leads to regional competitiveness. The purpose of constructing ratings of the subjects of the Russian Federation on the level of digital transformation and competitiveness is to assess and rank the regions based on indices. It includes certain indicators, which ultimately leads to the adoption of sound management decisions focused on increasing regional competition. Analysis of the region's competitiveness is one of the key characteristics of its comprehensive development. This issue has not been sufficiently studied in terms of quantitative analysis. The comparison of ratings in order to analyze the impact of digitalization on the competitiveness of Russian regions is a relevant issue of this study. The experience of Russian regions' application of digital technologies has considerable potential. The implementation of the strategic priorities of digital transformation directly depends on the development of digital transformation strategy and the sequence of its implementation by regional authorities. And the regional competition heavily depends on digital transformation.

Keywords: digitalization, digital transformation, competitiveness, rating, correlation.

JEL codes: R11, O11, R58

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Introduction

In recent years, digitalization became a fundamental trend in the development of the global economy. It changes its structure, and transfers it to a new qualitative state. Digitalization of the regional economy determines the trajectory of the country's development. It also demands the effective use of new digital technologies affects the competitiveness of individual companies and regions, as well as the state as a whole. Today, all of humanity depends on information and communication technology. The conditions for economic growth are provided by the creation of accessible high-tech services.

The peculiarities of the formation of the post-industrial economy and the prospects for its development in the regions of Russia are associated with the need for structural changes in the economy (Batrakova, 2021b). The main issue of Russia is to create conditions for the acceleration of scientific, technological and innovative levels, in order to ensure a balanced implementation of project activities in all 85 regions of the country. Therefore, these conditions in terms of the regional competition become relevant.

We should note that the analysis of regional competitiveness has not been sufficiently studied from both quantitative and theoretical perspectives. Nowadays, «regional competitiveness» as an economic category does not have a precise definition. The analysis of the factors forming the competitiveness of regions has different, sometimes contradictory, points of view (Batrakova, 2021a). The economic meaning of «competitiveness» is largely determined by the «competition» concept. Consequently, competitiveness is the property of an area to be more successful than others.

American scientist Michael Eugene Porter (born in 1947) wrote that only those territories that, having competitive advantages, hold them and, most importantly, create them, can be competitive. In the context of regional competitiveness, the work of L.N. Chaynikova «Methodological and Practical Aspects of Assessing Regional Competitiveness» should be noted. It gives a selection of «regional competitiveness» definitions, and

considers theoretical aspects of competitive advantages of the region, develops a methodology for assessing regional competitiveness (Chaynikova, 2008).

We follow the point of view of those authors who consider regional competitiveness as the ability of the region to realize its economic potential for stable socio-economic development of the region in order to ensure a high quality of life of its population (Vasilyeva, 2006). Assessing the competitiveness of a region is one of the key characteristics of its comprehensive development. It can be given based on the position of the area in the domestic and foreign markets, which can be determined by various factors: economic, social, political, etc. We can note that a area cannot be competitive in all sectors of the economy. It is important to identify the specialization of the area, and achieve a sustainable change in the factors that contribute to productivity growth. Economic, scientific, technical, and personnel potential is the basis of the region competitiveness forming. The competitive position of the region is created through the influence of various factors. Regions can compete with each other in such areas as the creation of modern infrastructure, the favorable environment for business, the use of information technology, the availability of skilled labor, etc. Also, the digitalization of the regions is an important area for studying.

Main Part

A comprehensive assessment of the regions ability to compete for resources and markets is the index of regional competitiveness (AV Regions Competitiveness Index – AV RCI), developed by the Leontief Center – AV Group Consortium. This index is composed of indicators representing the results of interregional competition in the following areas: Markets (products and economic complexes); Institutions (public, private and community); Human capital; Innovation and information; Natural resources and sustainable development; Space and real capital; Investment and financial capital.

Estimated values of competitiveness rating (AV RCI) from 0 to 5, by which all regions are grouped as follows:

- Group 1 includes the leading regions with a rating above 3.0, which form the centers of growth poles and play a major role in the Russian economy;
- Group 2 includes regions with a rating from 1.5 to 3.0;
- Group 3 includes regions with a rating of less than 1.5.

The results of the study are published at www.av-group.ru.

The top 20 regions of Russia according to the AV RCI-2022 rating are presented in Table 1.

Table 1– Regional Competitiveness Rating and Scores

Region	Regional competitiveness ranking AV RCI-2022	
	Rating	Score
Moscow	1	5
Saint Petersburg	2	4,15
Moscow region	3	3,94
Tatarstan Republic	4	3,58
Krasnodar Krai	5	3,16
Sverdlovsk region	6	3,07
Krasnoyarsk Krai	7	3,04
Novosibirsk region	8	2,08
Chelyabinsk region	9	2,78
Rostov region	10	2,77
Bashkortostan Republic	11	2,73
Samara region	12	2,68

Region	Regional competitiveness ranking AV RCI-2022	
	Rating	Score
Nizhny Novgorod Region	13	2,65
Khanty-Mansi Autonomous Okrug – Ugra	14	2,59
Yamalo-Nenets Autonomous Okrug	15	2,57
Irkutsk region	16	2,56
Perm Krai	17	2,53
Belgorod region	18	2,51
Sakha Republic (Yakutia)	19	2,41
Voronezh region	20	2,39
Karachay-Cherkess Republic	81	0,41
Republic of Altai	82	0,40
Tuva Republic	83	0,37
Republic of Ingushetia	84	0,37
Jewish Autonomous Oblast	85	0,00

Source: Annual Rating of regions on the achievement of national goals, 2022

The leading regions (Table 1) account for 48% of the total GRP of all Russian regions, 42% of all investments, 32% of the economically active population. The ranking and scores of the lagging regions are shown in Table 1.

According to Order No. 2816-r on 06.10.2021 by Government of the Russian Federation, the main direction of socio-economic development of the Russian Federation until 2030 is the digital transformation. It is a profound reorganization of business processes with extensive use of digital tools for their processing.

There are qualitative changes in the economic structure and the peculiarity of value added creation in the process of digital transformation. The theoretical foundations of these transformations were laid in the works of the classics of economic science as the systematic factors of their creation. In the digital economy value added is created by three components: technology, business task, and data. Digital transformation in the regions leads to the creation of new industries, radical growth of the market, the transition to a new technological and economic mode. These transformations have an impact on all the sectors of the economy (from creative to agriculture) (Batrakova, 2021b) and, as a result, lead to increased competitiveness.

The proliferation of digital technologies leading to digital transformation is one of the main trends in the development of the national economy. An important indicator of a region's digital development characterizing the degree and success of its digital transformation is the level of digital maturity.

The implementation of regions digital transformation is a fairly time-consuming process that requires significant financial costs. There is the federal support for digital innovation projects.

The regional experience of digitalization of the economy is quite extensive, so we will limit ourselves to some examples. Moscow is the leader in the national project implementation «Digital Economy»; the Republic of Tatarstan enhance the innovative development through digital technologies.

The first best practice of digitalization with the involvement of public-private partnership mechanisms was a unified digital platform for regional management in Murmansk region; Tomsk region developed a digital platform integrating data from all IT companies; Ulyanovsk region has great success in the application of digital technology in various areas of life. In the framework of the program «Innovative society and improving the quality of public and municipal services in the Kaluga region» citizens and organizations realized the use of ICT technologies (Panasenkova & Popova, 2020).

Also there is a project «Digital Professions» as part of the national project «Digital Economy». It aims

to provide citizens with the special IT education. For example, at Yaroslavl State Technical University the specialists from Yaroslavl branch of "Rosseti Center-Yarenergo" started an information course on the digital transformation program for the electric grid complex. There are similar practices in other regions.

The system of indicators of the regions rating digital transformation includes the following: Institutional Environment, Infrastructure and Access, Digital Transformation Potential. The total score is determined by summing up the scores of the indicators, the maximum value of which is 31. The top 20 regions in the digital transformation ranking at the end of the three quarters of 2022 are shown in Table 2. The ranking and scores of the lagging regions are shown in Table 2.

Table 2 – Rating of digital transformation of regions of Russia by the results of three quarters of 2022

Region	Rating of digital transformation of regions (the maximum possible total rating score for each region is 31)	
	Rating	Score
Lipetsk region	1	22,4
Khanty-Mansi Autonomous Okrug – Ugra	2	22
Chelyabinsk region	3	21,5
Kemerovo region - Kuzbass	4	21
Moscow region	5	20,6
Tula region	6	20,3
Tyumen Region (not including the Autonomous Oblast)	7	20,1
Kaluga region	8	20
Belgorod region	9	19,9
Kurgan region	10	19,7
Sakha Republic (Yakutia)	11	19,7
Yamalo-Nenets Autonomous Okrug	12	19,6
Chuvash Republic	13	19,5
Tomsk region	14	19,4
Tatarstan Republic	15	19,2
Orenburg region	16	19
Bashkortostan Republic	17	18,9
Sevastopol	18	18,8
Rostov region	19	18,6
Primorsky Krai	20	18,3
Astrakhan region	81	9,8
Tuva Republic	82	9,6
Tver region	83	9,1
Republic of Ingushetia	84	7,5
Kabardino-Balkarian Republic	85	6,9

Source: composed by author

In order to establish the impact of regions digitalization on competitiveness, we will conduct a comparative analysis of the digital transformation and regional competitiveness ratings. According to the

results, we compile a table (Table 3).

