

Modeling the Impact of the Institutional Environment on the Development of Digital Platforms and the Sharing Economy



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Abstract. Digital platforms and the sharing economy contribute to a more efficient allocation of resources by releasing underutilized assets and reducing transaction costs; this opens up additional opportunities for socio-economic development. However, the rapid introduction of digital platforms and changing consumption patterns necessitate the adjustment and transformation of the current institutional environment. The aim of our study is to model the impact of the formal and informal institutional environment on the platform economy and the sharing economy in various countries. We apply theoretical analysis to show possible impact of formal and informal institutions on the development of digital platforms and the sharing economy; on this basis, four relevant hypotheses are formulated. In the study, we use data from the Digital Platform Economy Index 2020, Smart City Index 2021, WJP Rule of Law Index 2020, Social Capital Index 2020, Barometr Trust Index 2021 for 26 countries. With the

For citation: Veretennikova A.Yu., Kozinskaya K.M. (2022). Modeling the impact of the institutional environment on the development of digital platforms and the sharing economy. *Economic and Social Changes: Facts, Trends, Forecast*, 15(5), 257–273. DOI: 10.15838/esc.2022.5.83.14

help of a correlation and regression analysis, we construct linear models demonstrating the impact of the formal institutional environment on the development of the platform economy, as well as the influence of informal institutions on the services of the sharing economy. We prove that a low level of corruption and the transparency of public administration are major factors in the formal environment that affect this type of activity. The informal environment is characterized by the level of trust and social contacts in the country, expressed through social capital. The novelty of our findings consists in determining the nature of influence of the formal and informal institutional environment on the development of the sharing economy. The significance of the results lies in the possibility of using the identified patterns for the development of digital platforms and the sharing economy

Key words: platform economy, sharing economy, institutional environment, formal institutions, informal institutions, sharing.

Acknowledgment

The research was funded by Russian Science Foundation grant 22-28-01830 (<https://rscf.ru/project/22-28-01830/>).

Introduction

The sharing model as a relatively new form of economic activity organization is quite familiar to the Russian mentality. At the same time, the development of digital technologies and their active application in daily transactions, both in the transformational and transactional economic sectors, have caused a new chance to be given to the phenomenon designated in the foreign economy as the sharing economy. The sharing economy seems to be a multidimensional phenomenon that expands from the implementation of the direct principle of collaborative consumption to the inclusion of aspects of the digital, network, collaborative, circular economy (Khusyainov, Urusova, 2017; Akhmedova et al., 2020), which, on the one hand, reveals its high potential, on the other hand, generates heterogeneity that prevents a comprehensive analysis of this phenomenon. The combination of heterogeneous elements, expressed in the transformation of values from consumption to cooperation, the revision of attitudes toward trust, the use of digital platforms, the formation of communities with common values, leads to a transformation of the behavior of economic agents,

to a change in institutional norms and rules of interaction, as well as to the formation of new economic institutions that arise at the intersection of old and new consumption models.

At the same time, the emergence of new forms of interaction requires an appropriate technological basis. At the same time, the development of the “sharing economy” is closely intertwined with the spread of the platform economy, which contributes to the development of the collaborative economy. The institutional environment, which is a set of formal and informal rules and norms of behavior (North, 1994), can both stimulate the formation of new forms of interaction, allowing modern trends to integrate into current processes, and restrain, creating restrictions for the penetration and consolidation of this business model. The scientific problem of the research is the need to determine the impact of the institutional environment on the development of the collaborative economy, which in the future will allow identifying areas of formation and realization of the potential of the sharing economy in solving socially significant tasks.

The purpose of the research is to model the impact of formal and informal institutional environments on the development of digital platforms and the collaborative economy in various countries. To achieve it, we have revealed the interpretations of the definition of the platform economy and the sharing economy, substantiated the role of formal and informal institutions in the development of the “sharing economy” with the help of a theoretical review, formulated hypotheses about the influence of the formal and informal institutional environment, and constructed regression models showing the nature of the influence of the analyzed factors on the sharing economy.

Institutional environment for the development of the platform economy and the sharing economy

Platform economy and sharing economy: interpretation of concepts

At the beginning of the 21st century, there is an active growth of different online platforms, from small websites with local coverage to international companies that offer various services, such as Internet search engines, online markets, video sharing platforms, music and video platforms, social networks, collaborative economy platforms, online games and etc.

