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THE INFLUENCE OF SOCIAL CAPITAL ON NETWORK EFFECTS

Introduction. *The current social and economic changes caused by networking relations in the economic system are a significant element of contemporary scientific research aimed to identify the essential characteristics of such new concepts as "network economy" and "social capital". This situation has resulted from the development of Internet technologies, the increasing role of intangible assets in value creation, and the need to study the state involvement in these processes, which identifies the level of their development.*

Problem. *The impact of social capital on the economic system has been observed in various patterns of economic system relationships, and it is amid the network economy that this impact is clearly revealed through the changes in the manifestation of network effects. It is necessary to specify such changes for the effective organization of economic relations under the conditions of the network economy as well as for the determination of the role of social capital in them.*

The aim *of the article is to identify the relationship between social capital and the network economy and determine in which interaction patterns of the economic system social capital changes (or levels) the manifestation of network effects.*

Methods. *In the course of the research, the following methods were used: analysis, generalization, comparison, analogy, scenario construction, graphic, and microeconomic analysis (marginal utility curve).*

Results. *In the course of the research, there has been revealed the relationship between the levels of social capital and network readiness, as well as theoretical and practical aspects of the*

ВПЛИВ СОЦІАЛЬНОГО КАПІТАЛУ НА МЕРЕЖЕВІ ЕФЕКТИ

Вступ. *Соціально-економічні зміни сьогодення, які зумовлені мережевізацією відносин в економічній системі, є значущим елементом сучасних наукових розвідок щодо виявлення сутнісних характеристик таких концепцій, як "мережева економіка" та "соціальний капітал". Така ситуація обумовлена розвитком інтернет-технологій, посиленням ролі нематеріальних чинників у створенні вартості та необхідністю дослідження включення держав у ці процеси, що ідентифікує рівень їх розвитку.*

Проблема. *Вплив на економічну систему соціального капіталу помічений у різних моделях взаємовідносин економічної системи і саме в умовах мережевої економіки він яскраво виявляється у зміні прояву мережевих ефектів. Конкретизація таких змін необхідна для ефективної організації економічних взаємовідносин в умовах мережевої економіки та визначення ролі соціального капіталу в них.*

Мета *статті – виявити взаємозв'язок соціального капіталу та мережевої економіки, визначити, в яких моделях взаємодії економічної системи соціальний капітал змінює (або нівелює) прояв мережевих ефектів.*

Методи. *Використано такі методи: аналізу, узагальнення, порівняння, аналогії, побудови сценарію, графічний, мікроекономічного аналізу (крива граничної корисності).*

Результати дослідження. *У ході дослідження виявлено взаємозв'язок між рівнями соціального капіталу та мережевої готовності, а також розглянуто теоретичні та практичні моменти в окресленій проблематиці. Результати аналізу природи формування різних моделей взаємовідносин економічної*

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outlined issues. The findings obtained while analyzing the nature of the formation of various relationship patterns of the economic system and the role of social capital in those patterns show that social capital determines the manifestation character of network effects (positive and negative) in such patterns.

Conclusions. *The components of social capital are identical to the elements of network viability. Thus, social capital becomes a key management object in the network economy. The obtained results of the research will form the basis for further scientific research on the social capital management system of an enterprise in the network economy.*

Keywords: network economy, social capital, network good, network effect.

системи та ролі соціального капіталу в них свідчать, що соціальний капітал визначає характер прояву мережевих ефектів (позитивний та негативний) у таких моделях.

Висновки. *Складові соціального капіталу є ідентичними до елементів життєздатності мережі. Так, соціальний капітал стає ключовим об'єктом менеджменту в умовах мережевої економіки. Отримані результати дослідження будуть базою для майбутніх наукових розвідок з питань системи управління соціальним капіталом підприємства в умовах мережевої економіки.*

Ключові слова: мережева економіка, соціальний капітал, мережеве благо, мережевий ефект.