Table 3 – Summary data of the regional rankings

Region	Regional competitiveness ranking		Rating of digital transformation of regions	
	Rating	Score	Rating	Score
Lipetsk region	36	1,78	1	22,4
Khanty-Mansi Autonomous Okrug - Ugra	14	2,59	2	22
Chelyabinsk region	9	2,78	3	21,5
Kemerovo region	28	2,06	4	21
Moscow region	3	3,94	5	20,6
Tula region	30	1,94	6	20,3
Tyumen Region (not including the Autonomous Oblast)	22	2,30	7	20,1
Kaluga region	37	1,77	8	20
Belgorod region	18	2,51	9	19,9
Kurgan region	77	0,64	10	19,7
Sakha Republic (Yakutia)	19	2,41	11	19,7
Yamalo-Nenets Autonomous Okrug	15	2,57	12	19,6
Chuvash Republic	51	1,43	13	19,5
Tomsk region	38	1,76	14	19,4
Tatarstan Republic	4	3,58	15	19,2
Orenburg region	33	1,84	16	19
Bashkortostan Republic	11	2,73	17	18,9
Sevastopol	70	1,03	18	18,8
Rostov region	10	2,77	19	18,6
Primorsky Krai	25	2,15	20	18,3

Source: composed by author

Analyzing the data in Table 3, we can conclude that there is no correspondence between the ratings. Thus, the regions that rank first in digital transformation are far from being at the top of the list in terms of competitiveness. For example, Lipetsk region ranks 1st in digital transformation, but 38th in competitiveness; Tula region ranks 6th and 30th, respectively; Sevastopol ranks 18th and 70th, and Kurgan region ranks 10th and 77th, respectively.

The dependence of scores of regions competitiveness and digital transformation is depicted in the form of a point chart (Figure 1). By this chart we can see the linear relationship between the indicators.

In order to determine the degree of parallelism between two quantitative series of the attributes under study, the direction and evaluation of the closeness of the established connection, the calculation of the Spearman rank correlation coefficient was used (Eliseeva, 2023).

This coefficient belongs to the method of nonparametric analysis. It is not required to check for distribution normality. This criterion was developed and proposed in 1904 for correlation analysis by the English psychologist known for his work in statistics Professor Charles Edward Spearman (1863-1945). The ranks correspondence of digital transformation and competitiveness of 20 regions is presented in Table 4.

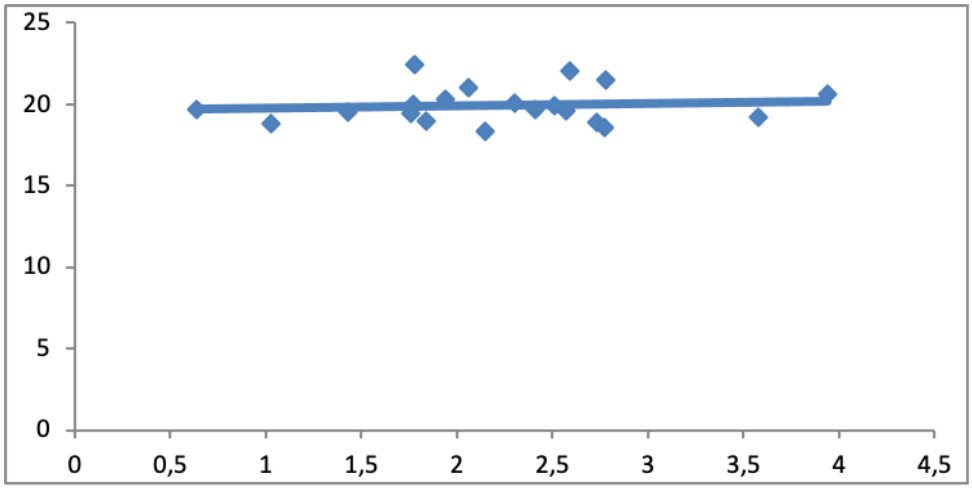

Figure 1. Correlation between regions digital transformation and competitiveness

Source: composed by author

Table 4 – Table of correspondence between the ranks of regional digital transformation and competitiveness

Rating rank of digital transformation of regions	Rating rank of the regional competitiveness
1	4
2	15
3	3
4	19
5	17
6	2
7	12
8	9
9	11
10	6
11	20
12	3
13	5
14	16
15	1
16	7
17	14
18	13
19	18
20	10

Source: composed by author

The Spearman rank correlation coefficient gave a result of 0.95. The statistical significance of the coefficient was tested using Student's t-test; the calculated value turned out to be 13.276; the tabulated value of the coefficient being 2.086. The calculated value of the t-criterion exceeds the table value for a given number of degrees of freedom. Therefore, the correlation is significantly different from 0 and is considered to be statistically significant. The Cheddock scale was used to check the closeness of the relationship, where the coefficient value of more than 0.9. It is assessed as very high, so we can conclude that the competitiveness

and digital transformation ratings are dough-related. It means that digitalization significantly affects the competitiveness of regions.

Conclusions

In conclusion, we can say that the experience of Russian regions' application of digital technologies has considerable potential. The implementation of the strategic priorities of digital transformation directly depends on the development of digital transformation strategy and the sequence of its implementation by regional authorities. And the regional competition heavily depends on digital transformation.

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Competitiveness of Russian regions in the context of the digital divide

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Abstract. The socio-economic inequality of the Russian Federation entities generates digital inequality, and affects the competitiveness of the agglomerations. The purpose of the study is to assess the impact of digital inequality on the Russian regions competitiveness level. The direct connection between the levels of ICT development and regional competitiveness is the hypothesis of the study. Therefore, regions with the similar characteristics of ICT development will have the same competitiveness level. We use the cluster analysis to test the hypothesis. As a result of the research, we confirm the hypothesis, according to the data characterizing the Russian economy in a four-year time interval.

Keywords: Socio-economic inequality of regions, regional competitiveness, entities of the Russian Federation, cluster analysis, ICT development, digital divide.

JEL codes: B41, O30, R11

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Introduction

ICT is a basic element of the innovation environment infrastructure of an agglomeration. It has a direct impact on regional competitiveness. Directly, by accelerating information exchange, reducing transaction costs, creating new services and products, and indirectly, by improving the quality of life of the population.

The connection between regional competitiveness and innovation in the economic literature has long been identified: starting from the works of the "founder" of the national competitiveness concept M. Porter and ending with the research of modern authors (Shkiotov, 2022). Indeed, Polyakova, Kolmakov & Yamova (2019) consider the regional competitiveness as a function of innovation activity; Naibaho (2021) shows how regional innovation policy stimulates the competitiveness of agglomeration; Zinovyeva et al. (2016) verifies the hypothesis of the innovative development impact on regional competitiveness; studies by Petronela & Cojanu (2013); Sabatino & Talamo (2017); Csete & Barna (2021) concern with the same relationships, but on the example of European regions.

The issue of these research in term of the Russian regions competitiveness is often associated with a number of complex tasks: starting with the choice of research methodology and ending with the lack of a regional competitiveness significant statistical base. Moreover, the competitiveness of Russian regions is greatly influenced by their socio-economic inequality (Shkiotov, 2022).

In this study we will analyse the relationship between the development of ICT by the cluster analysis at the level of the Russian Federation entities and the level of their competitiveness.

The research issue allows us to identify the relationship between the development of ICT and competitiveness, along with the factor of regional socio-economic inequality (in this context, digital).

Methods

The direct connection between the level of ICT development and the level of regional competitiveness is the hypothesis of the study. Therefore, regions with the similar characteristics of ICT development will have the same competitiveness level.

Research methodology

1. The study period is 4 years (short-term).

2. Indicators used:

Indicators characterizing the development of ICT in Russia:

- Number of fixed telephony subscribers per 100 residents in the Russian Federation, 2000-20 (FTS);
- Number of mobile phone subscribers per 100 residents in the Russian Federation, 2000-20 (MTS);
- Number of fixed broadband subscribers per 100 residents in the Russian Federation, 2011-20 (FBS);
- Number of Internet users, % of the population in the Russian Federation, 2014-20 (IU).

Indicators characterizing the level of competitiveness of the Russian Federation entities:

- Rating of Russian regions competitiveness AV RCI, 2018-21.

All the data used in the paper are taken from: Rosstat, Resource Center for Strategic Planning (https://stratplan.ru /). The dynamics of the studied indicators is shown in Figures 1 and 2.

3. Sample: 85 entities of the Russian Federation; 4-year time interval (2018-21).

4. Research methods: cluster analysis. In general, cluster analysis is designed to combine some objects into classes (clusters) in a way which maximises the similarity of objects in one class and maximises the difference between the objects of different classes. The quantitative similarity indicator is calculated in a proper way on the basis of data characterizing the entities. In this case, the aim of the cluster analysis is to divide the RF entities into classes, each corresponding to a particular group (with the same characteristic of ICT development). Note that all clustering algorithms need assessments of distances between clusters or objects, for which the scale of measurement is required. Since different measurements use completely different types of scales, the data should be standardised so that each variable has a mean of 0 and a standard deviation of 1.