As a component of the digital economy, the platform economy has no unified borders. At the same time, the discussion about the impact of the platform economy on social processes is a continuation of the discussion of the IT revolution (Kenney, Zysman, 2016). Platformization is becoming one of the development forms of the digital economy. N. Srnicek’s work discloses the role and trends in the development of digital platforms in some detail, in which the author shows both the potential and risks of the development of digital platforms. He notes that “the platform is located between users and acts as a platform on which they interact, which allows the platform

holder to get privileged access to the registration of this interaction” (Srnicek, 2019). D. Khumaryan (Khumaryan, 2019), analyzing the work of N. Srnicek, justifies that the main goal of the platform holders is not digitalization of market exchange, but capitalization of social interaction.

The platform economy refers to digital technologies driven by the Internet, cloud computing, big data and the Internet of Things, with a large number of platform organizations as leaders, developing and implementing a full set of platforms, consumers and service providers. In addition, the platform economy reduces the transaction costs of organizations, contributes to the formation of new types of economic integration, in which resources are largely integrated with traditional industries.

D. Evans defines the platform economy as a study of the unique economic phenomena of bilateral markets in a traditional market economy (Evans, 2003). According to researcher S. Makoev, the key link of the platform economy is the platform as an analogue of a channel for placing resources only in the digital space consisting of two important structural elements: software and hardware and management (Makoev, 2020).

Several legal definitions of the digital platforms have been proposed in European legislation. For example, the Organization for Economic Cooperation and Development (OECD) has defined digital platforms (Internet intermediaries) as organizations that “combine or facilitate transactions between third parties on the Internet, <...> they provide access, post, transmit and index content, products and services created by third parties on the Internet, or provide Internet-services to third parties”¹. Currently, the concept of “intermediary” is increasingly being replaced by the term “platform”, associated with a role that

¹ “The Economic and Social Role of Internet Intermediaries”, *OECD Digital Economy Papers*, 171.

goes beyond the link, and extends to providing a common space where users can carry out their activities and create added value. The members of the Commission of the European Union in the message about online platforms do not give legally sound definitions, but list some common features: a) platforms are able to create and form new markets, challenge classical business to organize new forms of participation or business based on the collection, processing and editing of large amounts of data; b) operate in various markets, however, with varying degrees of control over direct interactions between user groups; c) benefit from “network effects”, thus the value of the service increases with the number of users; d) use information and communication technologies to provide instant communication with their users².

Thus, we can distinguish two opposing discourses. On the one hand, the digital platforms embody an extremely passive position, thereby limiting themselves to non-interference between supply and demand in the market, for example, in the case of BlaBlaCar. On the other hand, the digital platforms actively influence not only the work of their providers, but also the relationships they establish with users. For example, using a complex algorithm, Uber can involve drivers in more profitable areas (for example, shopping malls, train stations) and introduce differentiated fares during peak hours. However, this scheme is also flexible, since platforms always have the ability to change their conditions at any time as a reaction to external factors.

There is no consensus in scientific research on which types of activities and which companies can be attributed to the sharing economy, which is due to the heterogeneity of this phenomenon.

² Online Platforms. Accompanying the document Communication on Online Platforms and the Digital Single Market. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52016SC0172>

In addition, alternative terms such as “shared consumption”, “joint use”, “gig-economy” or “access economy” are used in the literature (Schlagwein et al., 2019). At the same time, R. Bosman emphasizes that these commonly used and interchangeable terms have different meanings and cover a different range of activities³.

R. Botsman and R. Rogers (Bostman, Rogers, 2011) defined the economy of collaborative consumption as an economic system in which individuals share their underutilized assets and services in order to charge or share them for free and directly. A similar definition is also given in the Oxford Dictionary (2015), where the collaborative economy is defined as an economic system in which various individuals share assets and services using the Internet as a medium of exchange.

Nevertheless, G. Petropoulos (2017) called the collaborative economy a system that provides an opportunity to exchange underutilized assets to various individuals through intermediaries between consumers who equalize supply and demand using information technology (Petropoulos, 2017). However, Y. Hamari and his co-authors believe that the collaborative economy is related to the consumption of goods and services through various activities, such as exchange, trade and rent (Hamari et al., 2015). B. Balaram⁴ draws attention to the study of M. Felson and Y. Spaeth (Felson, Spaeth, 1978), in which joint use is described as an event involving one or more persons for the purpose of consuming goods and services during several combined events. On the other hand, R. Belk argues that the collaborative economy does not include money in exchange; he believes that joint use is the

³ Botsman R. (2013). The sharing economy lacks a shared definition. Available at: <https://www.fastcompany.com/3022028/the-sharing-economy-lacks-a-shared-definition>

⁴ Balaram B. (2016). Fair Share: Reclaiming power in the sharing economy. Available at: <https://medium.com/@thersa/fair-share-reclaimingpower-in-the-sharing-economy-499b46bd4b00>

coordination of the distribution and acquisition of resources by people for remuneration or other compensation; if it includes compensation, trade, exchange and barter are possible (Belk, 2014).