JEL Classification: O1; D85; L14; M21

Introduction. The term "network" is important in the social and economic environment. Observing the global trends in socio-economic development, it is possible to note that the key moments of public and economic activity are concentrated around networks. Involvement in the network is an opportunity of access to new knowledge, important information, and limited resources, which, in the modern world, is necessary for gaining competitive advantages at the level of both an individual and an organization, an enterprise, the state. According to UNCTAD experts, the share of the network economy in the world's GDP is approximately 15.5% [1].

Awareness of the economic significance of networks and the need to develop network relations has resulted in shaping a new social order – *the network economy*. This economic phenomenon is formed through digital technology, contacts (connections), interaction rules and trust. Technological development (digitalization) and public openness (development of social capital) are the drivers of integration of the network economy of a particular country. And it is the level of development of these two components that determines the prospects and pace of this process for the country.

Problem. Due to the long-term and effective performance of the network economy, it has become possible to identify its common action regularities and impact on the economic system. Scientists have determined that the network economy produces the network good and creates network effects. In scientific discourse, there is a thesis that the evolution of the modern economic system owes to the influence and development of intangible factors, particularly through social capital, which the World Bank recommends to include when assessing national wealth.

The nature of networking is closely related to the performance of social capital, which broadly effects the network in various ways. In this context, two questions arise: how to organize economic relations in the

network economy and what is the role of social capital in the given relations? To answer these questions it is necessary to determine the impact of social capital on the manifestation of network effects in the interaction patterns of an economic system.

Analysis of recent research and publications. The role of social capital under the formation of the network economy is currently quite a relevant issue among domestic scientists. Thus, N. Kovshun, N. Koba and M. Koba [2], while studying the impact of social capital on the performance of network structures in the context of digitalization, note that it is social capital that ensures high economic efficiency of network structures through a synergistic effect achieved as a result of interaction of their individual participants.

L. Vaganova and A. Humenyuk [3] study the issues related to the organization of economic activity in the network economy and highlight particular shortcomings of a network company and a network management structure existing specifically in personnel management and interaction with counterparties (i.e. difficulties associated with social capital management in these interaction patterns).

In 2020, L. Yeliseyeva reaches a conclusion that under the conditions of information and network transformation of the economy, the role of social capital increases.

Among foreign scholars, the research on the following aspects of the outlined issues is notably demanded: value chains in network structures; monopolization of markets through the action of network effects; level of countries' network readiness; social changes that take place in countries due to digitalization (change of social capital), etc. Such studies were conducted by: M. Kenney, B. Olalla, M. Jablonski, A. J. Wood, T. Koch [5–9] and others who studied the way the network economy affects the mentioned above aspects, and vice versa, how it manifests itself and under what principles it functions in these environments.

The analysis of scientific papers showed that they focus mainly on the theoretical substantiation of the relationship between the development of social capital and the network economy. At the same time, the impact of social capital on the performance of the network economy in various interaction models within an economic system is not specified.

The aim of the article is to identify the relationship between social capital and the network economy and determine in which interaction patterns of the economic system social capital changes (or levels) the manifestation of network effects.

The results of the study form the basis for further scientific research in the field of development of the social capital management system of an enterprise under the network economy.

Methods. The following methods were used: analysis, generalization, comparison, analogy, scenario construction, graphic, microeconomic analysis (marginal utility curve).

Results. Networking is referred to a change in worldview, an increasing role of social capital, digitalization of social and economic processes, penetration of Internet technologies into everyday life and business environment, etc. Such social and economic transformations became an area of academic interests among foreign scholars back in the 1990s when there were outlined some basic features of the development of the network economy [10–14]. Ukrainian scientists also studied these issues [15–23].

The conceptual foundations of the network society were substantiated by M. Castells, who refers to the network economy as a synthesis of the information and global economy which is characterized by the development of information and communication networks where the paramount importance belongs to information flows [10]. In his work "New Rules for the New Economy", K. Kelly formulated 12 rules for the network economy performance [11]. J. Bradford De Long, and M. Froomkin articulated the differrences between network management and market and hierarchical forms [12]. C. Shapiro and H. Varian, M. Katz describe network effects [13; 14].

