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Three-dimensional model of the institutional matrix as a methodological tool for designing institutional changes

Dmytro Ivanovych Dzvinchuk / Victor Pavlovych Petrenko*
Mariana Stepanivna Orliv/ Oleksandr Volodymyrovych Molodtsov
Ivano-Frankivsk National Technical University of Oil and Gas – Ukraine

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Abstract
The article offers a three-dimensional model of the institutional matrix that can be used as a methodological tool for designing institutional changes in transitional societies to develop their socio-economic systems. The empirical basis of the analysis is the results of the GLOBE research program that has defined value and practice scores of the main cultural dimensions in 62 countries which affect the formation and development of institutions. In contrast to the concept of alternative dominant "Eastern" (redistributive) and "Western" (market) matrices, as it is currently known, it is offered to interpret basic economic, ideological and political institutions of society in the form of alternative vectors. They create a spatial mega-matrix which consists of two dominant and six complementary matrices. Complementary matrices which are presented in the article are interesting for determining variants of the development of existing socio-economic systems, which could not be described using the elements of traditional matrices. It is demonstrated that real institutional matrices of modern mixed socio-economic systems are formed in the mega-matrix space with the participation of all its components. The possibilities and conditions for using the offered model in implementing institutional changes and in the development of socio-economic systems are revealed.

Keywords
Institution / Institutional matrix / Socio-economic system / Market economy / Transformation.

Modelo tridimensional da matriz institucional como ferramenta metodolóxica para deseñar cambios institucionais

Resumo
Este artigo ofrece un modelo tridimensional da matriz institucional que se pode utilizar como ferramenta metodolóxica para deseñar cambios institucionais en sociedades en transición que están a desenvolver os seus sistemas socioeconómicos. A base empírica da análise son os resultados do programa de investigación GLOBE, que define as puntuacións de valor e práctica das principais dimensións culturais de 62 países que afectan á formación e ao desenvolvemento das institucións. En contraste co concepto das matrices dominantes alternativas "orientais" (redistributivas) e "occidentais" (de mercado), como se coñecen actualmente, ofrécese, para interpretar as institucións económicas, ideolóxicas e políticas básicas da sociedade, a forma de vectores alternativos. Estes crean unha megamatriz espacial que consiste en dous matrices dominantes e seis complementarias. As matrices complementarias que se presentan neste artigo son interesantes para determinar as variantes no desenvolvemento dos sistemas socioeconómicos existentes, que non se poderían describir utilizando os elementos das matrices tradicionais. Demóstrase que as matrices institucionais reais dos sistemas socioeconómicos mixtos modernos se forman no espazo da megamatriz coa participación de todos os seus compoñentes. Revélanse as posibilidades e as condicións para utilizar o modelo ofrecido na implementación de cambios institucionais e no desenvolvemento de sistemas socioeconómicos.

Palabras clave
Institución / Matriz institucional / Sistema socioeconómico / Economía de mercado / Transformación.

Códigos JEL: O10, P10, P30.

* Corresponding author: ipo.pvp@gmail.com

1. Introduction

Scientific research into the institutional development of transitional societies, which are not able to withstand globalization challenges due to the instability of economic, political and ideological institutions, becomes very important in the context of implementing the sustainable development concept. The purpose of such research is to ensure the unity, continuity and synchronization of institutional development to provide stability and efficiency of the institutional system. To achieve this goal, the theory of institutional matrices is used more and more. This permits changes in institutions (which are considered the components of the system), based on the previous analysis, as well as to forecast future status and to determine trends in their development.

The institutional matrix works on certain principles, rules and regularities, which are the methodological basis for designing necessary and appropriate institutional changes. The implementation of this methodology will offer innovative approaches to the improvement of institutional systems of transitional societies on the grounds of development, using fundamental theoretical models. It will give us the possibility not just to better understand how institutions work, but also to generate strategies for institutional reforms (Diermeier & Krehbiel, 2001; Lowndes & Roberts, 2013).

Scientific papers of Bednar (2018); Bessonova (2012); Bolotina (2016); Coase (1992); Degtiarov & Degtiarova (2007); Delibasic (2016); Eggertsson (1999); Filippova (2011); Kirdina (2014); Molodtsov (2016); North (1994); Nowakowski (2013); Obolenskyi (2010); Polanyi (2001); Tambovtsev (1999); Veblen (1918); Williamson, Burnett & Bartol (2009) and others describe the concept of the institutional matrix. They also define the characteristics of *X* and *Y* institutional matrices as the models of basic institutions of society, determine their properties, reveal the main positions of the institutional matrices theory, and reflect their meaning for the formation of scientifically reasonable public policy on the introduction of institutional changes. However, the interpretations of the alternative institutional matrix models, which are currently known, do not allow us to analyze and estimate the interaction of their economic, political and ideological subsystems, considering the characteristics of the society and its main culture dimensions. The latter are important because political institutions are socially constituted and follow culturally framed rules and norms (Schmidt, 2014).Thus, for designing changes, it is important that cultural values indirectly predict leaders' behavior through the manifestation of culturally approved leadership expectations (GLOBE, 2014). Modern challenges, such as human rights, gender equality, democratic governance and so on, enhance the influence of cultural dimensions on the formation of ideological, political and economic institutions. Therefore "value" in the mainstream of institutional economics is determined not only through private ownership, exchange, competition etc., but also through culture (Nowakowski, 2013).

To provide a reasonable scientific explanation, analysis, and estimate the status and development of the institutional system, it is necessary to reconstruct transformation processes of the institutional matrix of society and to be able to look at their formalization and subsequent modeling. For this purpose, it is advisable to improve the institutional methodology based on combining the categorical apparatus of political science, public law, public administration, economics and sociology.

The purpose of the article is to develop a model of an institutional matrix as a methodological tool for theoretical conceptualization of implementing systemic institutional changes based on the reinterpretation of the existing matrix model in spatial coordinates, which will deepen the understanding of the opportunities for modeling alternative institutions.