In the report, provided by the UK government, the sharing economy is an online platform that helps people provide access to assets, time, skills and resources (Woskow, 2014). The European Commission has defined the collaborative economy as a business model in which activities through joint platforms are facilitated by creating a temporary open market for the use of goods and services that can be provided by individuals. Thus, the sharing economy is a component of the platform economy because modern solutions of the digital economy are necessary for its effective functioning⁵.

The terminological discourse regarding the differences between the concepts related to the “sharing economy” and “collaborative economy” in Russian practice is due to both the features of translation and the development evolution of these concepts and the corresponding business models. E.F. Avdokushin and E.G. Kuznetsova made a significant contribution to the designation of the boundaries of related terms describing the collaborative economy in Russian studies. The authors first of all divide the “sharing economy” and “collaborative economy”, comparing the first one with cooperation between individuals for the exchange, donation, use of goods and services, and the second one with the exchange of products, factors of production, waste from core activities, services between legal entities, as a result of which there is alienation not of property, but only the results of owning it, and making a profit (Avdokushin, Kuznetsova, 2022). According to the scientists, the sharing economy includes various subspecies of this activity type: the economy of

shared consumption, the exchange economy, the economy of sharing goods, collaborative economy, etc. (Avdokushin, Kuznetsova, 2019).

As part of our research, we use the term “collaborative economy” considering it as one of the versions of the translation “sharing economy”. At the same time, the “sharing economy”, in our opinion, covers both “collaborative consumption” and “joint use” of resources to obtain individual and general results. At the same time, we emphasize that the main condition for attributing a particular service for the exchange of underutilized assets to the collaborative economy is the availability of a digital platform. Thus, the collaborative economy is understood as an economic model of agent interaction based on the collective use of various types of assets through digital platforms. The sharing economy is based on the practice of using and exchanging products or services supported by Web 2.0 between a platform provider, an equal service provider and a client (user), it means that there is a triad exchange for monetary compensation – an exchange without transfer of ownership can occur both locally in a community or area, and globally.

The business model of organizing the collaborative economy is implemented on platforms that create an easily accessible market for temporary use of goods or services, usually provided by private individuals. It involves three groups of users: service providers who share their goods, resources, time or skills, users of these services and intermediaries connecting providers with users, facilitating transactions between them, which are online platforms⁶.

The collaborative economy has a high potential for development due to scaling, which allows users to save money, and suppliers of goods and services to receive additional income. In addition, this

⁵ A European agenda for the collaborative economy [COM (2016) 356]. Available at: <http://ec.europa.eu/DocsRoom/documents/16881>

⁶ Ibidem.

activity type contributes to reducing the level of excessive consumption, reducing carbon emissions, creating trust between members of society, as well as the development of social capital (see, for example: Rinne, 2018).

At the early development stages of the sharing economy, its advantages were recognized, such as the reduction of excessive consumption, a positive impact on the environment and the possibility of building interpersonal communications. The attitude toward property is also changing: the idea that the possession of goods for their consumption is not mandatory is becoming more and more widespread (Botsman, Rogers, 2011).

Thus, on the one hand, the collaborative economy, involving the use of the digital platform in the implementation of its activities, is a nested set of the platform economy; on the other hand, the principle of sharing resources, goods or services on a par with economic goals allows implementing social and environmental objectives, which increases the importance of this business model in the implementation of institutional changes.

The research relevance of the institutional context of the development of the collaborative economy is also confirmed in scientific papers on this topic. For example, much attention is paid in the literature to the role of formal institutions: the gaps in legislation concerning, for instance, user security or tax payment, and informal ones including trust on platforms, are discussed (Williamson, 2009). The research results conducted by PWC in 2015⁷ indicate that the most important reasons that encourage consumers to share are the favorable price of goods and services, the ability to access a variety of goods and services, high quality, the opportunity to get a unique experience, meet new people, participate

in a new cooperative lifestyle, the convenience of conducting transactions, absence of encumbrances related to cost, service, choice (Finley, 2013). The most important reasons for refusing to participate in the collaborative economy relate to the attitude toward property – individual consumers are still characterized by a lack of trust in platforms offering such goods and services (Wallenstein, Shelat, 2017). Strengthening the impact of benefits and reducing the impact of barriers requires further changes in formal and informal institutions.