Reflecting on the works of scientists seeking the grounds or starting point for the formation of a network economy, it should be noted that all of them focused on defining the major characteristics of the post-industrial economy, which were determined by D. Bell [24]. In other words, the main prerequisites for the formation of a network economy were as follows: awareness of human capital and its importance in value creation; transition from tangible to intangible production (the predominant role of the service sector); informatization of society, possession of information as one of the competitive advantages of both an individual and a private or public institution; technological progress, advent of the Internet and other technological innovations that have proven their effectiveness.

The advent and spread of the Internet is a transition point to a new social system: this fact changes not only the form of cooperation itself (serving as a new business tool), but also the philosophy of doing business, when the ability to be flexible and adaptive to rapid changes becomes important. It is this characteristic that is best manifested in the economic players (countries) with a high level of social capital, which implies a high level of trust, communication, an effective institutional environment (having clear norms, rules and sanctions) and established business traditions. From *Table 1,* it follows that there is a relationship between the level of social capital and the network readiness of countries. The highest social capital index during the years 2019-2021 rages from 60 to 64, whereas the network readiness – from 80 to 82.

Table 1

Ranking of countries on the Social Capital Sub-index in the Global Sustainable Competitiveness Index (GSCI) and Networked Readiness Index (WEF) in 2019-2021

Country	Index/rank					
	WEF			*GSCI*		
	2019	2020	2021	2019	2020	2021
Ukraine	48.91/67	49.43 ↑/64	55.70 ↑/53	41.3/87	44.4 ↑/82	43.9/85
Poland	61.46/37	61.80 ↑/33	64.33 ↑/33	50.2/32	53.1 ↑/34	53.7 ↑/33
Sweden	82.65/1	82.75 ↑/1	81.57/2	58.4/4	61.6/3	62.4 ↑/3
Finland	80.34/7	80.16/6	80.47 ↑/5	58.8/1	61.6 ↑/4	62.3 ↑/4
Denmark	81.08/6	82.19 ↑/2	81.24/3	55.3/11	57.8 ↑/14	60.4 ↑/9

Source: generated on the basis [25; 26].

The countries with the highest level of social capital – Scandinavian countries – also have the highest level of network readiness (see *Table 1*). Poland is ranked quite high in both indices and, at the same time, there is observed interdependence in growth. The situation in Ukraine is similar, but the indices are lower than those of the neighbouring country.

The formation of the network economy is directly related to the advent of the Internet as a tool allowing to reduce the impact of time, territorial, and other restrictions on the physical exchange of information, as well as to the social capital level in the country as an indicator of society's readiness to accept new innovative realities of the time.

The *fundamental characteristic of the network economy* which differs it from the previous economic systems is the development, transfer, and creation of added value of goods and services in networks, particularly on the Internet at a large scale, as well as through integrated partner and client networks [20; 27].

Thus, the network economy, which has some essential differences from the previous system, changes the hierarchical forms of economic relations. N. Mazina points out that the main mechanism used by business entities to coordinate their activities in the network is formal and informal collective agreements (relationships) which are supported by operational information exchange online, unlike the hierarchy where this function is performed by the plan. In addition, information is a management resource in the network where informal relations play a decisive role, and horizontal operational relationships are also available [19]. This *management pattern* makes the organization flexible for positive changes and responsive to possible crisis phenomena. Therefore, it is social capital that becomes the key object of management since it is the components of social capital that ensure the network performance. R. Putnam [28] singled out the following components of social capital: moral principles and norms, social values (trust) and network of social infrastructure (ways of communication and information exchange).

The main feature of the network economy is that it produces a *network good* (NG), which differs from the ordinary one in the fact that the former neglects the law of diminishing marginal utility. Identification of differences

between ordinary and network goods is described by A. Hrytsenko and Ye. Pesotska [15] who highlighted the following essential characteristics of the network good:

- the value depends on its prevalence;
- the marginal utility of each additional NG item increases (the law of increasing marginal utility). Consequently, the price that the consumer agrees to pay for NG increases;
- the production of only the first item of good requires greater costs. The marginal production costs of all subsequent ones are significantly reduced, approaching zero (reducing marginal costs);
- increased profits due to network expansion and network traps;
- the subjects' attitude towards goods directly depends on the availability of the same goods from other entities (economic interdependence of NG owners) [15].