2. Theoretical framework

To achieve the purpose mentioned above, we use institutionalism as a methodology of research and the institutional matrix theory for the spatial model development. It was a Russian researcher, Kirdina (2014), who offered the most complete summary of the results of previous research on institutional matrices and offered a two-dimensional model for their interpretation. She defined the model of

institutional matrix as a historically established and entrenched system of basic institutions in which institutional rules and norms regulate the working of the main subsystems – the economy, politics and ideology.

It should be mentioned that some innovative results are also contained in academic writings of other researchers which are devoted to the clarification of the impact of various institutions on economic, political and managerial activities, and in which institutional matrices are considered to be the necessary basis for modernizing the institutions of the economy, politics and ideology in their inextricable relationship (Bolotina, 2016; Molodtsov, 2016; Mykhnenko, Maharenko & Makarenko, 2011; Petrenko, 2019; Yelahin, 2014). It should also be noted that the concept of a matrix is used mostly to interpret data on the plurality of any elements of the research object (in our case, subsystems of the institutional system) to find new options for using their common characteristics, to obtain information about structural integrity and intensity of the interaction among elements, to compare items by similarity, to define their interaction, ranking and classification, to study and estimate possible transformations and their consequences (Berland & Dreveton, 2006; Chervyakova, 2017; Degtiarov & Degtiarova, 2007; Kutsenko, 2010; Lakhyzha, 2012; Lebediev, 2015; Miller & Whicker, 1999; Obolenskyi, 2010; Trach, 2016). Other researchers who seek to analyze various aspects of social system transformations (including institutional transformations), as well as their socio-cultural, sociological, political, market, behavioral, economic and managerial characteristics, also use matrix models (Bednar, 2018; Boiko-Boichuk, 2018; Chechetova-Terashvili, 2007; Delibasic, 2016; Filippova, 2011; Frolenko & Zhukevych, 2012; Ivanova & Yashkina, 2014; Nowakowski, 2013; Panasiuk, Petrenko, Popova & Yasinska, 2018; Pasenko, 2013; Predborska, 2013; Romanenko, 2005). Scientists distinguish between two "ideal types" of alternative institutional matrices. First, they were conventionally called "redistributive" and "market" matrices (Polanyi, 2001), "distributive" and "market" matrices (Bessonova, 2012), "Eastern" and "Western" matrices (Kirdina, 2014). However, professor Kirdina suggested identifying the matrices by the letters *X* and *Y* (Figure 1), since, in her opinion, geographically oriented names of the matrices are inaccurate in terms of dividing countries into Western and Eastern.

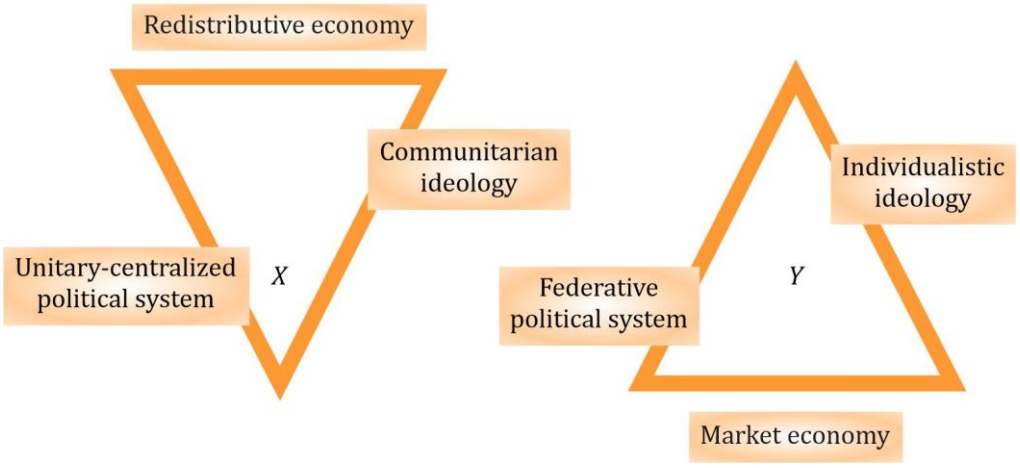

Figure 1. Alternative *X* and *Y* institutional matrices by Kirdina (2014).

It is the axiom that in countries with different institutional systems there are elements of both *X* and *Y* matrices. If a society is developed under conditions of a predominantly communal environment, then, in its institutional structure the institutions of the *X*-matrix are dominant, while alternative institutions of the *Y*-matrix have complementary functions. A mirror situation arises in a non--communal environment (Kirdina, 2014). Alternative institutional matrices implemented in different

countries of the world, in no way act as the reason for their political and ideological confrontation, unlike how it may be because of the collision of geopolitical interests.

It is obvious, that neither can we identify alternative matrices with socio-political systems, in particular the *X*-matrix with a communist system and the *Y*-matrix with a capitalist system. So, in this case, the categorical apparatus of political economy does not work, though it may be an adequate tool for demonstrating certain results of the analysis of matrix structures which is carried out to reflect their relationships and ratio based on the general theory of matrices that provides an opportunity to construct a matrix model using such parameters as alternativeness, dominance and complementarity.

In our opinion, the geometric model of alternative *X* and *Y* matrices offered by Kirdina (2014) in the form of a triad of basic economic, political and ideological institutions, is quite enough for a descriptive interpretation of their interaction in the formation of the institutional system. However, using matrix tools for studying these models in the form of triangles on a plane is impossible because although they are quite convenient for a descriptive interpretation of interaction they are absolutely inconsistent with the generally accepted theoretical concept of a matrix. A two-dimensional model of three variables makes it impossible to search and analyze elements at their intersection points. This drawback can be overcome by transforming the triad of fundamental characteristics into real matrix structures. In addition, *X* and *Y* matrices are only the "ideal types" of models of the basic institutions and do not reflect their cultural-institutional genotype or archetype of socio-historical development.

The archetype of socio-historical development serves as a basic institution which is the regulator of people's spontaneous, unconscious behavior. This is revealed in the relation to each other, to structures, organizations and the society as a whole. Herewith, we should consider people's behavior depends on their world view and may be influenced both by strategic calculation and seeking to maximize their material well-being, as well as by reference to a familiar set of moral or cognitive templates, each of which may depend on the configuration of existing institutions (Hall & Taylor, 1996).