Institutional environment of the collaborative economy

The institutional environment includes a set of formal and informal institutions (North, 1990). Formal institutions, as a rule, are controlled by the state; they are based on legislation established in a particular territory, officially fixed norms and rules of conduct. Informal institutions are based on deeply rooted codes of conduct, traditions, customs, sanctions and taboos. They exist independently of the state, are formed through interaction between individuals or communities (Finley, 2013).

We should note that formal institutions related to the collaborative economy and digital platforms have undoubtedly undergone significant changes over the previous decades. However, their transformation is rather slow, often not providing the current demands and opportunities of the collaborative economy. For example, in countries such as Russia, Greece, Hungary, there is no protection of the rights of consumers using digital platforms and services of the collaborative economy (Stephany, 2015). This problem reduces the demand for services in this area – lack of trust becomes one of the most important barriers to the development of the collaborative economy, as consumers need clear rules for the operation of exchange platforms supported from the outside, ensuring their safety and guaranteeing that in case of problems there are specific tools to solve them.

⁷ The Sharing Economy. Consumer Intelligence Series. PricewaterhouseCoopers LLP, 2015. Available at: <https://eco.nomia.pt/contents/documentacao/pwc-cis-sharing-economy-1-2187.pdf>

However, despite the gap in the speed of transformation of the institutional environment, as well as in the speed of formation and spread of the sharing economy, the demand for services of this activity type is growing. This is due to the changes taking place in society encouraging consumers to use the opportunities offered by the collaborative economy. Thus, informal institutions are changing faster than formal ones. Although according to the institutional economic theory it is generally assumed that the rate of transformation of informal institutions is quite low (Williamson, 2000), this thesis is not applicable to the formation of the sharing model (Helmke, Levitsky, 2004).

Thus, if the development of formal institutions lags behind the present economic processes, informal institutions are quite flexible to the current social needs and make it possible to develop collaborative economy. Informal institutions make it possible to overcome distrust of new services and types of interaction. In particular, consumers who use ratings or recommendations from friends are more likely to trust the “sharing economy” services. In addition, consumers of the services of the sharing economy platforms appreciate the principles that ensure transparency of transactions, simplicity and price competitiveness. Thus, informal arrangements replace traditional institutions and guarantee the safety of consumers.

In the article we propose an approach to the analysis of the collaborative economy taking into account both formal and informal institutions, based on the provisions of the institutional economy.

The development of the collaborative economy is associated with significant institutional changes, which can be divided into two groups. The first group includes changes in the consumers’ attitude to the ownership of goods. The second type of changes includes legal regulations designed to ensure the security of transactions on platforms, or rules voluntarily introduced by platforms to increase

transparency and user trust (Schor, Fitzmaurice, 2014). Thus, the newly created informal institutions – relations between platform users and trust in other people’s assessments – to some extent replace traditional formal regulations. Let us look at the formal and informal institutions that affect the collaborative economy in more detail.

Formal institutions

The dynamic development of the collaborative economy is an important task for states, however, as a rule, the transformation speed of legislative initiatives is often significantly lower. The key areas of necessary regulation concern:

- safety of users (for example, when traveling with Uber) and third parties (for example, accidents involving urban scooters)
- ensuring high quality of goods and services provided;
- elimination of external factors (for example, environmental pollution by rented cars);
- free-rider problem and moral risk associated with avoiding responsibility for causing damage or improper provision of services;
- level of corruption as a development factor of the platform economy and services for the sharing of goods and services.

These examples of regulation show how wide their range is and how important the problems of regulatory authorities are. In addition, the platforms are trying to influence the form of regulations introduced by the state.

It is also worth emphasizing that formal rules encourage the development of the collaborative economy. An analysis of the Timbro Sharing Economy Index shows that the collaborative economy is better developed in countries with greater economic freedom (Bergh et al., 2018).

At the same time, digital platforms, and hence services of the collaborative economy, operate in an external environment conditioned by formal norms and rules.

The analysis presented above shows that the collaborative economy can be developed when the principle of openness and mutual cooperation is implemented in a formal institutional environment. This was reflected in the following hypotheses:

H1. The absence of corruption in the country has a positive impact on the development of digital platforms.

H2. The openness of government organizations and the transparency of their activities have a positive impact on the development of digital platforms.

Informal institutions

On the one hand, changes in informal institutions are associated with a change in the social attitude to the popularization of the collaborative economy and the strengthening of trust in it. The generation born after the 1980s has developed a new approach to ownership, convenience of consumption, as well as the use of technology or reliance on recommendations. For this generation, the statement “You are what you own” changes to “you are what you share” (Belk, 2014). PWC (2015) points to a new attitude toward property, as 43% of respondents in the U.S. perceive it as a burden, and 57% consider access to be a new type of property. Moreover, 81% of respondents noted that it is cheaper to share goods than to own them. Thus, consumers notice the benefits of sharing and become more aware of the advantages and disadvantages of various ownership forms⁸.