The specific feature of determining the NG value is that it depends on its prevalence. The greater the number of users of such a good is, the more benefit it brings to each individual user as well as to the owner of this good. In other words, the increase in social capital among customers is an important element in building the competitiveness of a business. This is *a key feature of the network economy*, which is influenced by social capital.

Looking at the emergence, development and further existence of NG in economic life led to identifying the features of its performance. A key feature of the NG performance, as well as the network economy in general, is *the network effect*. With this in mind, there have also been identified several other features that provide a network effect. Their list and characteristics are presented in *Table 2.*

Table 2

Specific features of NG performance

Specific features	Characteristics
External network effects	When engaging each new subject into a network, its value increases significantly for other participants
Complementarity	As a rule, NG is interconnected with another good, and only in their relationship does it provide a network effect. For example, a mobile phone without a SIM card will not be NG even with an increase in the number of users
Commonality	For a network economy, the standard is the "language" through which network members understand each other. Common NG characteristics make it possible to interact and communicate with other network participants, as well as significantly expand the possibilities of using the good
Lock-in effect	The pre-described NG properties make consumers dependent on the environment of the network to which they are affiliated. This takes place due to the high costs (or inability) of terminating contracts; monopolization of markets; spending time and money on training new standards in case of abandoned previous ones, etc. For example, this situation is present when placing goods on well-known marketplaces
Economies of production scale	This effect also applies to the production of ordinary goods, but in the case of NG, it turns out to be much more effective: the cost of producing the first unit of such a good is much higher than the subsequent ones. Electronic and network technologies reduce the cost of copying digital information to almost zero

Source: generated on the basis [15].

On the one hand, the features mentioned in *Table 2*, are a logical result of the development of the economic system. However, on the other, they enforce new rules of efficient business conduct for modern enterprises and organizations. It is due to the change of importance or added criteria of business efficiency in the conditions of the network economy (for example, speed of decision making, access to information, digitalization of business processes, etc.) that there are set up new business entities – *network structures*. They are the companies that, based on Internet technologies, integrate in order to use their peculiarities, resources, specific advantages over others for implementation of certain joint projects [17].

While analyzing scientific sources on the given issue, there has not been defined any specified manifestations of network effects in various relationship patterns in the economic system. It may seem that they are the same in all patterns and give a positive result. However, there are intangible adjustting factors, in particular social capital, which changes the nature of network effects in different models of communication of the economic system subjects. Levelling its impact can lead to biased assessments of economic processes under the formation of a network economy and to false future forecasts as well.

Interaction patterns in an economic system can be arranged as follows: "business to business" (wholesale trade, electronic exchanges, network structures, etc.); "business to consumer" (retail, online stores, services, etc.); "business to government" (public procurement market, legislative regulation, etc.); "citizen to government" (e-government); "consumer to consumer" [18]. It is necessary to separate the concept of *network entrepreneurial structures* where the participants are enterprises (business), and that of *organizational network structures* which can be formed at different levels of interaction, where, apart from business, there are other participants of an economic system (organizations, the state, consumers, etc.) or business is not involved at all.

The penetration of the network economy into these interaction patterns changes their form and content. The change in form occurs due to the entry of Internet technologies, i.e., digitization of business processes, government and banking services, interpersonal communication, etc. takes place. Regarding the content, digitization occurs due to an increase in the level of social capital at the macro level (largely due to trust, institutional environment, enhance of informal forms of communication, etc.) and the desire to increase the network of useful contacts.