Institutional culture gives social processes certain sustainability and value content, and it also determines society's possibilities to adapt to changes at the appropriate development stage of civilization. It is the institutional culture that forms what we can call the "institutional-matrix mind of the society" which integrates and stabilizes it. Thus, according to Lowndes & Roberts (2013), we should look at "how institutions indirectly empower through informal and unwritten mechanisms such as gender norms or the privileges associated with nepotism or patronage, and how the narrative accounts of individual and group actors legitimize their authority and preemptive challenge" (pp. 201--202). By this means, motivated contribution to cultural demands provides integration and stability for social systems, thus, the problem of adequate motivation, especially sufficient attachments to joint values, is very important (Parsons, 1985).

Considering this, historical, cultural and rational connotations of the institutional matrix are important in actualizing its model and making decisions on the adaptation of the experience of developed countries. These three approaches serve for studying institutions, their status and development with different objects, logic of explanation and limitation. Therefore, scientists have become more open to combining historical, rational choice and sociological institutionalism through methodological pluralism or even "analytic eclecticism" (Hall & Taylor, 1996; Powell & DiMaggio, 1991; Schmidt, 2014; Sil & Katzenstein, 2010) which provides incremental, inductive and deductive research. We shall not limit our research only to the historical approach either, according to which institutional matrices are considered stable, historically arranged systems of basic institutions (Kirdina, 2014, p. 446). Like sociological institutionalists, we shall also consider why a particular institution might be chosen and how they can be transformed taking into account the relationship among institutions and an individual action which follows the "cultural approach". Within the framework of rational choice institutionalism, we shall consider that political action involves managing uncertainty (Hall & Taylor, 1996, p. 18), however, "new collaborative rationalities" compete with existing discursive realities, thereby undermining the strong position of "technical" knowledge (Reimer, 2013, p. 4656).

The elements of *X* and *Y* matrices are present in institutional systems of different countries in different ratios because of the peculiarities of their societal and organizational culture. Therefore, to develop a model of the institutional matrix as a methodological tool for theoretical understanding of the systemic institutional changes, it is necessary: firstly, to analyze the main cultural dimensions that influence the formation and development of social institutions on the example of countries, characterized by alternative types of institutional matrices (in the future it would be useful to consider such dimensions while making decisions on using foreign experience); secondly, to transform the triad of the fundamental characteristics of institutional matrices into real matrix structures, each of which consists of economic, political and ideological vectors, making it possible to use matrix analysis.

3. Empirical research base

In our research we used the results of the GLOBE research program (Global Leadership and Organizational Behavior Effectiveness) implemented in 1994 to 2014, which is one of the most large-scale and prestigious international management research projects in social sciences ever, because more than 200 researchers from 62 countries took part in it (GLOBE, 2014). Theoretical and empirical research through item evaluation, *Q*-sorting, and pilot studies redefined scientific understanding of culture and leadership in different societies around the world. We used quantitative indicators of practice and value scores to clarify differences in the formation of institutional matrices models because of the main dimensions of culture, and also to explain the need of the transition from the "ideal types" of the alternative institutional *X* and *Y* matrices to a spatial model of the institutional mega-matrix.

Having analyzed cultural dimensions of Russia and the USA (Figure 2), which are clear representatives of the alternative institutional *X* and *Y* matrices, we found that their practice scores are always separated with the average GLOBE score. This indicates the difference between their societal and organizational culture. The biggest difference is found out for the following dimensions: in-group collectivism (in favor of Russia); performance orientation, future orientation and uncertainty avoidance (in favor of the USA). Herewith, Russia has the lowest practice score of 2,88 among 62 surveyed countries for the last two cultural dimensions. However, the USA and Russia cannot be considered "ideal types" of alternative institutional matrices, because, firstly, the practice score in the USA for 8 out of 9 cultural dimensions is close to the average GLOBE score, and secondly, the value score and practice score (meaning the view of the society on what it should be and what it is) differ in some cultural dimensions of these countries by more than 2 points on a 7-point scale (i.e. more than 28%). Such deviations lead to changes in institutional systems.

The maximum practice scores for cultural dimensions which ensure the sustainability of institutions were found in Switzerland (uncertainty avoidance–5,37; performance orientation–4,94) and Singapore (future orientation–5,07). Herewith, the score of institutional and in-group collectivism in Switzerland, where the economy is based on market relations and circulation of the financial foreign capital, is lower than the average GLOBE score, but in Singapore, with a mixed economy type, these indicators are even higher than in Russia.

The results of the GLOBE project indicate that not all systems with a predominantly communitarian ideology have a redistributive economy. Thus, the highest level of institutional collectivism (5,19-5,22) was found in countries with market economies such as Sweden, Japan and South Korea, where state regulation and market mechanism are well balanced.

In Greece, which was in a profound financial crisis due to the large external debt, "squandering", inaction and corrupt authorities, practice scores of performance orientation (3,2) and institutional collectivism (3,25) are the lowest among all countries, but the level of power distance is rather high (5,4) which is not typical for models with a market economy type. Therefore, its institutional matrix cannot be attributed to any of the "ideal types" of *X* and *Y* alternative models in terms of the cultural-institutional genotype and the archetype of socio-historical development.

