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DIGITAL GENTRIFICATION AS A SIGN OF NEW INEQUALITY IN THE CONDITIONS OF SOCIO-SPICIAL TRANSFORMATIONS

ЦИФРОВА ДЖЕНТРИФІКАЦІЯ ЯК ОЗНАКА НОВОЇ НЕРІВНОСТІ В УМОВАХ СОЦІАЛЬНО-ПРОСТОРОВИХ ТРАНСФОРМАЦІЙ

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Abstract. *The scientific hypothesis of the article assumes that inequality in access to digital infrastructure, inequality in digital skills and digital literacy, inequality in the use of digital technologies are new forms of social stratification and forms of manifestation of various digital divides. We argue that digital inequality objectively acquires new forms of manifestation. Digital and spatial inequality coexist in at least two forms of manifestation – digital periphery and digital gentrification. Digital periphery is the result of the formation of territories with limited access to digital infrastructure, which in the context of digitalization of economic processes inevitably leads to economic marginalization. An analysis of the literature has shown that digital gentrification is considered as a consequence of the increase in the cost of housing in areas with developed digital infrastructure due to the internal migration of digital workers. We believe that this approach to defining digital gentrification requires further study, because in the era of digitalization, digital technologies not only change the physical space of cities, but also create new forms of spaces – digital environments, digital platforms, digital communities. This allows us to develop the concept of "digital gentrification" as a phenomenon that describes the processes of displacement, exclusion and transformation in digital space. The purpose of the study is to determine the essence of digital gentrification and its typology, which will allow us to characterize the positive and negative consequences of gentrification processes for inequality from the perspective of socio-spatial transformation. We define the digital environment as the communication environment of digital devices and the environment of digital inequality. By considering the digital environment as the basis of a complex network of digital interactions, we can better understand the differences that arise in access to technologies, their use, and technology-related skills. In the context of spatial inequality, the household is a key entity, since its socio-economic situation directly depends on spatial opportunities: access to infrastructure, jobs, social services, environmental conditions, etc. The spatial localization of the household determines its inclusion in socio-economic processes and*

opportunities for development. In the context of digitalization, the concept of "household" is significantly modified. Under the conditions of digital transformation, traditional households are being modified into "digital communities" (groups of individuals united by common interests or goals in the digital space, who carry out economic activities) or "virtual collectives" (temporary associations of individuals for the implementation of short-term projects such as crowdsourcing initiatives) or into decentralized autonomous organizations (forms of collective economic activity based on blockchain technologies and smart contracts). Hybrid households are being formed – distributed households. We propose to consider digital gentrification as a process of transformation of digital interaction spaces and digital platforms, which is characterized by a change in the nature and intermediary functions of the digital environment, accompanied by a revaluation of digital assets in the interests of new user groups or data-driven companies, marginalization or displacement of initial users, forced simplification of digital specialization due to the development of ICT, which allowed us to distinguish platform gentrification, spatial digital gentrification, infrastructure digital gentrification, algorithmic gentrification, cultural digital gentrification, informational gentrification, economic digital gentrification, professional digital gentrification, virtual-spatial gentrification.

***Keywords**: transformation, digitalization, automation, stratification, gentrification, smart city, urbanization, inequality, competition, productivity, innovation, technology, technological development, innovative development, digital development, digital economy, platform economy, ecosystem, Industry 4.0, AI, ICT, R&D, demand, supply, migration, highly skilled workforce, labor market.*

***Анотація.** Наукова гіпотеза статті базується на припущенні, що нерівність у доступі до цифрової інфраструктури, нерівність у цифрових навичках і цифровій грамотності, нерівність у використанні цифрових технологій є новими формами соціальної стратифікації і формами прояву різних цифрових розривів. Ми стверджуємо, що цифрова нерівність об'єктивно набуває нових форм прояву. Цифрова і просторова нерівність співіснують у щонайменше двох формах прояву – цифрової периферії і цифрової джентрифікації. Цифрова периферія є результатом формування територій з обмеженим доступом до цифрової інфраструктури, що в умовах цифровізації економічних процесів неминуче призводить до економічної маргіналізації. Аналіз літератури довів, що цифрову джентрифікацію розглядають як наслідок зростання вартості житла в районах з розвиненою цифровою інфраструктурою внаслідок внутрішньої міграції цифрових працівників. Ми вважаємо, що такий підхід до визначення цифрової джентрифікації вимагає поглиблення, адже в епоху цифровізації цифрові технології не лише змінюють фізичний простір міст, але й створюють нові форми просторів – цифрові середовища, цифрові платформи, цифрові спільноти. Це дозволяє нам розвинути концепцію «цифрової джентрифікації» як феномену, що описує процеси витіснення, ексклюзії та трансформації в цифровому просторі. Мета дослідження полягає у визначенні сутності цифрової джентрифікації і її типологізації, що дозволить охарактеризувати позитивні та негативні наслідки процесів джентрифікації для нерівності з позицій соціально-просторової трансформації.*