On the other hand, the collaborative economy is based on building relationships between dispersed groups of suppliers and consumers. This requires the creation of direct relations between the subjects, the restriction of anonymity, the adoption of procedures for verifying trustworthiness. Building relationships with formal and informal groups promotes trust,

while societies with a higher level of trust are less dependent on formal institutions for compliance with agreements. For representatives of these groups there is no need for personal acquaintance – it is enough that they are members of the same community of people using this platform. Thus, the general level of trust in society and the connections within it have an impact on the economic behavior of subjects.

Research in the field of social capital is closely related to the topic of trust and informal institutions. Social capital is usually interpreted as a degree of trust, norms of cooperation and associative membership or networks in society (Curtis, Lehner, 2019). Interest in this topic has grown thanks to the research of sociologist J. Coleman (Coleman, 1988) and political scientist R. Putnam (Putnam, 1993).

The research results on social capital show that individuals are more likely to trust people with qualities and characteristics inherent in themselves. However, a high reputation on the platform becomes more important than a high similarity, which allows overcoming even deep-rooted prejudices. Currently, almost every platform is trying to convince its users that it actively cares about ensuring security. For example, Uber has created an “Uber community guidelines” designed to improve safety.

High ratings and trust are crucial for the prosperity of suppliers of goods and services. The breakthrough for the Alibaba platform was the introduction of the so-called “trust pass”, i.e. a certificate for sellers that confirmed their trustworthiness. Sellers with such a certificate received an average of 6 times more orders than unregistered ones. Research for eBay also confirms the importance of reputation. The seller who received a negative comment lost an average of 8% of weekly sales. Thus, reputation has a measurable financial impact. In addition, one negative comment increases the risk of further negative

⁸ The Sharing Economy. Consumer Intelligence Series. PricewaterhouseCoopers LLP, 2015. Available at: <https://eco.nomia.pt/contents/documentacao/pwc-cis-sharing-economy-1-2187.pdf>

opinions by 25%⁹. According to 2020 data, 99% of transactions on Swaptree are successful, and only 1% receive negative comments, mainly for trivial reasons, such as delayed delivery (Georgoula, Skoultos, 2020).

To increase the value of rating systems, models are introduced to assess their reliability, checking the quality of comments left. An example of a rating system evaluation project is “Trustmark”, launched in 2015. This is a top-down project presented by the UK authorities, which became the first country to recognize that consumers should be helped to assess the reliability of exchange platforms and their applications (Möhlmann, 2015). Similar initiatives are being taken by private companies such as Traity and TrustCloud. They allow aggregating information from different platforms, social networks and build the reputation of users based on them. This makes it possible to apply information from one platform to another, which is important for a consumer who starts using a new service without a transaction history or user ratings. The information that users leave during online transactions allows detecting certain behaviors, for example, evaluating behavior on social networks, in particular responsibility or predictability, and linking it to ratings on different platforms.

In order to further model the impact of the informal institutional environment on the organization of the platform economy and the collaborative economy, we have formulated the following hypotheses:

H3. The development of digital platforms and the collaborative economy is positively influenced by the level of trust within societies and their social ties.

H4. The level of trust in institutions has a positive impact on the development of the collaborative economy.

⁹ Chappelow J. (2020). Sharing Economy. Available at: <https://www.investopedia.com/terms/s/sharing-economy.asp>

Research methodology

Due to the fact that the collaborative economy model is developing mainly in large cities, we use two levels of observations for this study: countries and cities. In the case of the development of the digital platforms, we have investigated the cross-country level. To test the hypotheses, we have used data for 2020 from the digital platform development report – Digital Platform Development Report, calculated by the Global Entrepreneurship and Development Institute¹⁰. The use of big data, new algorithms and cloud computing creates a global digital platform of an economy built around platform companies. The Digital Platform Economics Index (DPE Index) combines two separate but related databases on digital and entrepreneurial ecosystems. The new framework looks at digital entrepreneurship in a broader context.

For another dependent variable – development rate of the collaborative economy – we have used data from the IMD-SUTD Smart City Index for 2021¹¹. The index focuses on how residents perceive the effectiveness of efforts aimed at making their cities “smart”, and includes a survey of citizens about their satisfaction with various services including those related to the collaborative economy (car sharing, bike rental), as well as websites or applications that allow residents to distribute unnecessary things.