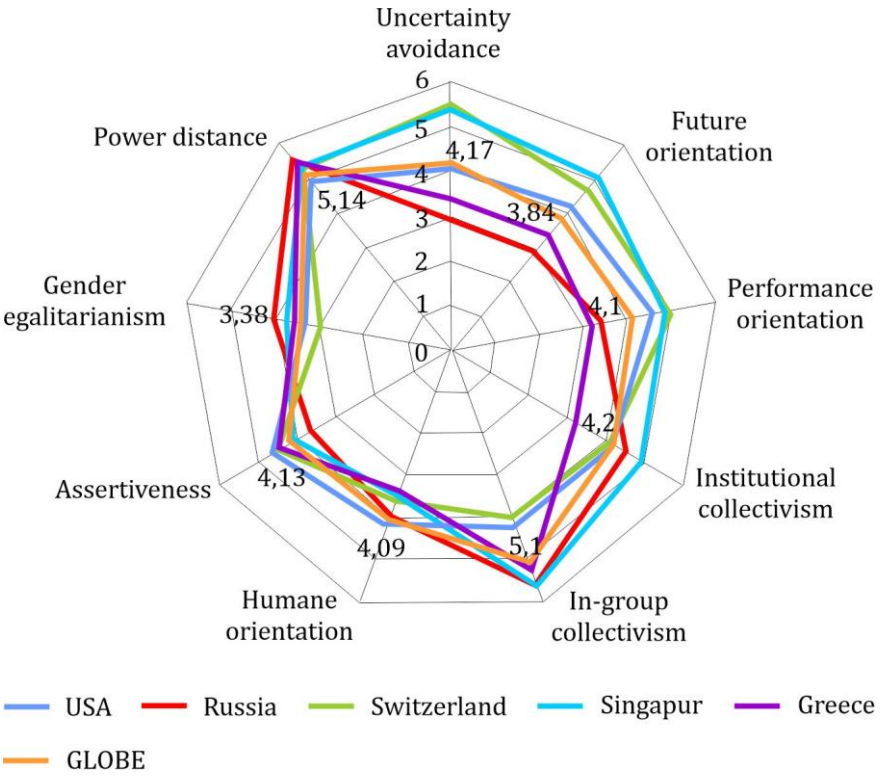

Figure 2. Practice score of the main cultural dimensions.

Consequently, in contrast to theoretical "ideal types" of the alternative *X* and *Y* matrices, the existing institutional matrices are hybrids in their essence. They are formed under the influence of cultural factors and certain rules arising from the properties of alternatives, invariance, bipolarity, dominance and complementarity of their basic institutions. This leads to principal differences among institutional systems of various societies.

4. Developing the institutional mega-matrix spatial model

To provide the opportunity for matrix analysis, economic, political and ideological vectors of the alternative institutional matrices should be interpreted as follows:

♦ *X*-matrix:

– Economic vector W^{RedEc} as the sum of subvectors of basic institutions of redistributive economy: institution of redistribution (W_{InRed}); institution of supreme conditional ownership ($W_{InSupCondOwner}$); institution of cooperation (W_{InCoop}); institution of service labor ($W_{InServLb}$); institution of cost limitation ($W_{InCostLim}$).

$$W^{RedEc} = \Sigma\ (W_{InRed}, W_{InSupCondOwner}, W_{InCoop}, W_{InServLb}, W_{InCostLim}) \quad (1)$$

– Political vector W^{UnitPS} as the sum of subvectors of basic institutions of the unitary-centralized political system: institution of unitary-centralized territorial organization of power ($W_{InUnitPow}$); institution of power hierarchy ($W_{InPowHier}$); institution of appointment on positions ($W_{InAppoint}$); institution of general assembly and unanimity ($W_{InGenAssembl}$); institution of appeals to the public authority ($W_{InAppeal}$).

$$W^{UnitPS} = \Sigma\ (W_{InUnitPow}, W_{InPowHier}, W_{InAppoint}, W_{InGenAssembl}, W_{InAppeal}) \quad (2)$$

– Ideological vector W^{ComId} as the sum of subvectors of basic institutions of communitarian ideology: institution of collectivism ($W_{InCollect}$); institution of egalitarianism ($W_{InEgalit}$); institution of order (W_{InOrd}); institution of well-being orientation ($W_{InWellBeing}$); institution of support for thinking stereotypes (integralism–holism–continuity) ($W_{InStereotSup}$).

$$W^{ComId} = \Sigma\ (W_{InCollect}, W_{InEgalit}, W_{InOrd}, W_{InWellBeing}, W_{InStereotSup}) \quad (3)$$

♦ *Y*-matrix:

– Economic vector W^{MarkEc} as the sum of subvectors of basic institutions of market economy: institution of exchange (W_{InEx}); institution of private ownership ($W_{InPrivOwner}$); institution of competition ($W_{InCompet}$); institution of contract labor ($W_{InContrLb}$); institution of profit maximization ($W_{InProfMax}$).

$$W^{MarkEc} = \Sigma\ (W_{InEx}, W_{InPrivOwner}, W_{InCompet}, W_{InContrLb}, W_{InProfMax}) \quad (4)$$

– Political vector W^{FedPS} as the sum of subvectors of basic institutions of the federative-subsidiary political system: institution of federative organization of power ($W_{InFedPow}$); institution of local self-government and subsidiarity ($W_{InSelfGov}$); institution of elections (W_{InElec}); institution of a multi-party system and democratic majority ($W_{InDemoc}$); institution of legal claims ($W_{InLegal}$).

$$W^{FedPS} = \Sigma\ (W_{InFedPow}, W_{InSelfGov}, W_{InElec}, W_{InDemoc}, W_{InLegal}) \quad (5)$$

– Ideological vector W^{IndId} as the sum of subvectors of basic institutions of individualistic ideology: institution of individualism ($W_{InIndiv}$); institution of stratification ($W_{InStrat}$); institution of freedom (W_{InFree}); institution of pecuniary-oriented attitudes ($W_{InPecun}$); institution of specialization (reductionism–discretecity) ($W_{InSpecial}$).

$$W^{IndId} = (W_{InIndiv}, W_{InStrat}, W_{InFree}, W_{InPecun}, W_{InSpecial}) \quad (6)$$

Therefore, the *X* and *Y* matrices are formed with two alternative triads of vectors, the components of which are basic institutions, mentioned above. In the future these institutions will be presented only by such triads as: W^{RedEc}, W^{UnitPS}, W^{ComId} and W^{MarkEc}, W^{FedPS}, W^{IndId}. As a result of this interpretation we obtain the image of two alternative institutional matrices in the form of cubic spaces which are created with vectors W^{RedEc}, W^{UnitPS}, W^{ComId} and W^{MarkEc}, W^{FedPS}, W^{IndId}, presented in the Figure 3a, b. So, the resulting vector of the socio-economic system development in the *X*-matrix (redistributive matrix) $\overrightarrow{\sum W}^{IMXT}$ is formed under the influence of narratives and basic institutions of vectors W^{RedEc}, W^{UnitPS}, W^{ComId} (Figure 3a).