Цифрове середовище визначено нами як комунікаційне середовище цифрових пристроїв та середовище формування цифрової нерівності. Розглядаючи цифрове середовище як основу складної мережі цифрових взаємодій, ми можемо краще зрозуміти відмінності, що виникають у доступі до технологій, їх використання та навички, пов'язані з технологіями. У контексті просторової нерівності домогосподарство виступає ключовим суб'єктом, оскільки його соціально-економічне становище безпосередньо залежить від просторових можливостей: доступу до інфраструктури, робочих місць, соціальних послуг, екологічних умов тощо. Просторова локалізація домогосподарства визначає його включеність у соціально-економічні процеси та можливості для розвитку. В умовах цифровізації поняття «домогосподарство» істотно модифікується. Відбувається розмивання просторових меж,

індивідуалізація економічної поведінки, віртуалізація споживання, змінюються моделі розподілу ролей та прийняття рішень всередині домогосподарств, що пов'язано із новими можливостями для самореалізації, які надає цифрова економіка. Ці трансформації ставлять під сумнів адекватність традиційного розуміння домогосподарства як єдиного, просторово локалізованого суб'єкта економічної діяльності. По суті, в умовах цифрової трансформації відбувається модифікація традиційних домогосподарств у «цифрові спільноти» (групи індивідів, об'єднані спільними інтересами або цілями в цифровому просторі, які здійснюють економічну діяльність) або «віртуальні колективи» (тимчасові об'єднання індивідів для реалізації короткострокових проєктів на кшталт краудсорсингових ініціатив) або у децентралізовані автономні організації (форми колективної економічної діяльності, засновані на блокчейн-технологіях та смарт-контрактах). Формуються гібридні домогосподарства – розподілені домогосподарства. Ми пропонуємо розглядати цифрову джентрифікацію як процес трансформації просторів цифрової взаємодії та цифрових платформ, який характеризується зміною характеру та посередницьких функцій цифрового середовища, що супроводжується переоцінкою цифрових активів в інтересах нових груп користувачів або компаній-даталістів, маргіналізацією або витісненням початкових користувачів, примусовою симпліфікацією цифрової спеціалізації внаслідок розвитку ІКТ, що дозволило виокремити платформенну джентрифікацію, просторову цифрову джентрифікацію, інфраструктурну цифрову джентрифікацію, алгоритмічну джентрифікацію, культурну цифрову джентрифікацію, інформаційну джентрифікацію, економічну цифрову джентрифікацію, професійну цифрову джентрифікацію, віртуально-просторову джентрифікацію.

Ключові слова: *трансформація, диджиталізація, автоматизація, стратифікація, джентрифікація, смарт-місто, урбанізація, нерівність, конкуренція, продуктивність, інновація, технологія, технологічний розвиток, інноваційний розвиток, цифровий розвиток, цифрова економіка, економіка платформ, екосистема, Індустрія 4.0, ШІ, ІКТ, R&D, попит, пропозиція, міграція, висококваліфікована робоча сила, ринок праці.*

Introduction. We are witnessing powerful transformational processes that involve the emergence of new forms of inequality that combine digital, spatial, economic and social aspects. Inequality in access to digital infrastructure, inequality in digital skills and digital literacy, inequality in the use of digital technologies as new forms of social stratification are forms of manifestation of various digital gaps, which in the professional literature are simplistically synonymous with digital inequality, which, in our opinion, objectively acquires new forms of manifestation. Digital and spatial inequality coexist in at least two forms of manifestation – digital periphery and digital gentrification. Digital periphery is the result of the formation of territories with limited access to digital infrastructure, which in the context of digitalization of economic processes inevitably leads to economic marginalization. Digital gentrification is considered as a consequence of the increase in the cost of housing in areas with developed digital infrastructure due to the internal migration of digital workers. We believe that this approach to defining digital gentrification requires deepening, because in the era of digitalization, digital technologies not only change the physical space of cities, but also create new forms of spaces – digital environments, digital platforms, digital communities. This allows us to develop the concept of "digital gentrification" as a phenomenon that describes the processes of displacement, exclusion and transformation in digital space.