For 2020, we use data from the WJP Rule of Law Index as independent variables to test hypothesis 1 at the intercountry level¹². The index characterizes the development rate of the rule by law in 139 countries and jurisdictions providing

¹⁰ Digital Platform Economy Index, 2020. Available at: <https://thegeedi.org/wp-content/uploads/2020/12/DPE-2020-Report-Final.pdf>

¹¹ IMD-SUTD Smart City Index (SCI), 2021. Available at: <https://www.planbe.com.gr/news/smart-city-index-2021>

¹² WJP Rule of Law Index, 2020. Available at: <https://worldjusticeproject.org/rule-of-law-index/global/2021/table>

assessments and ratings based on eight factors: limitations of government powers; absence of corruption; openness of government; fundamental rights; order and security; regulatory enforcement; civil justice; criminal justice.

Representatives of more than 138,000 households, including 4,200 practicing lawyers and experts from around the world, were interviewed to obtain points and ratings in the WJP 2020 Rule of Law Index. This index is the most comprehensive data set of its kind in the world and the only one that mainly relies on primary data including the points of view and experience of civil society.

We use Edelman Trust Barometer of 2021, conducted annually and displaying the level of trust in business, nonprofit organizations, government, and media (X_3), as independent variables at the intercountry level. In addition, the report calculates the arithmetic mean among the indicators in different countries. As part of the study, we use this indicator as an indicator of the level of trust in formal institutions¹³.

To test hypothesis 3 on the impact of the informal institutional environment on the platform economy and the collaborative economy, we use the Social Capital Index¹⁴ for 2020 (X_4). The social capital of a country is the sum of social stability and well-being of the entire population (perceived or real). Social capital creates social cohesion and a certain level of consensus, which, in turn, provides a stable environment for the economy and prevents excessive exploitation of natural resources (Georgoula, Skoultos, 2020).

In addition to local historical and cultural influences, social consensus is influenced by several factors: health systems and their accessibility (measuring physical health); equality

of income and assets that correlate with crime rates; demographic structure (to assess the future balance of generations in society); freedom of expression, absence of fear and violent conflicts. Only in these conditions can the economy flourish, create additional value, jobs and ensure the incomes growth.

As a result of using the available statistical data, we have obtained 26 observations. During the analysis, we have considered such countries as Russia, Korea, Ireland, Spain, Turkey, Japan, UK, UAE, Germany, Australia, France, Italy, Canada, Singapore, Argentina, Brazil, Malaysia, USA, the Netherlands, South Africa, Colombia, Mexico, Saudi Arabia, India, Indonesia, China and their capitals.

We use the following variables to test the formulated hypotheses and further simulate the impact of the formal and informal institutional environment on the development of digital platforms and the collaborative economy:

Y_1 – digital platforms development index in the world countries;

Y_2 – level of carsharing development in the city, expressed by an indicator characterizing citizens; agreement that “carsharing applications have reduced congestion”;

X_1 – index based on population survey and showing agreement that there is no corruption in the country;

X_2 – index based on population survey and showing agreement that the openness of state institutions is observed in the country;

X_3 – social capital development index in the country;

X_4 – index of public confidence in formal institutions (general indicator).

When constructing the model, we have made a preliminary analysis of the initial statistical data, as a result of which we identified the most appropriate type of functional dependence between the economic processes under consideration. At the

¹³ Edelman Trust Barometer, 2021. Available at: <https://www.edelman.com/trust/2021-trust-barometer>

¹⁴ Solability Social Capital Index, 2020. Available at: <https://solability.com/global-sustainable-competitiveness-index/the-social-capital-index>

second stage, we have carried out a correlation analysis of the studied factors, which made it possible to determine whether there are factors in the model that form such a negative phenomenon as multicollinearity.

At the third stage, we directly constructed multifactor models; at the fourth stage, we conducted a study of the quality of the constructed models. The fifth stage included checking and eliminating the autocorrelation of residues in the model. At the stages of data processing, we used Python software product.

Research results

As the research result, we have constructed two models reflecting the influence of the formal and informal institutional environment on the development of digital platforms and the sharing economy.

At the initial stage of data analysis, we revealed that the distribution of random variables by the tested factors and the dependent variable Y1 is linear in both models. As a result of the analysis of the matrix of pairwise correlations, we have found that there is no multicollinearity in the model (*Table*);

Correlation matrix

	Y1	X1	X2
Y1	1	0.80	0.75
X1	0.81	1	0.44
X2	0.75	0.44	1
Df Residuals:	1	0.80	0.75
Source: own compilation.			