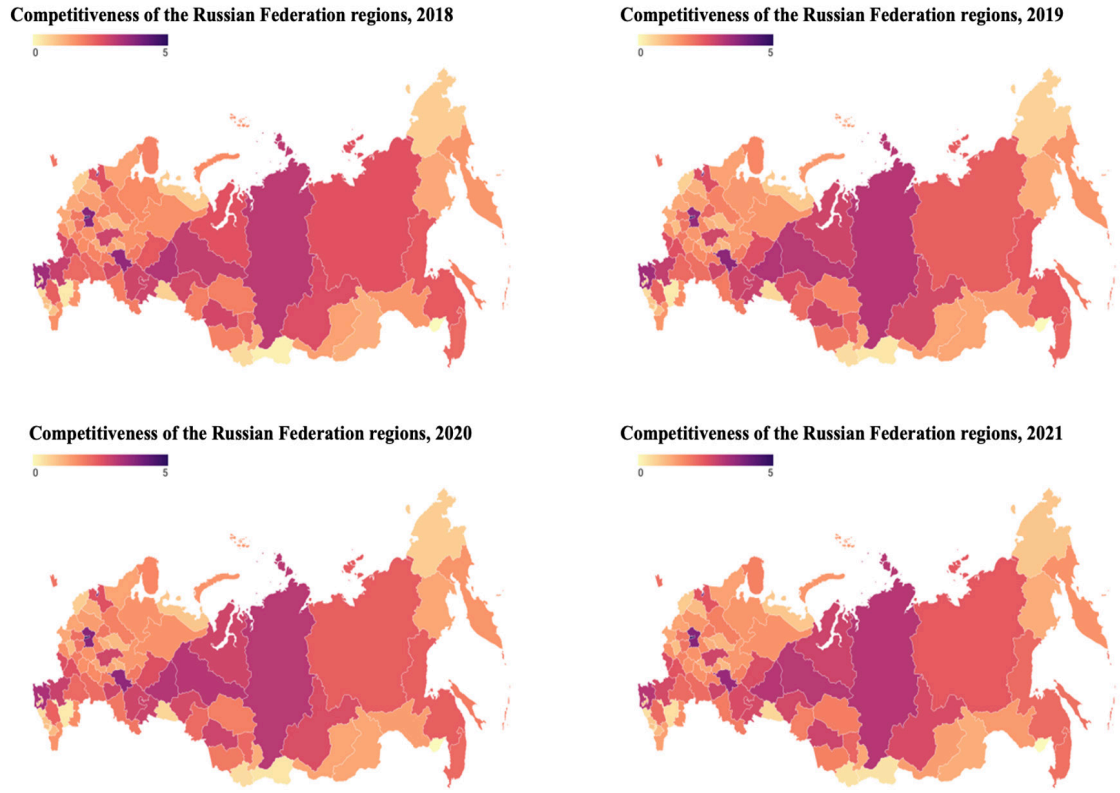

Figure 1. Competitiveness of the Russian Federation regions, 2018-21

Source: Russian Regions Competitiveness Index AV RCI , 2018-21

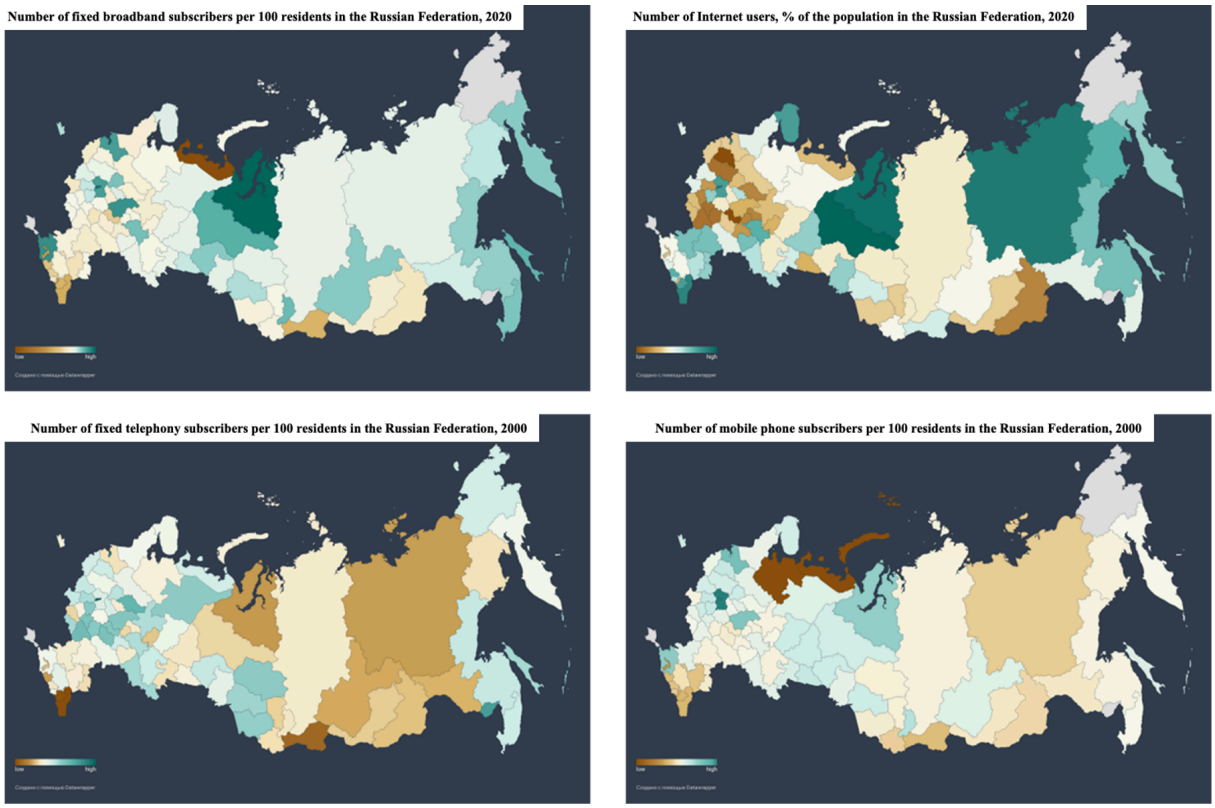

Figure 2. The development of ICT in the Russian Federation regions, 2020
Source : Rosstat, 2016-20

Research progress

At the first stage of the study, we will find out whether the regions form "natural" clusters that can be comprehended.

The full link method defines the distance between clusters as the largest distance between any two objects in different clusters. The proximity measure defined by the Euclidean distance is a geometric distance in n-dimensional space and is calculated as follows:

$$d(x, y,) = \sqrt{\sum (x_i - y_i)^2} \quad (1)$$

The most important result obtained as a result of tree clustering is a hierarchical tree (see Fig. 3).

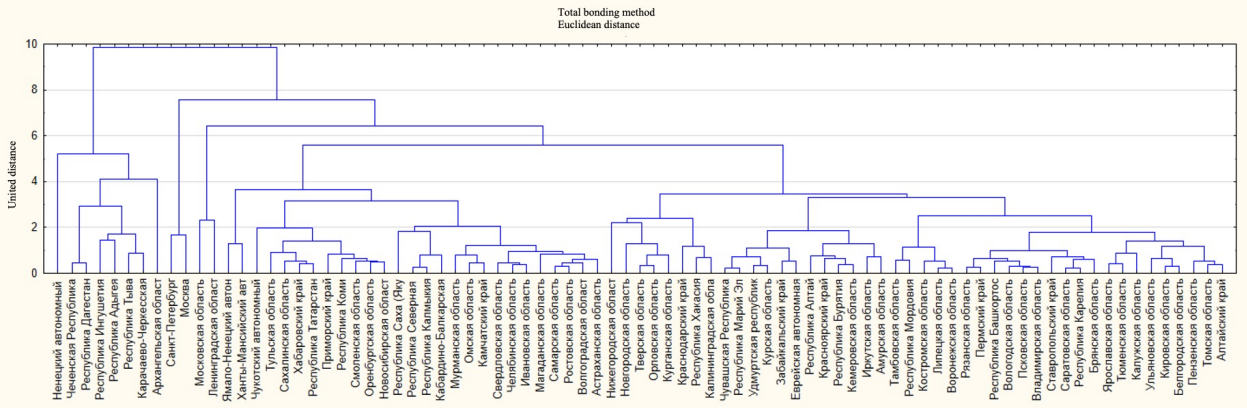

Figure 3. Vertical dendrogramme by constituent entities of the Russian Federation
Source: composed by authors

The analysis of the diagram starts from the top (for a vertical dendrogram) with each region in its own cluster.

When we down from the top the adjacent regions form the clusters. Each node in the diagram above represents a union of two or more clusters, the position of the nodes on the vertical axis determining the distance at which the respective clusters have been joined.

Based on the visual representation of the results, we can assume the formation of five natural regional clusters. We can test this assumption by dividing the initial data by the K-means method into 5 clusters, and checking the significance of the difference between the groups obtained.

The K-means method is as follows: calculations begin with k randomly selected observations (in our case k=4), which become the centers of groups. Then the object composition of clusters changes in order to minimize variability within clusters and maximize variability between clusters. Each subsequent observation (K+1) belongs to the group which similarity measure with the center of gravity is minimal. After changing the cluster composition, a new center of gravity is calculated, most often as a vector of averages for each parameter. The algorithm works until the composition of the clusters stops changing. When the classification results are obtained, we can calculate the average value of the indicators for each cluster to assess their differences.

To determine the significance of the difference between the obtained clusters In the analysis of variance, we use a p-value of 5% (a value of p <0.05 indicates a significant difference).

Table 1 – Results of the variance analysis

	Between - SS	ss	Inside - SS	ss	F	significant. -p
FTS 2020	39,91118	4	42,08882	78	18,49109	0,000000
MCS 2020	54,75084	4	27,24916	78	39,18070	0,000000
FBS 2020	60,78172	4	21,21828	78	55,85956	0,000000
IU 2020	48,49548	4	33,50452	78	28,22490	0,000000

Source: ccomposed by authors

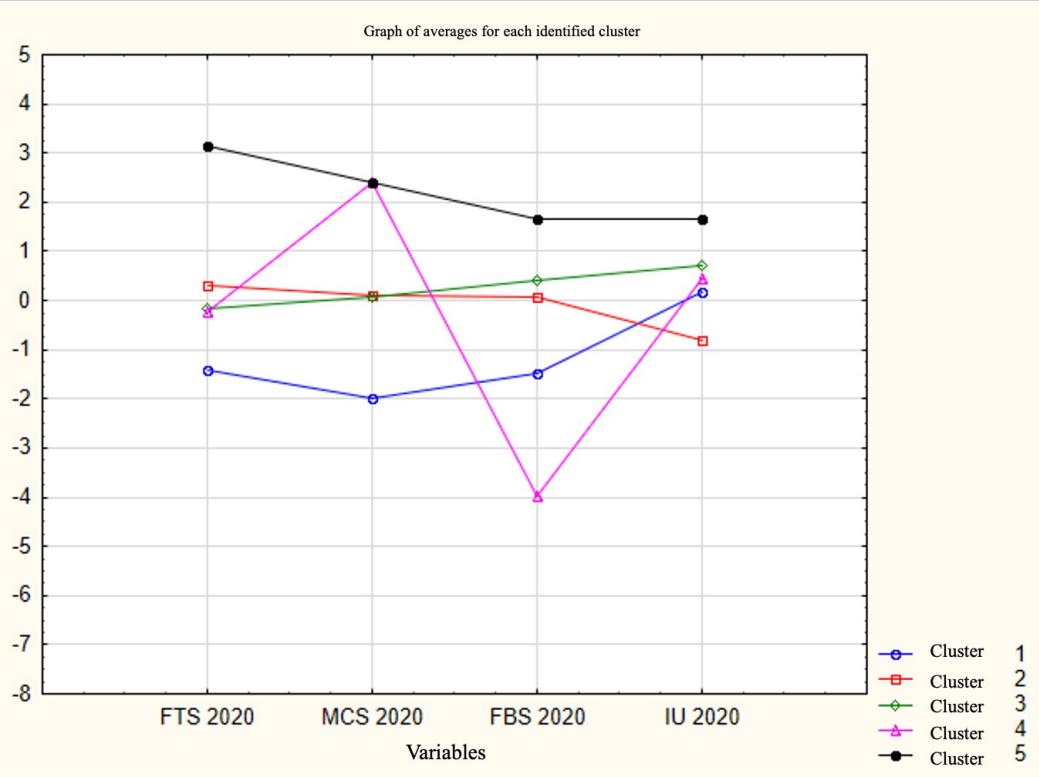

Figure 4. Graph of averages for each identified cluster

Source: composed by authors

Results

Therefore, each of the five analyzed clusters contains the objects with similar characteristics of ICT

development.