$$\overrightarrow{\sum W}^{IMXT} = \overrightarrow{\sum}\left(\overrightarrow{WRedEc}, \overrightarrow{WUnitPS}, \overrightarrow{WComId}\right) \quad (7)$$

The resulting vector of the socio-economic system development in the *Y*-matrix (market matrix) $\overrightarrow{\sum W}^{IMYT}$ is formed under the influence of narratives and basic institutions of vectors W^{MarkEc}, W^{FedPS}, W^{IndId} (Figure 3b).

$$\overrightarrow{\sum \mathrm{W}}^{\mathrm{IM3T}} = \overrightarrow{\sum}\left(\overrightarrow{WMarkEc}, \overrightarrow{WFedPS}, \overrightarrow{WIndId}\right) \quad (8)$$

Suggested interpretation of the alternative institutional matrices in the form of paired economic, political and ideological vectors, which are logical objections of each other (9), expands the possibilities of their joint usage.

$$\overrightarrow{WRedEc} \neq (\overrightarrow{\mathrm{WMarkEc}}); \overrightarrow{WUnitPS} \neq (\overrightarrow{WFedPS}); \overrightarrow{WComId} \neq (\overrightarrow{WIndId}) \quad (9)$$

Corresponding alternative pairs can be represented in the form of the following three vector continuums: economic vector (W^{RedEc} – 0 – W^{MarkEc}), political vector (W^{UnitPS} – 0 – W^{FedPS}) and ideological vector (W^{ComId} – 0 – W^{IndId}). They are connected in relation to the joint common center (0) – the emergence, formation and development of the socio-economic system towards the X_0 (redistributive) or the Y_0 (market) type (Figure 4).

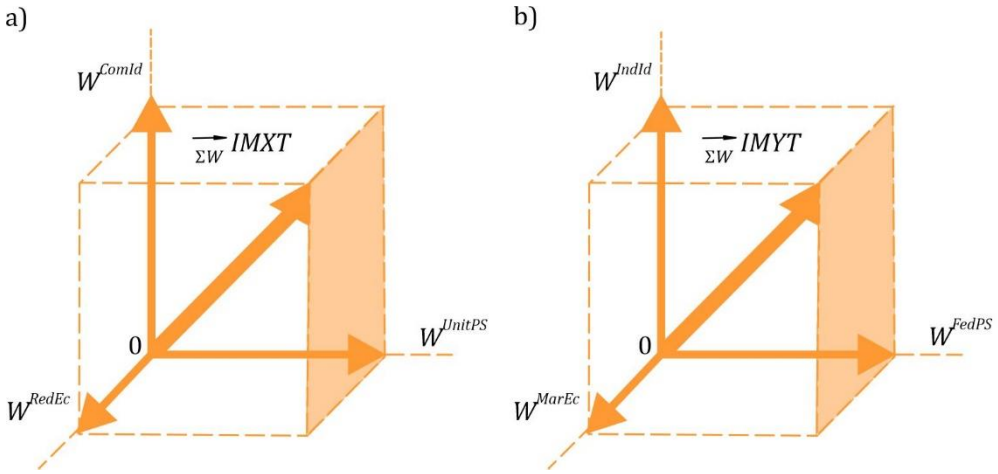

Figure 3. Interpretation of the alternative institutional matrices of socio-economic systems as a spatial combination of vectors of basic institutions: a) *X*-matrix, b) *Y*- matrix.

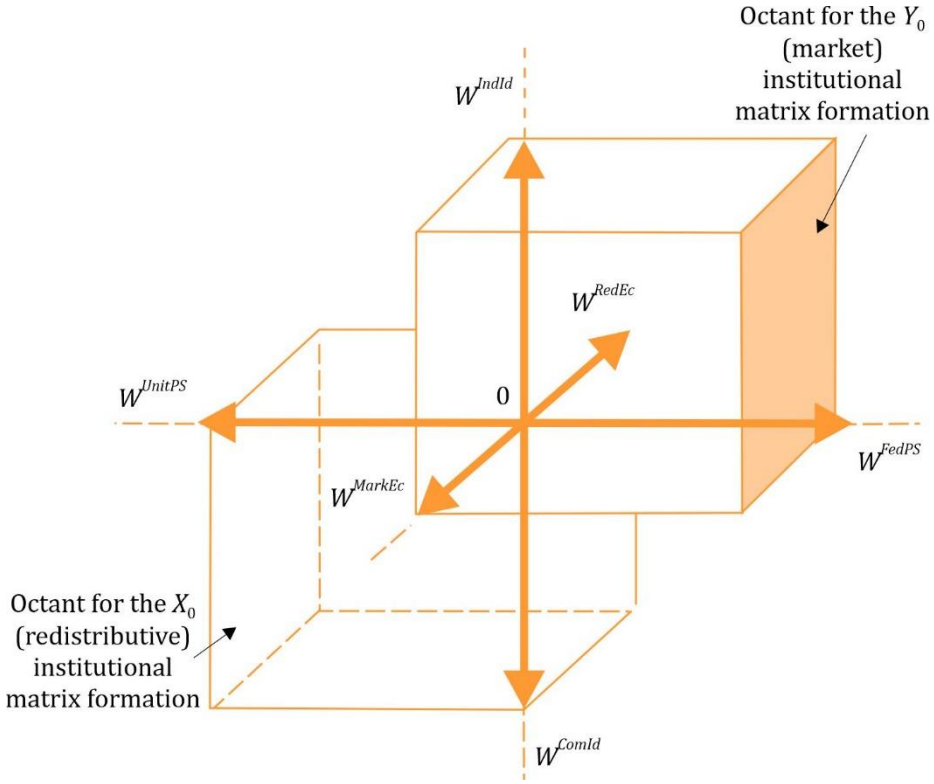

Figure 4. Combining the alternative institutional matrices into a single system with a joint center (0) – the emergence, formation and development of the socio-economic system.