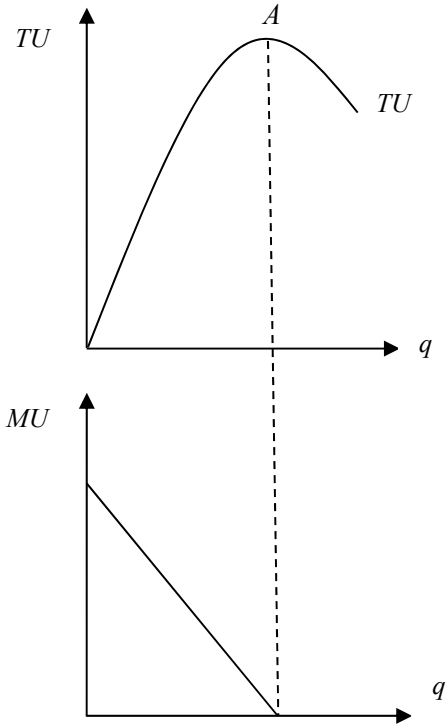
With the basic features of the performance of the network economy and social capital, it becomes possible to find some exceptions in the manifestation of the network economy. This applies mainly to the activities of enterprises and organizations as a periphery of circulation of intangible factors of development (including social capital).

While studying the integration of the network economy into the social and economic environment, the main focus is on the "business to business"

model which involves the formation of entrepreneurial network structures. It is the results of their activities that are a source of information for statistics and indicate the contribution of the network economy to GDP.

However, a company interacts with a number of other counterparties that indirectly influence this macroeconomic indicator and have peculiarities of their own. Considering the interaction patterns of an individual company, we can distinguish five interrelated levels of relations among the following: consumers; work team; state; suppliers (business that provide raw materials and do not have the purpose of creating a joint product); other companies (in order to build a network structure where companies unite to create a common product). The structure is similar to the common patterns of interaction in the economic system but it includes a level of interaction within the business entity itself (that is within the work team, due to which added value is formed) as well as interaction with suppliers (detailing the "business to business" model, which can be of two types: relations with suppliers or other companies).

To consider the process of forming labour resources of an enterprise, where social capital is constantly present and the network effect may be manifested, we will use the microeconomic analysis tool – the marginal utility curve (*Figure*).



TU – individual total utility from the use of social capital

MU – individual marginal utility from the use of social capital;

q – number of group members.

Curve of the individual marginal utility of an "Olson small group" member

Source: author generated

The social capital of an enterprise is characterized as a "small group" whose goal is to maximize the well-being of its members. In the example in *Figure* there is considered a separate division of an enterprise, or its branch,

where its working team is formed as a centre for the social capital performance creating a collective good (a bonus for achieving the stated goals of the enterprise). Thus, we have the following characteristics of this group:

- a limited number of members;
- a collective good is formed (suppose that the company sets itself certain goals for a specified period, provided that they are achieved, this division will be awarded a fixed total bonus which will be distributed among the team members);
- to achieve the set goals and obtain a collective good, each member's individual contribution (their knowledge, skills, connections, time, etc.) is necessary.

In small groups, the result of effective work of social capital (generating a collective good) is distributed among a small number of participants, while bringing greater benefits to an individual participant. In such a situation, the incentives to invest in the social capital of the group by an individual participant are quite strong [4].

The total utility from the results of social capital action increases to a certain saturation point (i.e. *A* – the maximum satisfaction of a participant's needs with the optimal number of participants) (see *Figure*). Once this point is reached, the total utility will decrease since there will be fewer benefits provided for an individual participant by social capital. In addition, with an increase in the number of participants, the problem of "the ticketless" increases – there are those who enjoy the collective good, but do not contribute to obtain it.

The situation in *Figure* is described with a fixed level of social capital in the "Putnam group" (state), that is, there exists historically established social capital and a certain state of the institutional environment.

As for the other interaction patterns of the economic system, the actions of the network economy laws are fully revealed and give a positive effect in the "business to consumer" model when it comes to increasing the client base. A striking example is the *Google* search engine, which is a free resource for consumers, which draws their attention, and which is why the number of users is growing. Understanding this, the company compensates for its costs through advertising, the placement of which is beneficial to the business since there is a confidence that the advertised product will be noticed by a significant audience. Thus, a *network trap* is created for customers using Google services [29].

Similar features are inherent to the "citizen to government" model where e-government technologies are being actively introduced. The more citizens trust and use electronic public services, the faster the digitalization of society as one of the elements of the development of the network economy will take place. In addition, it will help reduce the effects of such negative developments in the economy as corruption, shadow economy, etc. In Ukraine, there has been introduced "Diya" (Action) state instrument, one of the purposes of which is to fight against corruption: according to the

Ministry of Digital Policy. Its implementation has an anti-corruption effect of UAH 2.05 billion per year, and significant savings in 15 fields of the economy as well as procurement [30].