Table 2 – Cluster elements number 1 (ICT development 2016-2020-normal.sta) and distances to the cluster center

The Russian Federation entity	united .
Arhangelsk region	1,368331
Karachay-Cherkess Republic	0,499598
Nenets Autonomous Okrug	1,835369
Republic of Adygea	0,497613
The Republic of Dagestan	1,018835
The Republic of Ingushetia	0,764094
Tyva Republic	0,539968
Chechen Republic	0,855668

Source: composed by authors

Table 3 – Cluster elements number 2 (ICT development 2016-2020-normal.sta) and distances to the cluster center

The Russian Federation entity	united .
Altai region	0,406289
Belgorod region	0,246388
Bryansk region	0,517195
Vladimir region	0,281692
Vologda Region	0,231457
Voronezh region	0,694870
Jewish Autonomous Region	0,518757
Transbaikal region	0,775763
Kaluga region	0,439424
Kemerovo region	0,578819
Kirov region	0,249924
Kostroma region	0,766736
Krasnoyarsk region	0,482026
Kurgan region	0,438232
Kursk region	0,520861
Lipetsk region	0,613329
Nizhny Novgorod Region	1,056106
Novgorod region	0,624760
Oryol Region	0,404696
Penza region	0,578855
Perm region	0,344203
Pskov region	0,210207
Republic of Bashkortostan	0,288610
The Republic of Buryatia	0,653361
Komi Republic	0,519518
Mari El Republic	0,471436

The Russian Federation entity	united .
The Republic of Mordovia	0,821095
Ryazan Oblast	0,327270
Stavropol region	0,500585
Tambov Region	0,575846
Tver region	0,404463
Tomsk region	0,479782
Tyumen region	0,469883
Udmurt republic	0,590485
Ulyanovsk region	0,200521
Chuvash Republic	0,566949
Yaroslavl region	0,443104

Source: composed by authors

Table 4 – Cluster elements number 3 (ICT development 2016-2020-normal.sta) and distances to the cluster centerr

The Russian Federation entity	united .
Amur region	0,583679
Astrakhan region	0,360636
Volgograd region	0,328749
Ivanovo region	0,152850
Irkutsk region	0,647906
Kabardino-Balkarian Republic	0,799467
Kaliningrad region	0,372107
Kamchatka Krai	0,166887
Krasnodar region	0,877195
Magadan Region	0,346635
Murmansk region	0,359722
Novosibirsk region	0,564676
Omsk region	0,163260
Orenburg region	0,493759
Primorsky Krai	0,439428
Altai Republic	0,657792
Republic of Kalmykia	0,666258
Republic of Karelia	0,390542
The Republic of Sakha (Yakutia)	0,925665
Republic of North Ossetia - Alania	0,554175
Republic of Tatarstan	0,530108
The Republic of Khakassia	0,703398
Rostov region	0,289221
Samara Region	0,196227
Saratov region	0,391625
Sakhalin region	0,545727

The Russian Federation entity	united .
Sverdlovsk region	0,276255
Smolensk region	0,464011
Tula region	0,680609
Khabarovsk region	0,380432
Khanty-Mansi Autonomous Okrug - Yugra	0,944547
Chelyabinsk region	0,333044
Chukotka Autonomous Okrug	0,775715
Yamalo-Nenets Autonomous Okrug	1,285826

Source: composed by authors

Table 5 – Cluster elements number 4 (ICT development 2016-2020-normal.sta) and distances to the cluster center

The Russian Federation entity	united .
Leningrad region	0.578400
Moscow region	0.578400

Source: composed by authors

Table 6 – Cluster elements number 5 (ICT development 2016-2020-normal.sta) and distances to the cluster center

The Russian Federation entity	united .
Moscow	0.417757
Saint Petersburg	0.417757

Source: composed by authors

Now it is possible to calculate basic descriptive statistics for each cluster. We make a graph of the average and confidence intervals for variables in each cluster (see Figure 5)

Below is a table of descriptive statistics for each of the indicators (see Table 7).

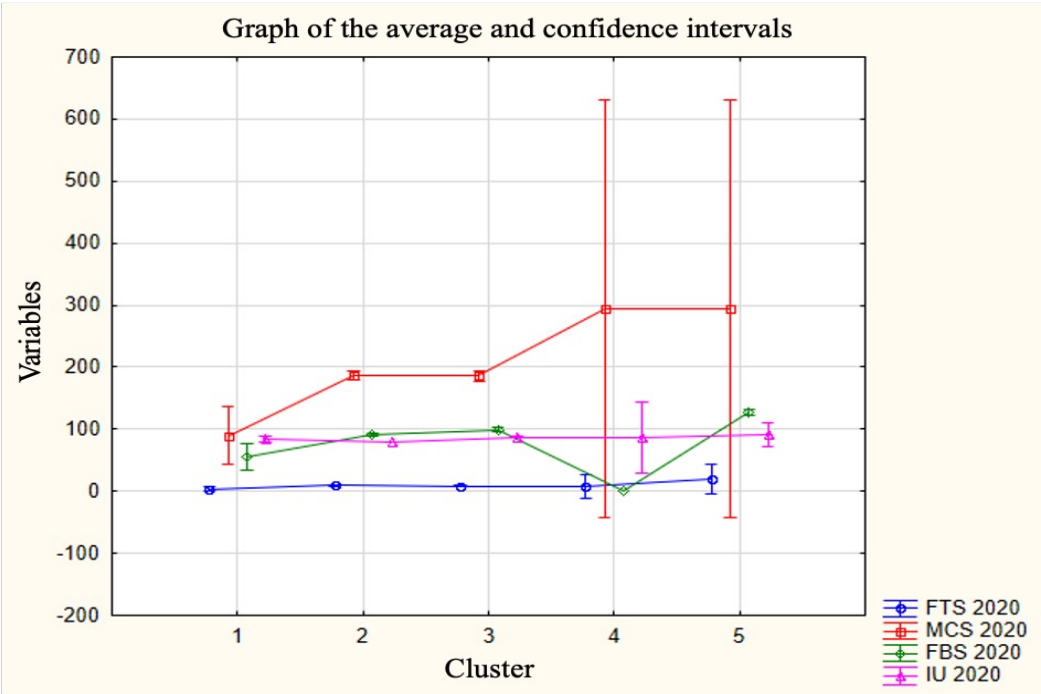

Figure 5. Graph of the average and confidence intervals for variables in each cluster

Source: composed by authors

Below is a table of descriptive statistics for each of the indicators (see Table 7).

Table 7 – Final table of averages

Cluster	FTS 2020	MCS 2020	FBS 2020	IU 2020
1	3,7675	89,1425	56,225	84,125
2	9,81608	186,2835	91,5676	79,40541
3	8,18221	185,9712	98,9441	86,88235
4	7,98	294,535	0	85,5
5	19,87	294,535	127,4	91,5

Source: composed by authors

At the second stage of our research, we will analyze the competitiveness of the regions according to the clusters identified above. We can assess the average value of the regions competitiveness in each selected cluster and analyze the level of regional competitiveness for each isolated cluster.

We will use the t-criterion for independent samples. The grouping variable "klasters" splits the data into groups. Cluster samples will be compared relative to the average of their scores on each scale.

Table 8 – Results of the assessment of the regional competitiveness average level for identified clusters

	Average - 1	Average - 2	t-value	Degree of freedom	p	N obs. - 1	N obs. - 2	Standard deviation - 1	Standard deviation - 2	F-relative dispersion	p - variance
t -criterion; Grouped .: klasters (ICT Development 2016-2020.sta) Group 1:1 Group 2:2											
Competitiveness 2020	0.841250	1.714324	-3.44113	43	0.0013	8	37	0.490115	0.677535	1.911029	0.378057
t -criterion; Grouped .: klasters (ICT Development 2016-2020.sta) Group 1:1 Group 2:3											
Competitiveness 2020	0.841250	1.970588	-3.54639	40	0.0010	8	34	0.490115	0.863190	3.101823	0.123226
t -criterion; Grouped .: klasters (ICT Development 2016-2020.sta) Group 1:1 Group 2:4											
Competitiveness 2020	0.841250	3.160000	-5.29969	8	0.0007	8	2	0.490115	0.876812	3.200500	0.233499
t -criterion; Grouped .: klasters (ICT Development 2016-2020.sta) Group 1:1 Group 2:5											
Competitiveness 2020	0.841250	4.515000	-8.95983	8	0.0000	8	2	0.490115	0.685894	1.958474	0.408795
t -criterion; Grouped .: klasters (ICT Development 2016-2020.sta) Group 1:2 Group 2:3											
Competitiveness 2020	1.714324	1.970588	-1.39742	69	0.1668	37	34	0.677535	0.863190	1.623117	0.157386
t -criterion; Grouped .: klasters (ICT Development 2016-2020.sta) Group 1:2 Group 2:4											
Competitiveness 2020	1.714324	3.160000	-2.91272	37	0.0060	37	2	0.677535	0.876812	1.674752	0.407728
t -criterion; Grouped .: klasters (ICT Development 2016-2020.sta) Group 1:2 Group 2:5											
Competitiveness 2020	1.714324	4.515000	-5.69206	37	0.0000	37	2	0.677535	0.685894	1.024827	0.636265
t -criterion; Grouped .: klasters (ICT Development 2016-2020.sta) Group 1:3 Group 2:4											
Competitiveness 2020	1.970588	3.160000	-1.89289	34	0.0669	34	2	0.863190	0.876812	1.031813	0.634247
t -criterion; Grouped .: klasters (ICT Development 2016-2020.sta) Group 1:3 Group 2:5											
Competitiveness 2020	1.970588	4.515000	-4.07335	34	0.0003	34	2	0.863190	0.685894	1.583796	1.000000

Source: compiled by the authors

The fastest way to analyze Table 9 is to view the fifth column (containing p-levels) and determine which of the p-values are less than the established significance level of 0.05. The averages for the two groups are different for the most dependent variables.