As a result of such combinations, instead of two separate alternative matrices, we are building a system of two spatial institutional matrices with a joint center (0): Y_0 is a market matrix, the space of which is formed with vectors (W^{MarkEc} – W^{IndId} – W^{FedPS}) and X_0 is a redistributive matrix generated with vectors (W^{RedEc} – W^{ComId} – W^{UnitPS}). For these matrices we can use the most well-known theoretical works on the institutional development of socio-economic systems, as well as matrix analysis methods. In Figure 4 it becomes obvious, that as a result of combining two alternative spatial institutional matrices Y_0 and X_0 into a single system, we obtain a spatial mega-matrix, which consists of 8 sub-matrices formed in the corresponding subspaces-octants (Figure 5).

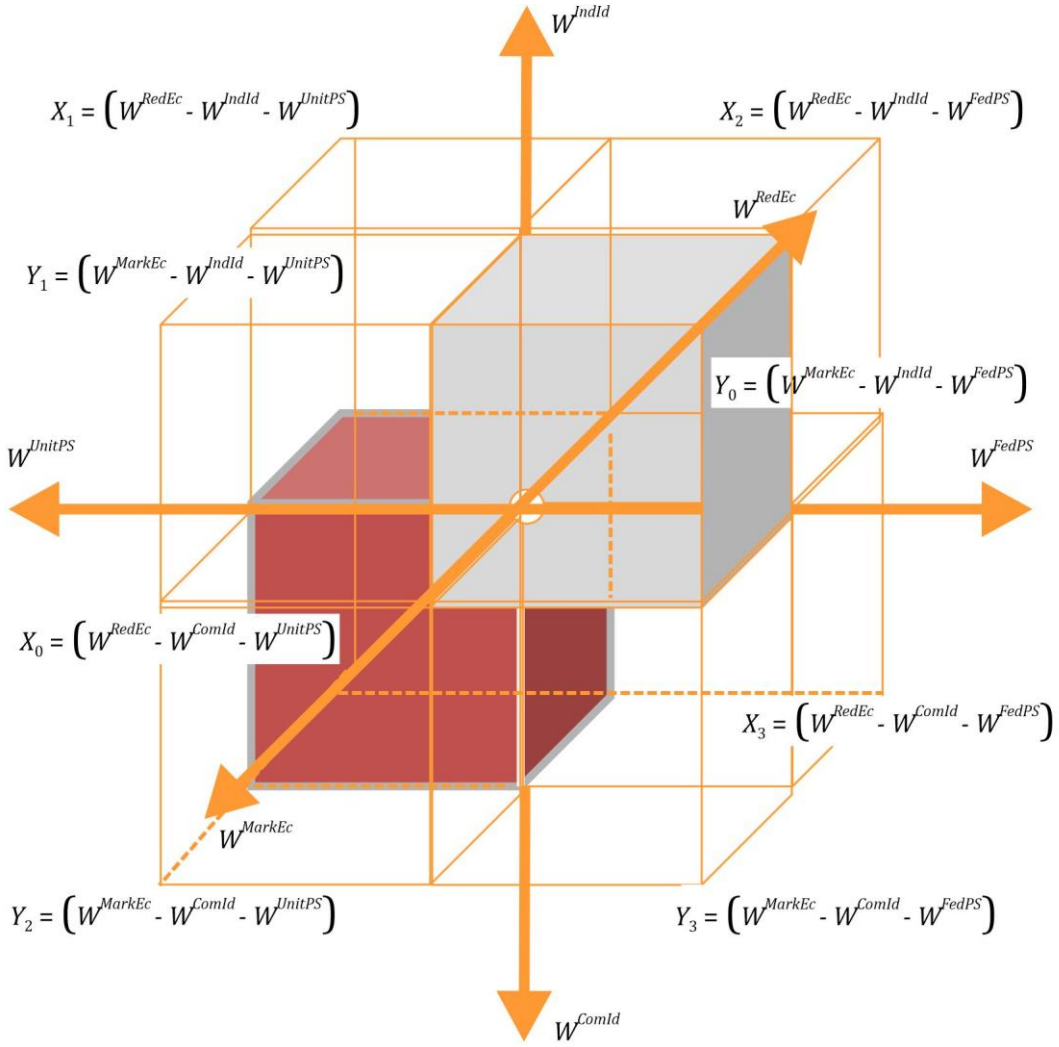

Figure 5. Spatial model of the institutional mega-matrix, which consists of 4 "market" matrices Y_0, Y_1, Y_2, Y_3 and 4 "non-market" matrices X_0, X_1, X_2, X_3.

Apart from two traditional matrices X_0 and Y_0, additional octants also describe institutional characteristics of six additional matrices, the subspaces of which are formed on such combinations of economic, political and ideological vectors, which have never been considered and analyzed by researchers before. From these six newly created matrices, three institutional matrices are formed in the space with the participation of the market economy vector (W^{MarkEc}) and vectors of other subsystems, which can be described as follows:

$$Y_1 = (W^{MarkEc} - W^{IndId} - W^{UnitPS}) \quad (10)$$

$$Y_2 = (W^{MarkEc} - W^{ComId} - W^{UnitPS}) \quad (11)$$

$$Y_3 = (W^{MarkEc} - W^{ComId} - W^{FedPS}) \quad (12)$$

Another three institutional matrices are formed with the participation of the redistributive economy vector (W^{RedEc}) as follows:

$$X_1 = (W^{RedEc} - W^{IndId} - W^{UnitPS}) \quad (13)$$

$$X_2 = (W^{RedEc} - W^{IndId} - W^{FedPS}) \quad (14)$$

$$X_3 = (W^{RedEc} - W^{ComId} - W^{FedPS} \quad (15)$$

Consequently, as a result of the spatial interpretation of the traditional dominant Y_0-matrix, three new complementary Y_1, Y_2, Y_3 matrices are formed (we call them "pro-market" matrices), in which there are some elements of the alternative X_0-matrix, namely: ($W^{IndId} - W^{UnitPS}$), ($W^{ComId} - W^{UnitPS}$) and ($W^{ComId} - W^{FedPS}$). At the same time, three new "non-market" X_1, X_2, X_3 complementary matrices are formed to the traditional dominant X_0-matrix, with the following elements of the alternative Y_0-matrix: ($W^{IndId} - W^{UnitPS}$), ($W^{IndId} - W^{FedPS}$) and ($W^{ComId} - W^{FedPS}$). Thus, six additional octants, formed with the participation of the vectors mentioned above, are of certain interest from the standpoint of identifying adequate variants of the socio-economic system development which could not be described using only elements of the traditional X and Y matrices. Therefore, if X_0 and Y_0 should be considered alternative and dominant matrices according to Kirdina's terminology, then all six additional matrices are complementary and can exist and coexist in different variants of the political and socio-cultural subsystems of dominant systems.