Figure 1. Regression analysis results

OLS Regression Results						
Dep. Variable:	DP	Risquared:	0.835			
Model:	OLS	Adj. Risquared:	0.820			
Method:	Least Squares	Fi statistic:	58.13			
No. Observations:	26	Prob (Fi statistic):	1.01ei 09			
Df Residuals:			91.483			
			23			
Logi Likelihood:						
Df Model:	2	AIC:	189.0			
Covariance Type:	nonrobust	BIC:	192.7			
	coef	std err	t	P> t	[0.025	0.975]
const	35.0710	8.097	4.331	0.000	i 51.821	18.321
X1	65.1050	10.491	6.206	0.000	43.403	86.807
X2	65.4636	12.852	5.094	0.000	38.877	92.050
Omnibus:	2.977	Durbini Watson:	1.563			
Prob(Omnibus):	0.226	Jarquei Bera (JB):	2.084			
Skew:	0.693	Prob(JB):	0.353			
Kurtosis:	3.015	Cond. No.	11.7			

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

Source: own compilation.

Figure 2. Results of regression analysis between service of the collaborative economy and social capital index

OLS Regression Results						
Dep. Variable:	DP		R-squared:	0.385		
Model:	OLS		Adj. R-squared:	0.359		
Method:	Least Squares		F-statistic:	15.03		
No. Observations:	26		Prob (F-statistic):	0.000720		
Df Residuals:	24		Log-Likelihood:	-108.57		
			AIC:	221.1		
			BIC:	223.7		
	coef	std err	t	P> t	[0.025	0.975]
const	-23.5913	18.865	-1.251	0.223	-62.526	15.344
X3	1.4911	0.385	3.876	0.001	0.697	2.285
Omnibus:	9.712	Durbin-Watson:	0.320			
Prob(Omnibus):	0.008	Jarque-Bera (JB):	7.835			
Skew:	1.186	Prob(JB):	0.0199			
Kurtosis:	4.269	Cond. No.	288.			

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

Source: own compilation.

then we have determined the dependence of the development rate of digital platforms on factors X_1 and X_2 .

Figure 1 presents the results of the regression analysis.

As a result, we have obtained the following model:

$$Y_1 = -35.07 + X_1 \times 65.1 + X_2 \times 65.46. \quad (1)$$

Testing the hypothesis about the impact of the social development index led to the following results (Fig. 2).

As a result, we have built the following model:

$$Y_2 = -23.59 + X_3 \times 1.49. \quad (2)$$

At the next stage, we have carried out an assessment of the adequacy and reliability of the results obtained. The significance of the determination coefficients in the first model prob (F-statistical = $1.01e-09$) and prob (F-statistical

= 0.000720) allows concluding that the model as a whole is reliable, and also confirms the representativeness of the sample. The coefficients of determination indicate that the variations in the indicators of the development of digital entrepreneurship platforms by about 83 and 38% depend on the indicators selected at the modeling stage of the matrix of paired correlation coefficients. Checking the null hypotheses of the insignificance of regression coefficients indicates that the selected factors do have an impact; their regression coefficients are statistically reliable and significant. The value of the F-criterion and the significance level of p demonstrate that the constructed model is significant at the significance level of $\alpha = 0.05$. The Darbin – Watson test, used to control models for the presence of autocorrelation of residues, has proved that there is no dependence between the residues, they are randomly distributed and range from 0 to 4.

Also, we have tested the models for heteroskedasticity by visual analysis of the residue graph. There are no signs of instability of variance and dependence of residuals, the model is homoscedastic.

Thus, with the help of quality control, we have concluded that the models are reliable; we have confirmed the influence of factors of the formal and informal institutional environment on the development of digital platforms. We have confirmed Hypotheses H1 and H2. The H3 hypothesis is confirmed for the collaborative economy when considering the impact of carsharing on traffic congestion. We refuted the H4 hypothesis at the stage of correlation analysis.

Discussion of the results

As a result of the analysis, we have proved that the nature of the influence of the formal and informal institutional environment on the development of digital platforms and the collaborative economy differs. For instance, the platform economy is more influenced by the formal environment, in particular the level of corruption and the openness of state institutions, which may be due to significant efforts for business in organizing enterprises based on the platform economy. However, formal institutions are less essential for the development of the collaborative economy, which can be explained by the more significant influence of institutions that relate directly to companies using the collaborative economy model. Thus, trust in platforms becomes a decisive factor for the development of the sharing economy. Based on their knowledge, the platforms use applicable institutional solutions and implement user assessment systems, in this way ensuring the anonymity of users.

At the same time, formal and informal institutions are interconnected; the interaction between them is complex. Both types of institutions

may be associated with the same field, and their overall influence increases, or, conversely, institutions may be inconsistent and function in opposition to each other. Informal institutions can fill gaps in formal institutions, modify existing formal institutions, or lead to new solutions. Despite the fact that informal norms and rules fill the emerging gaps of absent or weak formal institutions, they cannot completely solve the problems with the presence of institutional dysfunctions, especially in conditions of changing economic processes (Eggertsson, 2006).