The graph for these resulting tables (7-8) is the box plot (see Figure 6).

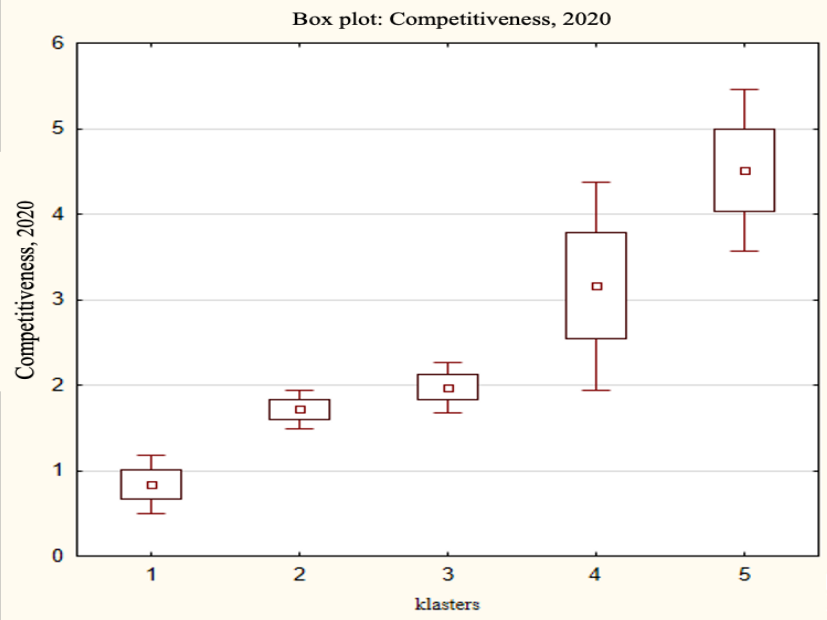

Figure 6. Span Diagram

Source: composed by authors

The difference is more significant the averages in Figure 6 and cannot be explained by the the variability of the initial data. Indeed, there is unexpected difference on the constructed graph. The variance for cluster groups 4 and 5 is greater than for 1-3 (rectangles representing standard deviations equal to the square root of the variation). If the variances in the two groups differ significantly, the one of the requirements for the use of the t-test is violated. This difference should be considered in further studies.

Conclusions

We confirmed the hypothesis by the results of our research. Regions with similar characteristics of ICT development are in the same group in terms of regional competitiveness. Hence, the development of ICT (digital inequality in the context of Russian regions) has a direct impact on the competitiveness of the agglomeration.

The obtained research results can be explained by the limitations of the model used (insufficient sampling for cluster analysis; changes in the methodology of data collection, and assessment of complex indicators).

Thus, the result could activate a new applied research on the competitiveness of Russian regions in the context of digital inequality.

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Competitiveness of the furniture industry products in the changed conditions: state and directions of providing at the federal and regional levels

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Abstract. Recently the domestic furniture industry became a prospective industrial field in order to increase the competitiveness of products. In terms of this increasing there were upgrading of the technical base, the range of products, sales service, and delivery. We assess the issues and identify the forms of Russian furniture enterprises transformation to ensure their competitiveness in the conditions of import substitution. In the conditions of the import substitution and sanctions restrictions, we can see that Russian furniture producers have mastered the production of certain simple components. Also there is the development of the production of paints and coatings. For example, particle boards (fiberboard) in the early 2000s, with changes in import duties it turned out more profitable to organize the production of these products in Russia, as a result of which the need for them is completely covered by domestic producers. By the end of 2022, prices of the furniture products decreased by 10%. The reasons were: a reorientation from European to Turkish and Chinese manufacturers (who have lower prices); the lower prices of Russian materials (for example, particleboard). Since, the final product of domestic kitchen furniture production largely consists of imported components, the cost of products is very strongly influenced by the volatility of the ruble. And, of course, due to changes in logistics processes, transportation costs are becoming markedly higher. The paper analyzes these processes on a national scale and identifies the factors of competitiveness at the regional level.

Keywords: furniture production, competitiveness factors, sales volume, shift in demand, sanctions.

JEL codes: D41, L13, L40

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Introduction

The specific nature of the product of furniture production as a special type of economic good is due to its long-term use and multiple variants of consumption. The most important factors determining the competitiveness of a particular manufacturer usually include the variety and quality of products, price level, forms and level of after-sales service, delivery, e-commerce, advertising politics, etc. It is ultimately expresses the dynamics of volumes and market share of the enterprise, its financial stability.

Enterprises of the furniture industry are located throughout the country. The industry employs 79 entities of the Russian Federation. This segment working population share is 6%.

The Russian furniture market is the most competitive one. It includes both large factories producing furniture in the industrial scale and small entrepreneurs working by individual orders. High competition promotes regular modernization of production, updating the equipment, attracting qualified employees. It helps to increase the popularity of the brand, involve more consumers, and increase their loyalty to the

brand. Russian furniture successfully competed with the same products from Belarus, Poland, and China. It is exported to the CIS countries. The furniture made of wood is producing by about 2,500 companies; 15 manufacturers production volumes exceeds 1 bn rub / year.

Main Part

In Russia the territorial cross-section of this type of activity reveals the dominant position of furniture production in the Central and Volga Federal Districts. They account for about 60% of all furniture production in Russia. The production of furniture by Federal Districts is shown in Figure 1.

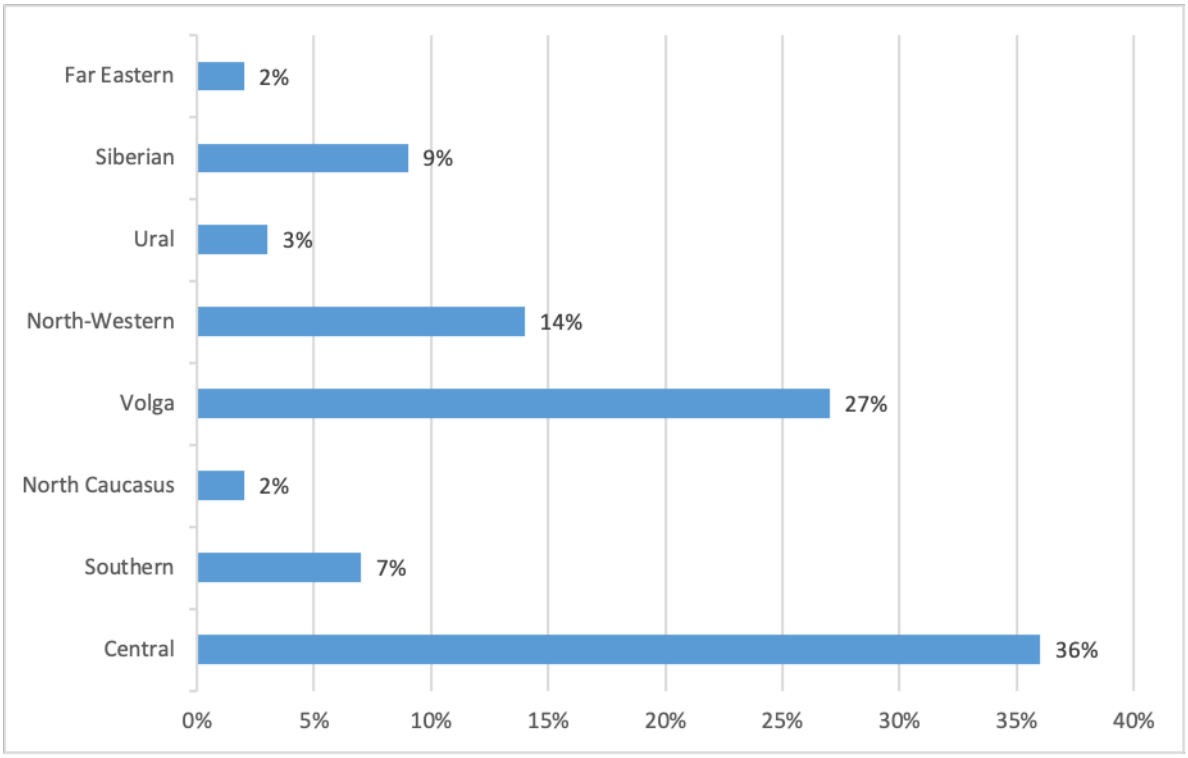

Figure 1. Structure of the furniture industry by Federal Districts of Russia in 2021
Source: composed by authors

The main production of furniture in Russia is concentrated in the Central (36%) and Volga (27%) Federal Districts. As for regions, Vladimir (86%), Voronezh (84%), Tomsk (63%), Penza (55%), and Moscow (50%) regions showed the best dynamics of furniture production (more than 1 bn RUB, an increase of more than 30%) at the beginning of 2021.

The top 10 largest furniture manufacturers in Russia for 2021 are as follows: Ascona; Mebel Style; Dok-15; FF Mariya; Korol Divanov; Orma Group; Ikea Industry Tikhvin; Micron; Shatura; Litvud.