If looking at the situation of enterprises uniting for common goals (creating entrepreneurial network structures, for example, chambers of commerce and industry, chains of value creation), certain conditions must be fulfilled for a network effect to occur. In such structures, the real situation is that with an uncontrolled growth of the number of participants, the effectiveness of this group decreases or the original goal of creating such a structure is lost. It happens so because with an increase in a group members (structure), it becomes more difficult to achieve coordinated actions since the values and motives for joining of each participant may vary. Under such conditions, it is more difficult to determine common values, monitor compliance with these guidelines and, in case of a critical situation, quickly make effective decisions. Therefore, for the effective operation of such network relationships (structures), a limited (necessary) number of participants should be determined taking into account the rational needs of such a structure, goals and capabilities of individual participants.

Thus, understanding the essence of network effects along with their manifestation in various models of interaction of economic entities is an important stage for developing a management system in enterprises, organizations and the country. At the same time, social capital is a regulation factor in building and accumulating contacts as well as an object that requires the development of management, regulation and control methods.

The constant presence of social capital in the process of networking interaction patterns of an economic system determines the nature of network effects. *A positive demonstration of the network effect* for the company that creates it is possible with the growth of its client base or the number of users (if it concerns the digitization of administrative services). In this case, a networked good is created and the peculiarities of its functioning are identified (see *Table 2*). Also, with the right choice of channels of interaction with the key consumer, there takes place a growth of social capital, which is manifested through increased confidence in the product, rapid dissemination of information about it, creating a positive image, etc.

A negative demonstration of the network effect is present in cases of forming a pool of participants whose aim is to solve certain problems, which requires the concentration of their personal resources. Such a pool of participants includes the following: a working team, entrepreneurial network structures, public organizations, etc. The nature of such structures lies in the fact that their activities provide benefits to a large number of people, including non-participants, through the performance of important social and economic functions. For example, the effective work of one employee is important for the profitability of the enterprise, and this, in its turn, will ensure its development and contribute to the economic growth of the country. At the same time, such structures offer access to limited or poorly available

resources for their participants. These can be both tangible benefits (bonuses, distribution of profits, material goods, discounts, benefits, etc.) and intangible ones (access to information, useful contacts, etc.). Because of this, the majority has a desire to be included in such a structure. Thus, there is a risk of losing the values laid down in the purpose of its creation. Under such circumstances, an increase in the number of participants leads to the problem of "the ticketless", conflict of interests, stratification of the group, loss of coordination in actions, decrease in the efficiency of activities, increase in decision-making time, decrease in social and economic utility, etc.

Conclusions. The importance of the network economy development at the national level (namely in the context of digitalization and predominance of informal and horizontal forms of relations) is confirmed by the studies carried out by leading international organizations. The postulates of the network economy are a valuable guideline for the development of business, state institutions, public organizations, etc. While studying the basic characteristics of the network economy and social capital, it was found that the components of social capital are identical to the elements of a network viability. That is why there is a link between the level of social capital in the country and the entry speed of the network economy, which is confirmed by international ratings.

Due to the constant action of social capital in the patterns of interaction between economic entities, there takes place a change in the manifestation of the network effect that lies in the fact that the growth of a network's participants contributes to an increase in its value. While developping this idea, it is determined that social capital divides the nature of the network effect manifestation into positive and negative. The positive result is present when a client base is built. The negative result is present in the case of creating a network structure (entrepreneurial or organizational). It is in such network structures that social capital is a key object of management, so the results of the study will become a significant basis for further scientific research on the social capital management system of an enterprise in a network economy.

Conflict of interest. The author declares that they have no financial or non-financial conflicts of interest regarding this publication; have no relationship with government agencies, commercial or non-profit organizations that might be interested in presenting this view. Given that the author works in an institution that is the publisher of the journal, which may lead to potential conflict or suspicion of bias, the final decision on the publication of this article (including the choice of reviewers and editors) was made by those members of the editorial board who are not associated with this institution.

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