The review of the literature. The socio-economic manifestations of digital transformations *(Vdovychenko, Yu., 2018; Kraus, N., Holoborodko, O., & Kraus, K., 2018; Plakhtii, M. A., 2020; Trokhymets, O., Tomareva-Patlakhova, V., & Semenov, A., 2024; Tulchynskyi, R. V., & Horbatiuk, M. R., 2023; Tsyfrova transformatsiia ekonomiky: mikro- ta makroaspekty, 2022; Yakushko, I. V., 2022)* and their impact on the emergence of new forms of inequality and rivalry are highlighted in the works of Ukrainian scientists *(Bulatova, O. V., Reznikova, N. V., & Ivashchenko, O. A., 2023; Krysvatyi, A., Desiatniuk, O., & Ptashchenko, O.,*

2023; Panchenko, V., Reznikova, N., Ivashchenko, O., & Rusak, D., 2024; Perfilieva, A., Siliutina, I., Antypenko, N., & Vlasenko, D., 2022; Reznikova, N. V., Bulatova, O. V., Shlapak, A. V., & Ivashchenko, O. A., 2023; Reznikova, N. V., Bulatova, O. V., Shlapak, A. V., & Ivashchenko, O. A., 2023; Reznikova, N. V., Karp, V. S., & Ivashchenko, O. A., 2023; Reznikova, N. V., Rubtsova, M. Yu., & Ivashchenko, O. A., 2019; Reznikova, N. V., Chuhaiiev, O. A., Ptashchenko, O. V., & Ivashchenko, O. A., 2023; Desyatnyuk, O., Krysovatyy, A., Ptashchenko, O., & Kyrylenko, O., 2024; Desyatnyuk, O., Krysovatyy, A., Ptashchenko, O., & Kyrylenko, O., 2025; Desyatnyuk, O., Krysovatyy, A., Ptashchenko, O., Kyrylenko, O., & Kurtsev, O., 2025; Reznikova, N. V., Ptashchenko, O. V., Chugayev, O. A., & Ivashchenko, O. A., 2022; Shlapak, A., Yatsenko, O., Ivashchenko, O., Zarytska, N., & Osadchuk, V., 2023) and foreign scientists *(Bijker, W. E., Hughes, T. P., & Pinch, T., 1987; Brennen, S., & Kreiss, D., 2014; Bresnahan, T. F., & Trajtenberg, M., 1995; Saura Garcia, C., 2024a; Saura García, C., 2024b)*, among which we highlight the works of P. Di Maggio, F. Garip, E. Hargittai *(DiMaggio, P., & Garip, F., 2012); DiMaggio, P., & Hargittai, E., 2001)*. The British sociologist R. Glass *(Glass, R., 1964)* is the author of the theoretical concept of physical gentrification – this term she used to describe socio-economic changes in working-class areas of London. The global perspective of gentrification and its chronology are noted in the works of Davidson M, Lees, L. *(Davidson, M., & Lees, L., 2010)*, K. F. Gotham *(Gotham, K. F., 2005)*, M. Graham, S. De Sabbata, M.A. Zook *(Graham, M., De Sabbata, S., & Zook, M. A., 2015)*, C. Hamnett *(Hamnett, C., 2003)*, R. Kitchin *(Kitchin, R., 2014)*, L. Lees, T. Slater, E. Wyly *(Lees, L., Slater, T., & Wyly, E., 2008)*. Despite the growing attention to digital transformations, in-depth research is needed on the latest manifestations of gentrification, which will allow us to offer a comprehensive approach to digital stratification at a new qualitative level.

The purpose of the article. The purpose of the study is to determine the essence of digital gentrification and its typology, which will allow us to characterize the positive and negative consequences of gentrification processes for inequality from the perspective of socio-spatial transformation.

The main material of the article. R. Glass *(Glass, R., 1964)* identified the main characteristics of gentrification as class displacement, physical transformation of space, change in the social and cultural character of the area, as well as dynamic development processes that accompany the rise of representatives of the working class by representatives of the middle class, who bought the apartments upon completion of the lease, putting them on the road of insanity, thereby changing the "social portrait" of the area. Over time, the concept of gentrification evolved and was supplemented by the concepts of new-build gentrification, super-gentrification, tourist gentrification, commercial gentrification, which allowed the actualization of new mechanisms of stratification.