About 200 enterprises are the medium business ones. Their production volume is 0.3-1 bn rub. per year. Some large enterprises in the furniture industry are presented in Table 1.

Table 1 – The main indicators characterizing major furniture manufacturers for 2021

Name	Location	Revenue, mln. rub.	Net profit, mln. rub.	Average number of employees, persons
«Mebelnaya fabrika mariya», LLC	Saratov region	7930	120	1571
«Korol divanov», LLC	Saratov region	7735	312	2856
«Zhivye diany», LLC	Moscow region	7536	463	1607

Name	Location	Revenue, mln. rub.	Net profit, mln. rub.	Average number of employees, persons
«Litvud», LLC	Vladimir region	5114	450	1558
«IKEA industry tikhvin», LLC	Leningrad region	4499	94.7	1057
«Shatura Furniture», JSC	Moscow region	4494	236	1053

Source: SBIS, 2022

Table 1 shows that the large furniture enterprises revenue is about 4.5-8 bn rub., and the number of employees ranges 1100-3000 (SBIS, 2022).

The modern furniture enterprises aimed at improving the competitiveness of products. Therefore, they introduce the innovative technologies, modernization of production, the use of new quality materials, effective labor methods, etc.

The furniture industry in Russia develops successfully for a long time, but the market is not geared totally, there are a large number of illegal manufacturers in this industry. Their production volumes are not taken into account by Rosstat. This does not allow us to make the proper conclusions about the real state of the competitive environment.

About the nine-tenths of the kitchen furniture market belongs to Russian manufacturers. This market is considered to be unstructured, with a large number of so-called non-systemic small players, which increases competition.

About half of all companies in the industry have their own production base. But, the most competitive are those, which are able to control not only the production of furniture, but also the sales. According to the studies, 33% of furniture purchases are made online.

Large companies are constantly producing new models of casegoods or seating furniture. They are take into account consumer demand and the financial capacity of all potential buyers.

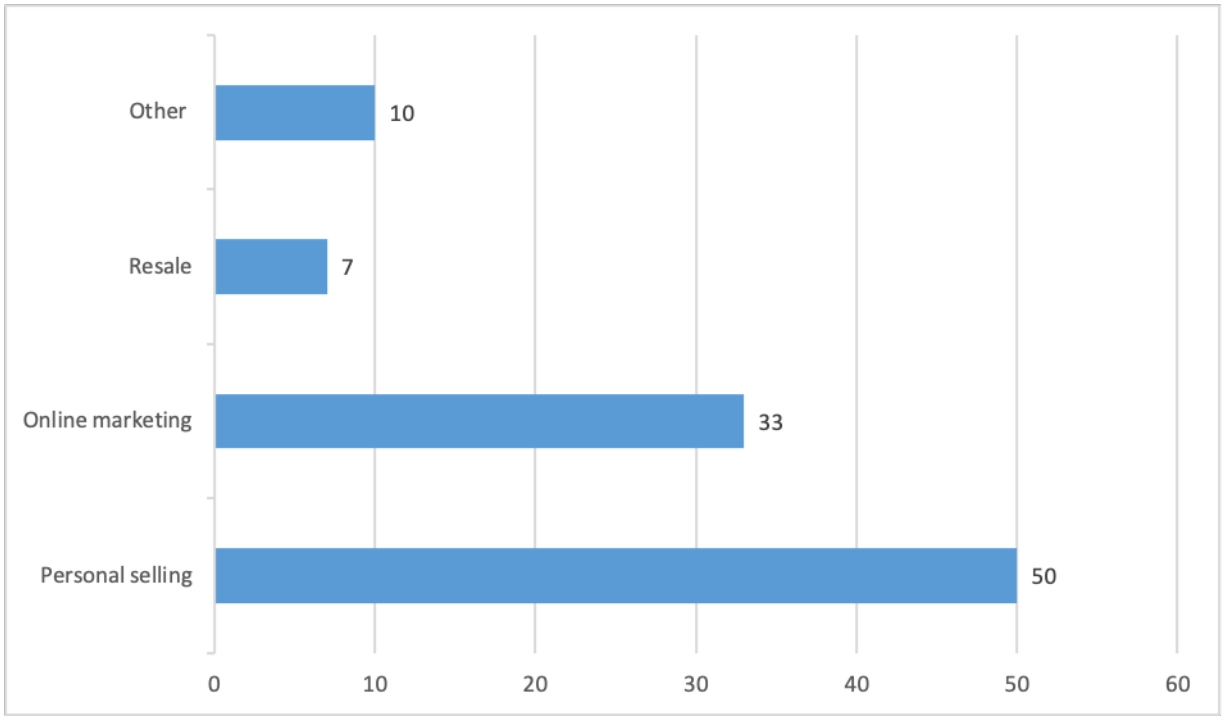

Figure 2. Implementation of furniture sales by different marketing communications, %
Source: composed by authors

According to the Figure 2, 50% of potential customers adhere to the traditional choice of furniture (specialty stores, exhibitions, etc.); 33% of customers use Internet resources (online sites, catalogs, websites);

and 7% of customers are looking for furniture on Avito, Yula, etc. to make a deal type C2C.

The furniture industry in Russia has an individual nature of placement – the consumer determines the place in the market, the share, and success of the company, etc. Potential consumers of the furniture market – adults working people. Therefore, we can conclude that the number of consumers of the furniture market corresponds to the number of working-age population, and the revival of the furniture market is closely related to the volume of construction, which tend to increase (Gromyko, 2016).

The changes in the furniture market following the changes in the housing market. There is a trend for transforming furniture, so creating a kind of «furniture constructor» which allows combining a bedroom, kitchen, work area, dressing room and hall within a limited space (Shostko, 2021).

The main factors of the domestic production development are both an increase in housing construction and the share of already furnished apartments.

The study highlights the main factors of competitiveness of furniture products from the consumer's point of view (Fig. 3).

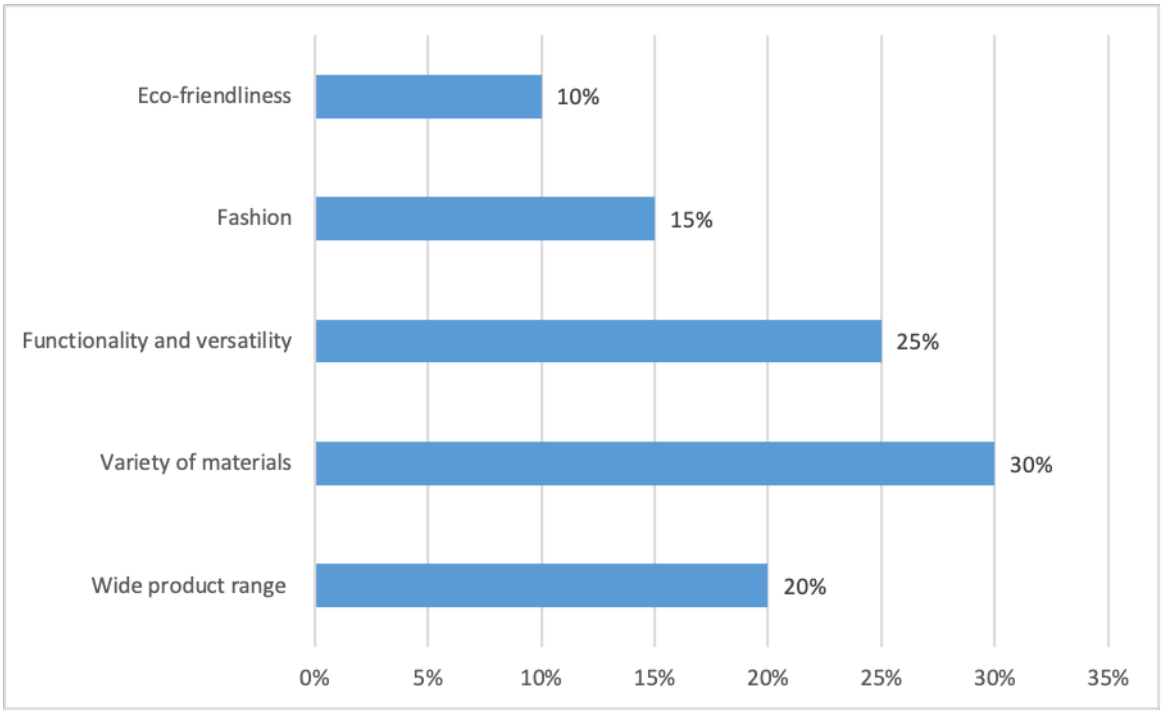

Figure 3. Factors of competitiveness of furniture enterprises products, %
Source: composed by authors

According to Figure 3, the most important for consumers is the variety of materials used, the versatility of application, and the ability to choose the products; less of a priority for buyers are the parameters of fashion conformity, and eco-friendliness of products.

The furniture market in Russia, according to estimates by Tebiz group (2022), increases rapidly in 2021 due to a significant increase in imports (an increase of over 30%) and domestic production (over 7%), and reaches 4.9 bn USD. Undoubtedly, the main demand for furniture is formed by the consumers, and the volume of production will depend to a greater extent on their real income and the volume of housing.

Before the SMO, the Russian payment service «Yukassa» and furniture company «Hoff» conducted a study. By the results of this study, total furniture sales for January-November 2021 increased by 27% year-on-year, and compared to pre-demand 2019, the increase was almost 35%. Nowadays, furniture products belong to the luxury segment. They are too expensive for the most citizens, so Russian consumers reoriented to domestic goods. As consumers have become more inclined to save, to save for non-urgent purchases, indicators of competitiveness such as high quality and acceptable price, as well as brand recognition and credibility, have come to the fore.

The Kostroma region is of particular interest in assessment of the competitiveness of furniture enterprises.

Its industrial policy is aimed at creating a highly efficient industrial complex with a rational composition and structure, which will be able to ensure the production of competitive products, employment, stable revenues to the budgets of all levels.