5. Discussion

Since most of the world's existing economic systems are mixed, we have additional opportunities to describe the options, directions, goals, tasks and decisions for implementing institutional changes as well as for managing the development of socio-economic systems in which fundamental market and redistributive institutions ensure their sustainability and integrity in the contradictory unity. The essence and basic content of the institutional matrix of a socio-economic system are determined by those economic relations, which have a dominant character. The degree to which the society belongs to a certain dominant institutional system depends on basic institutions, general framework and restrictions of the influence of complementary institutions, which together form the real institutional matrix. In such a matrix the ratio of economic institutions and institutional forms is shaped, influenced by political, ideological and economic values of society and corresponding system of public administration. The most generalized version of the real spatial institutional mega-matrix of the socio-economic system should be a model with a mixed composition of all three system continuums. This is confirmed by current realities of existing mixed type economies, in which both market and non-market economic institutions and institutional forms have opportunities for simultaneous functioning (Figure 6).

Thus, the institutional system of the society is formed in the space of the institutional mega-matrix. Its socio-economic results are determined by the essence and effects of a set of triads of economic, political and ideological basic institutions of the market and redistributive institutional systems. The real matrix is formed involving all octants of the mega-matrix. It is a result of the transformational activity of members of the society (based on their culture, values, ideological and political beliefs,

among others), the public administration system and the action of the mechanisms of spontaneous competition of different institutions.

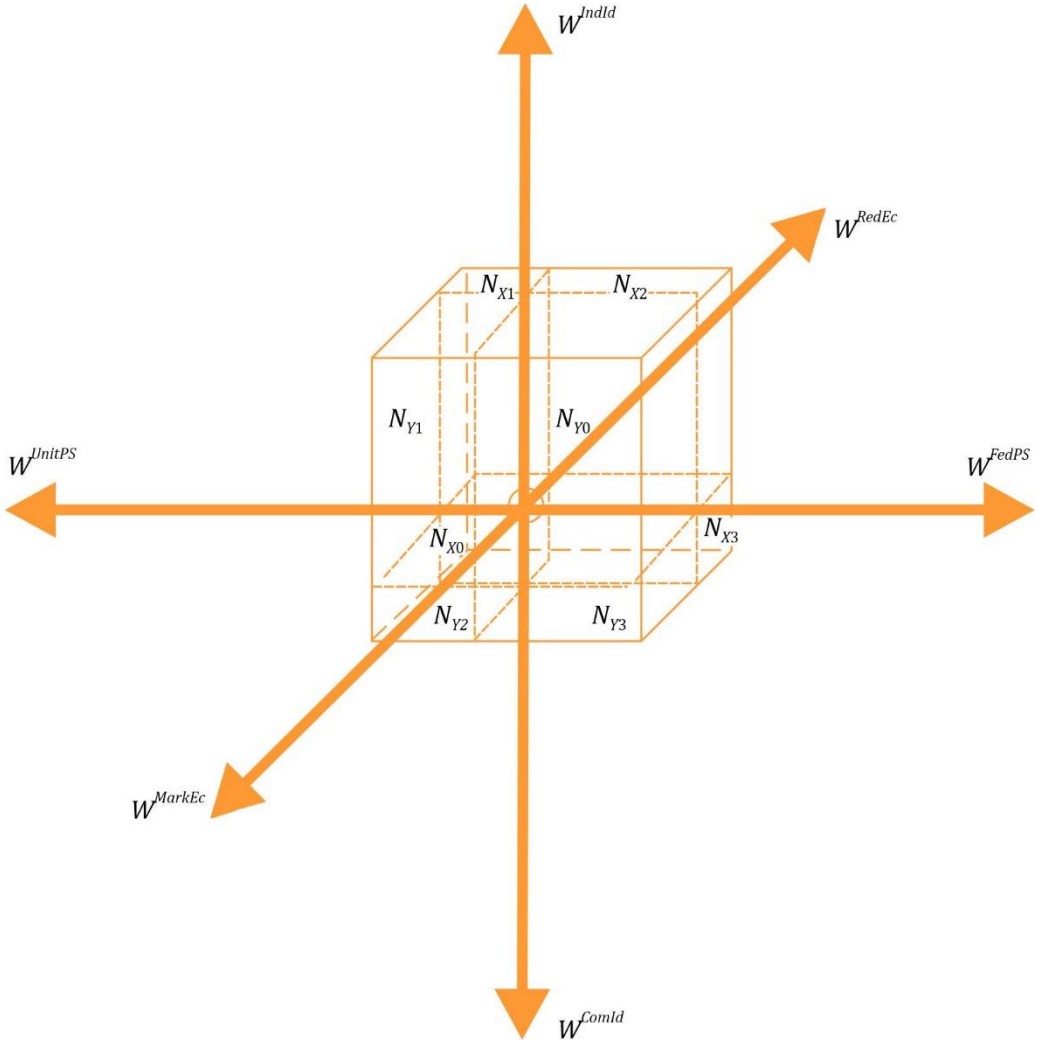

Figure. 6 Model of the institutional matrix of the socio-economic system formed through the interaction of all dominant and complementary components in the space of the institutional mega-matrix

The type of the institutional system is determined by the ratio of the number of societal members who, depending on their own beliefs and values, prefer a certain kind of basic institutions of the alternative ideological, political and economic vectors. If we assume that full status members of the socio-economic system are N intellectuals with well-established ideological, political and economic views, then their distribution among the dominant and complementary components of the institutional matrix of the society at a certain point of time will be determined according to the following formula:

$$N = \Sigma N_{Xi} + \Sigma N_{Yj} = \Sigma\,(N_{X0} + N_{X1} + N_{X2} + N_{X3}) + \Sigma\,(N_{Y0} + N_{Y1} + N_{Y2} + N_{Y3}) \quad (16)$$

where N_{Xi} and N_{Yj} are the number of people whose views are described with the characteristics of the dominant and complementary matrices of the non-market and market economy respectively.