Due to the variability of organizations, related to the platform economy, consideration of the diversity of formal institutions is difficult. However, in the case of the platform economy and the collaborative economy, other factors influencing the development of these types of activities are equally important including rating systems that help to strengthen trust between the entities carrying out transactions and support informal institutions. Thus, users of the platforms gain confidence in other entities with whom they can agree on the terms of transactions. Consequently, the absence of formal institutions can be replaced by the development of informal ones.

When comparing the results obtained with the conclusions of the previous studies, we should turn to the work (Helmke, Levitsky, 2004). The authors consider the convergence of formal and informal institutions and their effectiveness. If following formal and informal institutions yields the same results, they are considered convergent. If the results are different, then this interaction is divergent. Formal institutions are effective in situations where there is an effective enforcement mechanism, otherwise formal institutions are ineffective. In addition, formal and informal institutions are complementary if they lead to the same results, while formal institutions are effective, and

informal ones fill any gaps in formal institutions and enhance their effectiveness (for example, a developed legal system in society). In the case of adaptive institutions, formal rules are also effective, but following informal institutions does not lead to the same results. Informal institutions encourage behavior that differs from the formally accepted one, although they do not directly violate the rules. Institutions compete when informal institutions produce results that differ from inefficient formal institutions. In this regard, informal institutions compete with formal ones and create a kind of alternative rules. Institutions are substitutive when convergent informal institutions coexist with inefficient formal institutions. In this situation, despite the fact that organizations violate formal rules, the goals can be achieved. Thus, informal institutions are able to achieve the results expected from formal institutions. In addition, informal institutions contribute to the development of appropriate formal institutions (for example, in countries with weak State structures). Important observations on the role of informal institutions can be found in E. Ostrom (Ostrom, 1990). According to the researcher, solutions created by communities are in some cases more effective than exogenous rules. At the same time, it is impossible to create such rules without favorable conditions provided by informal institutions, such as trust, willingness to cooperate, and positive attitude to exchange.

With regard to the development of institutions that affect the collaborative economy, it is worth noting the expectations in the field of gradually building convergent formal and informal institutions. However, at this stage of the development of the platform economy and the collaborative economy, this conclusion has no unambiguous confirmation, since no direct influence of formal institutions on services of the collaborative economy has been revealed. At the same time, the links between formal institutions and

the development of digital platforms are still found, which is due to the current adaptation of market processes to the spread of digital platforms, and the institutional environment to the introduction of more effective and popular forms of interaction between economic agents. Thus, at the current stage of ESP development in traditional market processes, we can talk more about the presence of substitute and adaptive institutions.

Moreover, the results show that the working out of the platform economy and the collaborative economy is closely correlated with the development of inclusive institutions, which, among other things, are usually associated with a reduction in transaction costs (Auzan, 2019). The effectiveness of inclusive institutions for the development of the economy and society is shown in the work (Acemoglu et al., 2003). This type of institution is closely related to “open access orders” (North et al., 2009). This allows each member of society to participate in solving political and economic problems, which creates favorable economic and political incentives for the development of innovation and the rule by law leading, in turn, to economic growth. The inclusiveness of institutions in this context will be characterized by the implementation of the principle of openness of public administration, as well as the creation of a favorable environment based on the principles of cooperation and trust.

Conclusion

In a study conducted to model the impact of formal and informal institutional environment on the development of the platform economy and the collaborative economy in the global space, we have obtained the following results.

First, we have revealed the connection between the platform economy and the collaborative economy. The research shows that the collaborative economy is part of the platform economy because it uses its resources. At the same time, the collaborative economy has goals that go beyond

the framework of the platform economy, such as efficient allocation of resources and reduction of environmental pollution.

Second, when analyzing the impact of the formal institutional environment on the platform economy and the collaborative economy, we have constructed a linear multifactorial model demonstrating the most significant influence of factors such as low corruption and openness of public administration.

Third, when analyzing the impact of the informal institutional environment on the platform economy and the collaborative economy a one-factor linear model is constructed that demonstrates the impact of the level of social capital development

on the development of services of the collaborative economy.

The theoretical significance of the presented research is to confirm the importance of inclusive formal institutions for the development of digital platforms. At the same time, the institutional environment of the collaborative economy is still being formed. In the current period of its development, social capital has a special influence on it.

The presented research results can be used to build an effective institutional environment that allows developing the potential of the digital platforms and the collaborative economy to solve socially significant tasks.

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Received August 25, 2022.