The code RCEA 31.0 «Furniture Manufacture» allows assigning this RCEA as the main type of activity or as an additional code of economic activity of the newly created organization. The analysis of the furniture industry in the Kostroma region allows us to conclude that the most common is RCEA 31.0 «Production of furniture». – 23 companies in the region, RCEA 31.09 «Manufacture of other furniture» – 12 companies in the region, and RCEA 31.02 «Manufacture of kitchen furniture» – 8 companies in the region.

The main participants in the furniture market are large players involved in the production of furniture for more than a year. Table 2 shows a list of 5 large furniture production organizations in the Kostroma region by revenue and assets.

Table 2 – Rating of furniture organizations in the Kostroma region

Place	Organizations	Industry, RCEA code	Indicators, mln. rub.	
			revenue	assets
1	«Furniture Factory No. 7», LLC	31.0 Manufacture of furniture	2 415	1 067
2	«Delta-ko», LLC	31.01 Manufacture of furniture for offices and trade companies	1 845	0.11
3	«KS-Oktyabr», JSC	31.01 Manufacture of furniture for offices and trade companies	999	659
4	«KS-Sreda», JSC	31.01 Manufacture of furniture for offices and trade companies	617	323
5	«Nrava», LLC	31.09 Manufacture of other furniture	405	281

Source: SBIS, 2022

The expansion of the range of products, the reorientation of markets, the development of new types of production in order to improve production efficiency have necessitated the enterprises to diversify the business. In fact, since the above presented LLC or JSC are components of large furniture organizations, the comparative assessment (Table 3) conducted for a single organization, in turn consisting of several companies (which also does not allow to analyze large well-known furniture factories on certain financial parameters).

The most famous furniture companies in the region are:

1. «Furniture Factory №7», LLC (This company produces furniture under the brand «Mr. Doors»). «Mr. Doors» company has been working on Russian furniture market since 1996 and for the last two decades has become a real leader in production of custom built-in and case goods furniture.

2. «Vash Den» Factory. Factory «Vash Den» was established in 1994. It is located in Kostroma, and is currently the leading enterprise in Russia for the production of seating furniture.

3. «INTERA», LLC (the company manufactures its products under the «OGOGO Obstanovochka» brand), which specializes in the production of case goods and seating furniture. The history of the company has more than 110 years, starting with a timber factory, reorganized into a JSC «Kostromamebel», and then – into «INTERA», LLC.

The authors conducted a comparative assessment of the enterprises-leaders competitiveness in five parameters: assortment, price, PR, fame and reputation, based on expert evaluations (Table 3). We involve six experts, industry specialists, and the Department of Economic Development of the Kostroma region in this assessment (Shamilova, 2018).

By Table 3, the furniture factory «Vash Den», which is the leading Russian enterprise in the production of case goods and seating furniture, has the highest rates. Project «Vash Den» successfully competes with the giants of the Russian and European markets. For 27 years of fruitful work and improvement of production

the brand «Vash Den» has become the one of the leading manufacturers in the furniture market in Russia. The company confidently holds the leadership producing furniture, using high-tech Italian and German equipment.

Table 3 – Comparative assessment of the competitiveness of furniture enterprises in the Kostroma region

Indicator name	«Furniture Factory No. 7», LLC	«Vash Den» Factory	«INTERA», LLC	«Itana» Factory	«Kedr» Factory	«Takos» Factory	«Shellen» Factory
Range of products	5	5	5	4	3	3	4
Pricing policy	3.5	4.5	3	5	3.5	4	3.5
Marketing policy	3	4	4.5	2.5	3	2.5	3
Brand awareness	4	5	5	3.5	2.5	3.5	2
Reputation	4.2	4.1	4.3	4.9	3.8	3.8	3.2
Total score	19.7	22.6	21.8	19.9	15.8	16.8	15.7
Place among the competitors	4	1	2	3	6	5	7

Source: composed by authors

Indeed, the regional factories have existed for quite a long time, but with the support of the region it is possible to develop the furniture industry. The region has all the resources for development, which especially affects the quality of materials, since the region belongs to the leading producers of wood in the country.

In assessing the level of competitiveness of Russian furniture manufacturers in the new environment we need to pay attention to the serious dependence of furniture production on imports. Assessment shows that a quarter of the required components purchased were produced domestically, with Asian countries producing 5-10%. The most of the materials and components – almost 2/3 – came from Europe and the United States. Experts believe that most of them can also be made in Russia. But it will require some time, and can cause the quality issues.

So far no high-quality decorative materials are produced in our country, e.g. thermoplastic, artificial stone, which is used in the production of table tops. Manufacturers are looking to Brazil, Hungary, China, Turkey and Russia to replace them.

As for equipment, the leading Russian enterprises have modern machines with a sufficiently long service life, and for a certain period they do not need to be updated. But, due to the fact that they are very expensive, then start uppers cannot have such costs, which is clearly not conducive to the development of competition in this market.

There is an opinion that the production of quality accessories is not such a serious problem, but this view is deeply wrong. Western companies, which have invested millions in equipment and engineering, are careful to protect their technology. Russian companies prefer not to copy but to import the accessories. For example, Chinese manufacturers copy them because of their large market. But in Russia the market is not so large. In the conditions of the import substitution and sanctions restrictions, we can see that Russian furniture producers have mastered the production of certain simple components. Also there is the development of the production of paints and coatings. For example, particle boards (fiberboard) in the early 2000s, with changes in import duties it turned out more profitable to organize the production of these products in Russia, as a result of which the need for them is completely covered by domestic producers.

In the summer of 2022, the Association of Furniture and Woodworking Industries (AFWI) predicted the drops of the sales by half by next year. However, due to changes in suppliers and the process of strengthening

the national currency, experts estimate the size of the decrease at the level of 4-5% in physical terms, almost without reducing the volume results.

By the end of 2022, prices of the furniture products decreased by 10%. The reasons were: a reorientation from European to Turkish and Chinese manufacturers (who have lower prices); the lower prices of Russian materials (for example, particleboard).

Since, the final product of domestic kitchen furniture production largely consists of imported components, the cost of products is very strongly influenced by the volatility of the ruble. And, of course, due to changes in logistics processes, transportation costs are becoming markedly higher.

Conclusions

We should note that our country still imports the significant amounts of furniture from Western countries, while the export of Russian goods to Western countries has been completely stopped. Those manufacturers who previously supplied goods, particularly to IKEA, are now targeting consumers on the Russian market.

One of the managers of a large furniture factory believes that «the departure of IKEA is, first of all, the departure of convenient service for customers». And since most of the goods sold in this network were produced by domestic enterprises. Many industry leaders try to present adequate modern solutions to the customer, using this interesting foreign experience as well. Marketing formats for furniture directly from stock, as individual items for self-assembly are being explored.

Such experience is gradually accumulating in the domestic furniture industry. For example, the module «case – bed – sofa» is available in the assortment of Ascona, the largest manufacturer of mattresses. A variety of the modes of transformers for eight years produces the company Olisys, as well as furniture factory Guter Mobel, which uses its own transformation devices. The most notable work in this direction is carried out by the company «Duma Mebel», which is the successor of the firm «Umnaya Mebel», established in the early 90s. The experience in the manufacture of seating furniture (own retail network, supplies to 20 regions of the country), extensive competence in the field of production technology – ensure the competitiveness of this company in the market of transformable furniture.

It is important to emphasize the high quality of the company's components – the company buys fittings and mechanisms made in Germany, and adjustable struts made in Italy. The share of these imported components reaches half of the total costs. The company's competitive advantages include not only high quality and safety, but also customization, and the individual needs of the consumers.

An important issue of competitiveness is raised by experts, referring to the reaction and actions of the state as a response to sanctions from Western countries. According to the executive director of a large furniture company Angstrem, domestic manufacturers are not on equally with partners from Western countries. The appreciating ruble led to greater efficiency in importing furniture to Russia than its exports to other countries. Since, in the opinion of this leader, Russian furniture production, as well as that of friendly countries, entirely satisfies the needs of the population, a proposal is made to completely ban imports from these states (Grammatikov et al., 2022).

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The COVID-19 pandemic and its consequences as a trigger for digital business development

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Abstract. The COVID-19 pandemic and its consequences become a de facto catalyst for digitalization in all areas of the economy. Also they accelerate the development of digital business. Companies have to adapt their business processes and institutional infrastructure to work online. The results of the author's analysis were the provisions that the COVID-19 pandemic and its consequences contributed to the transition from targeted digital transformation of business models and business processes to their systemic digitalization. Digital transformation contributed to the formation and development of creative digital business, which relies on digital platforms and the widespread use of digital technologies, especially artificial intelligence. In modern conditions, transnational digital corporations of the United States and China act as drivers for the development both the digital economy and digital business. Corporations compete for leadership in the development of digital technologies, in particular, artificial intelligence use.

Keywords: digitalization, digital transformation, digital business, digital platforms, artificial intelligencee.

JEL codes: F01, F55

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Introduction

Since the mid-twentieth century there has been a gradual increase in the role of knowledge and information, the developed countries made the transition to the information society and knowledge economy. Its characteristic feature was a linear progression of the innovation process stages within the boundaries of enterprises, while information communications performed an auxiliary function. The first decades of the 21st century demonstrate a dramatic growth of digital data, the consequence of which was the transition to a new stage of development, a digital civilization in which human life and activity are associated with the creation and use of information in its digital form.

The COVID-19 pandemic and its consequences became a trigger for digitalization in all spheres of public life and in all sectors of the economy. Companies and organizations had to rapidly adapt their business processes and their infrastructure to work in a remote format. The widespread introduction of digital technologies lead to the dramatic change in the relationship between consumers and producers, employees and employers, business, government, and society. At the same time, during the pandemic, some companies (airlines, travel companies, film industry, hotel business, non-food trade, and others) lost their positions,

while others (IT-companies, online sales and delivery of goods, pharmaceutical companies), on the contrary, significantly strengthened them.