Thus, we can build the institutional matrix using the quantitative and qualitative characteristics of population groups (results of social, statistical, economic and combined studies, surveys and estimates of ideological, political and economic priorities of full status population, local and national referendums, elections), which fall into a certain octant of the mega-matrix and determine the dominant and complementary institutional components. To make sure that a certain socio-economic system belongs to a particular matrix type, one of the following equations should be fulfilled:

$N = N_{X0}$ at $N_{Y0} = 0$ – for the dominant "non-market" matrix.
$N = N_{Y0}$ at $N_{X0} = 0$ – for the dominant "market" matrix.
$\Sigma N_{Xi} \neq 0$ and $\Sigma N_{Yj} \neq 0$ – for the dominantly complementary matrix.

The meaning of these components is the outcomes of the societal basic institutions, which can be defined by calculating the quantitative indicators recognized by human resources of various economic, political and socio-cultural narratives. In this regard it is appropriate to cite the opinion of Shulha (2018), who claimed that any necessary and appropriate change in the institutional matrix of the society is possible only as a result of adequate changes in the mentality of its human resources. In his opinion, the lack of dialogue between public authorities and society leads to the formation of two social spaces – the state and the society, which will exist separately because of the widening gap between them. The elimination of the "power distance" should start with changes in the mentality of public administration employees, which is based on the assimilation and usage of the corresponding narratives. This condition was emphasized by Professor Bartlett from the Harvard Business School and Professor Ghoshal from the London Business School in 1990. They argued that we should develop healthy organizational psychology for using organizational matrix structures – mutual norms, values and beliefs that shape the way of thinking and actions of individual leadership. The first possibility to solve this problem effectively is to create a matrix in the minds of leaders. Only under such conditions can qualitative transformations be obtained (Bartlett & Ghoshal, 1990).

Consequently, qualitative transformations of modern societies will be provided only if relevant changes in their institutional matrices are made based on the reasonable choice and necessary economic, ideological and social narratives in people's minds (first of all, leaders and public administration employees). Therefore, we have two options while designing institutional changes for transitional societies: 1) to learn what is expected in its culture (orientation, power distance, gender egalitarianism, uncertainty avoidance, degree of collectivism, etc.) and to operate in a socially desirable way, considering progressive experience of the countries with similar cultural dimensions; 2) to change the mentality of human resources through the technologies of transformative learning, oriented on implementing the narratives of the market institutional matrix and modern world-view values of global economy.

The second option was used while implementing the pilot project "Aware Residents is a Strong Community" aimed at introducing the decentralization reform in the Western region of the Ukraine and creating two amalgamated territorial communities (hereinafter referred to as ATCs) that are able to take responsibility for their further functioning and development (Panasiuk et al., 2018). Since the GLOBE project did not cover the Ukraine, we could not operate its power distance indicators. Therefore, our reengineering program was carried out in four stages: (1) the pre-project sociological survey via questioning all adult categories participating in the elections; (2) distributing educational and methodical materials, creating web pages on the websites of local self-government bodies as well as sections in local newspapers on the issues of decentralization and amalgamation of territorial communities; (3) implementing training activities for local leaders and community residents; (4) the second follow-up sociological survey to define the results of implementing the program. After the comparison of quantitative indicators of the pre-project and follow-up surveys we defined that the perception level of power decentralization increased from 38,8% to 62,6% and individual support for

community amalgamation – from 27,4% to 60,6% as well[1]. As a result of local elections, two communities were formed by their residents. This way, the pilot project allowed the direction of the political vector of the unitary-centralized political system W^{UnitPS} through its sub-vector $W_{InPowHier}$ (institution of power hierarchy) to change. Since the project covered only two ATCs in the west of the country, obviously, it could not provide the substitution of the vector $W_{InPowHier}$ (institution of power hierarchy) by vector $W_{InSelfGov}$ (institution of local self-government and subsidiarity) for the institutional matrix of the Ukraine.

6. Conclusions

The article offers spatial interpretation of the alternative institutional matrices. The way in which they are positioned in the space of the institutional mega-matrix opens up opportunities for creating new methodological approaches to institutional changes, designing and identifying adequate variants of the socio-economic system development, which could not be described using only the elements of the traditional *X* and *Y* institutional matrices. These approaches are based on matrix analysis methods of social and economic phenomena and their target modification management.

The three-dimensional model of the institutional mega-matrix, which is offered, consists of two dominant and six complementary matrices and provides the following opportunities:

- to refute the statement about the invariance and consistency of the institutional matrix, since it indicates possible directions and conditions of the institutional development of the society;
- to analyze and compare the institutional matrices of different countries using the suggested interpretation of economic, political and ideological vectors;
- to rank the status of the society and its institutional system by categories of the "emergence--formation-development" in accordance with the meanings and ratio of dominance and complementarity of basic institutions;
- to design institutional changes and to manage the development of socio-economic systems in which fundamental market and redistributive institutions ensure their sustainability and integrity in the contradictory unity.

Further research will be focused on a more in-depth study of complementary institutional matrices, determining their counterparts in the existing institutional systems of the world, as well as on the development of tools for network, sociological, statistical and economic research, and the identification of criteria for grading, positioning and managing changes in socio-economic systems based on the suggested models of the institutional mega-matrix.

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[1] 100-point rating scale was selected to predict the election results.

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