The digital economy as an economy of the new technological order plays a significant role in ensuring global economic growth, increasing labor productivity in various sectors of the economy, contributing to the formation of new markets and industries, new ways of interaction between economic entities. National economies that are unable to adapt to the demands of the digital economy are condemned to a marginal position in the global economic system. Digitalization becomes the key to economic security and state sovereignty in the 21st century. In this regard, digital transformation is designated by the President of Russia as one of the national development goals until 2030. Insufficient attention to the digital component caused the slowdown of many industries in the Russian Federation.

Methods

The works of S. Freeman (2002) and B. Karlsson (2006) pay considerable attention to the issues of the digital economy, its innovative processes, and the influence of the institutional environment on digitalization. F. Cook and K. Laurentis (2010) study a platform approach to the digital economy. W. Boumal (2003) explores features of the development of entrepreneurship in the digital economy, paying special attention to the complementarity of large and small innovative companies. D. Klimanov describes the new culture of management in a digital economy (Klimanov & Tretyak, 2019).

The purpose of this study is to analyze the impact of the COVID-19 pandemic on the digitalization of business processes.

Research methodology is based on institutional and economic, interdisciplinary, empirical methods, on generalization, and on interpretation of new economic institutional concepts.

Results

The rapidly developing information technology plays an important role in various sectors of the economy. If, under the conditions of the closed innovation paradigm, only large enterprises with significant capital resources and a powerful research base could truly compete on the global market. The digital transformations help to reduce external transaction costs. Digitalization contributes to the transformation of both the global economy as a whole and most national economies They change not only the structure of the economy, but also lead to dramatic transformations of the business processes within individual corporations. Digitalization of business processes has, in turn, contributed to a reduction of the effective size of the enterprise. This trend is the most obvious for innovation-oriented companies, which contributes to their continuous development.

In the context of digitalization, one of the key challenges for entrepreneurship is to reduce transportation and logistics costs in order to increase their global competitiveness. Governments of the world's leading countries have a significant role in this process. For example, since 2016, the U.S. Department of Commerce has been implementing the "Digital Attaché" program, which aims to facilitate the access of American companies to the global online market and increase their exports through global e-commerce channels.

The rapid transformations in all sectors of the economy, driven by digitalization, have profoundly impacted entrepreneurship and business models. If previously high-tech projects were implemented by some large companies in clusters and technoparks, and covered a small number of participants, today priority concerns with the development of innovative ecosystems and platform-based innovations. It integrates a variety of knowledge bases and technologies, and attracts a wide range of users. Each new member adds value to the platform, promoting a network effect.

A digital platform is a high-tech business model that facilitates the exchange of information, goods, and services between two or more participants. From an institutional point of view, the digital platform is an intermediary institution. The use of a digital platform reduces the length of the chain of intermediaries between the manufacturer and the consumer. Also it helps to reduce transaction costs in the interaction of platform participants compared to the same interaction outside the platform.

Digital platforms are a new form of business organization in various spheres of economic activity (e-commerce – Amazon, Alibaba, Ozon: passenger transportation – Uber, Didi, YandexGo; hotel booking

– booking.com, hotels.com, ostrovok.ru, etc.). Digital platforms reveal new opportunities to stimulate innovation processes, implement partnerships between producers and consumers, facilitate interaction of science, education and innovation, and foster new markets and industries in the digital economy.

Currently, digital platforms and the platform ecosystems they form are transforming entire industries and various types of socio-economic activity, becoming drivers of economic growth, innovation and competition (Geliskhanov & Yudina, 2018). Members of the platforms can share the latest inventions and use the enterprises as an experimental "laboratory". The platform approach meets the requirements of the new socio-technological paradigm of digitalization, contributes to the formation of a "sharing economy" (for example, carsharing using the Yandex Drive platform, home sharing using the airbnb platform), which leads to new forms of industrial and digital cooperation. Digital platforms provide fast and reliable communication, form mechanisms of interaction and exchange between economic agents, reduce entry barriers to markets, decreasing the role of geographical factors. Digital platforms connect small and medium-sized businesses with consumers, leading to a significant expansion of demand.

Digitalization and globalization help the world's largest IT companies (Alibaba, Alphabet, Amazon, Apple, Meta, Microsoft, and Tencent) create the global digital platforms that allow them to do business practically all over the world, including those with their physical absence in a number of countries. Unfortunately, in recent years, the activities of major IT companies indicate not only the development of a competitive environment and increased share of innovative developments, but the gradual monopolization and centralization of the market. It raises serious concerns, since traditional tools of antimonopoly regulation often do not function in conditions of rapid change. Thus, Meta (former Facebook) acquired about 100 different companies in recent years, including Instagram (2012), WhatsApp (2014), Oculus VR (2014), LiveRail (2014), CTRL-labs (2019), and Kustomer (2021). In 2020, the U.S. Federal Trade Commission sued Meta, accusing it of systemic antitrust violations. According to the plaintiff, Meta is characterized by years of anti-competitive behavior, the company's strategy is to takeover potential competitors in order to eliminate potential threats to Meta online dominance.

Digital platforms became most widespread in the e-commerce systems of the U.S. and China. Thus, in the U.S. the creative industries market has reached $1 trillion, China is also close to this figure. But in the Russian Federation it is only $34.2 billion (about 2.5 trillion rubles), or slightly over 2% of GDP.

Chinese experts believe that digital platforms and e-commerce are the core of the country's digital economy. Automated manufacturing and the use of artificial intelligence technology are growing rapidly in China today. For example, in 2021, Xiaomi began to construct a fully robotic smartphone factory ("Black Light Factory"). All business processes at the factory will be carried out by the robots using AI technologies.

Modern robots can solve an increasingly diverse range of tasks, become more agile, and serve creative industries. These industries can be defined as a sector of the economy associated with intellectual activity, developing mainly on ideas and technologies, while robotization, coupled with AI, forms a creative business. Since 2018, China became the leader in the developed manufacturing market, mainly due to ICT services. It is followed by Germany and the United States (Simachev et al., 2021).

Sberbank is the most active platform business model in Russia. For several years it became a full-fledged ecosystem. Currently, the Sber ecosystem includes SberAuto, SberEpharmacy, SberLogistics, SberMarket, SberMegamarket, and Samokat. Sber analyzes and takes into account the experience of foreign business ecosystems, such as Alibaba, Amazon, Kakao, Shopify, and others. For example, the Canadian company Shopify is the one of Amazon's main competitors. Shopify sells $120 billion worth of goods per year. Its turnover has grown by more than 44% the last 12 months. The company's characteristic feature is a cloud-based shopping platform that allows business owners to create and manage their online stores easily. A company that wants to trade through Shopify chooses one of three subscription types and receives a specific set of options. A merchant can integrate their website with hundreds of third-party payment gateways, customize and optimize the checkout process, promote their products and services via Meta and Instagram, use delivery from Shopify partners, and manage inventory (Obukhova, 2021).

Digital platforms offer to the users various products and services, collect and analyze data about all

aspects of their activities and lives, etc. It leads to more accurate and personalized offers and helps to improve the quality of products and services provided by the platforms. Also it allows to build personalized trusted relationships with users, as well as to create business models, increasing profits.

The COVID-19 pandemic drove technological innovation to a new level and stimulated new ways of doing business. For example, the Chinese online store JD.com and the Chinese music label Taihe Music Group have launched three-hour online music shows, during which you can order one-click delivery of various alcoholic beverages right during the broadcast.

Discussion

The business model main goal is to ensure the reliability of the entire value chain, and protects against potential failures when interacting with participants, which is greatly facilitated by digitalization processes.

Today, Germany, China, South Korea, the United States, and Japan show the greatest use of robotics and artificial intelligence technologies. There are more than 2/3 of industrial robots are concentrated in these countries. In Russia considerable attention is paid to the development of these areas in terms of the innovative transformations.

In recent years, Russian innovative companies began to make greater use of artificial intelligence technologies to digitize business processes and improve interaction with customers. It leads to the efficiency of their activities. For instance, Gazprombank developed and implemented a decision-making system for customer applications for credit products based on artificial intelligence (AI analyzes personal data, credit history, and data from external sources). Sberbank developed and implemented the "PATRIOT" system to optimize the cash collection service of ATMs and offices (the system, using machine learning algorithms, independently makes decisions on the amounts, nominal structure, frequency, and time of ATM and bank office service).

Currently, the key sectors of the Russian economy demand the next step towards the complete digitalization of technological processes. The market needs the innovative tools in the form of a digital industrial platform to organize end-to-end interaction of all participants in this process. This platform allows to combine and integrate the best Russian digital solutions. It helps to implement them in production. Foreign experience shows the need to create a unified Russian IT structure that will unite various IT systems and ensure cybersecurity.

Conclusions

The study conducted by the authors revealed that the COVID-19 pandemic and its consequences contributed to the transition from a targeted to a comprehensive digital transformation of business processes in all areas of the economy. On the basis of digital business a new creative digital companies are forming and developing. It includes the digital platforms, platform economy, and extensive use of artificial intelligence technologies.

Digital creative business is characterized by the modification of business processes, the cross-border nature of data and technologies, the enormous speed of spread of not only information, but also new technologies, their adaptation to national and regional economies. The basis of the new form of business organization is digital platforms. Digital platforms help to improve the quality of management, create global markets for goods and services, and quickly and efficiently export demanded products abroad. In addition to the positive impact, the activities of digital platforms contribute to the monopolization of markets, threatens the dissemination of users' confidential information. It gradually leads to an increase of their power and the possibility of manipulating consumer behavior.

The drivers of the digital economy in the world are American and Chinese digital corporations, which have created global digital platforms. Russian business in general is behind in the use of digital technology. But there is successful experience in the creation and operation of digital companies in certain sectors of the economy. Radical changes caused by the COVID-19 pandemic lead to the digitalization of the Russian economy, to the emergence of new directions and ways of doing business.

At the same time, today Russia lacks an effectively functioning national innovation system. It reflects

the weakness of horizontal ties between the participants in the innovation process, and therefore there is no synergistic effect. It is necessary to create a unified digital industrial platform that will collect the best Russian practices and business models, and promote their implementation. IT-products are promising areas for Russian exports. These developments require extensive financial support and an effective system for promoting Russian products abroad, with trade missions as the core participants.

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