The author of the concept of technofeudalism, Y. Varoufakis *(Varoufakis, Y., 2021)*, coined the concept of technofeudalism from terminologists to describe the new system of water supply, which is the rise of primary capitalism. Technofeudalism is a by-product of platform capitalism and precautionary capitalism *(Zuboff, S., 2019)*. Techno-feudalism of ideas as a new macroeconomic system. C. Saura García *(Saura Garcia, C., 2024a; Saura García, C., 2024b)* at a high theoretical level lays out the basis for data-feudalism as a manifestation of digital expansionism.

Digital expansionism violates the digital boundaries that divide the global information space. Digital boundaries are social constructs that can be divided into discursive and ontological levels. The discursive level is a reflection of power relations and discourse in the international arena. The ontological level is infrastructure, software, and digital content. There is a complex interdependence between the two levels, which do not coincide. At the discursive level, states act as subjects of formation that seek to strengthen their sovereignty and protect themselves from information security threats. A feature of digital territories and digital borders is their dynamism – they are constantly changing and rebuilding, and the creation of new territories and new dimensions of cyberspace occurs as a result of the activities of states and non-state actors. The

digital environment is an integrated communication environment in which digital devices interact and manage content and actions in it. The digital environment is a communication environment of digital devices and an environment for the formation of digital inequality. By viewing the digital environment as the basis of a complex network of digital interactions, we can better understand the differences that arise in access to, use of, and technology-related skills.

Economic inequality refers to differences in economic well-being between individuals or groups of individuals. Within-country economic inequality begins to increase after technological advances in the management of human capital, labor, skills, and competencies occur within a country. Economic inequality is not measured solely by income differences, but encompasses a broader range of factors, including: wealth, which reflects the longer-term accumulation of resources and power; income (refers to the flow of money received over a given period, including wages and investments); access to resources (health care, education, housing, and social safety nets); opportunity (availability of avenues for economic advancement, including education, training, and access to capital or loans). The choice of unit of measurement of inequality – the individual, the household, or the family – affects the assessment of inequality. Because income is typically distributed within a household or family, the most common unit of measurement for income differences is the household, which is an economic unit consisting of one or more people (not necessarily a family) who jointly own and control income and accumulated wealth. Income differences between households are typically lower than those between individuals. In the context of spatial inequality, the household is a key entity, since its socio-economic situation directly depends on spatial opportunities: access to infrastructure, jobs, social services, environmental conditions, etc. The spatial localization of the household determines its inclusion in socio-economic processes and opportunities for development. In the context of digitalization, the concept of "household" is significantly modified. There is a blurring of spatial boundaries, individualization of economic behavior, virtualization of consumption, and changes in the models of role distribution and decision-making within households, which is associated with new opportunities for self-realization provided by the digital economy. These transformations question the adequacy of the traditional understanding of the household as a single, spatially localized entity of economic activity.

The digital transformation of the economy creates new opportunities and challenges. There is a transformation of consumption – the replacement of ownership with access, personalized consumption is spreading, which affects the possibility of generating economies of scale. A separate type of economic entity is being formed – the prosumer, who is both a producer and consumer of digital content, a digital product or a digital service. Prosumerism blurs the lines between production and consumption. Lowering barriers to entry allows households to create micro-enterprises with minimal initial investment. Households gain access to a wide range of financial instruments through fintech platforms. New opportunities arise for households to raise and invest funds outside the traditional banking system. Using decentralized finance and cryptocurrencies, households are experimenting with alternative forms of saving and increasing capital. In essence, in the context of digital transformation, traditional households are being modified into "digital communities" or "virtual collectives" or into decentralized autonomous organizations (Table1).

Table 1

Digital household as an actor of digital gentrification

Aspect	Traditional household	Digital household
Spatial localization	Attachment to a specific place of residence	Geographical distribution. Virtual presence
Economic background	Shared budget	Partially integrated or autonomous budgets
Dynamism	Relatively stable composition and structure	Dynamic composition, flexibility, temporality, situationality
Base of formation	Family ties	Common interests, common competencies

Economic functions	Consumption, savings, investments	Consumption, savings, investment, production, prosumerism, crowdfunding, sharing

Source: compiled by the authors

Hybrid households are being formed – distributed households (family members who live in different locations but maintain economic unity thanks to digital communications), platform households (households that actively interact with digital platforms as consumers and suppliers of resources (housing, transportation), digital household ecosystems (networks of interconnected digital devices, services, and platforms that ensure the economic activity of households).

We propose to consider digital gentrification as a process of transformation of digital interaction spaces and digital platforms, which is characterized by a change in the nature and intermediary functions of the digital environment, accompanied by a revaluation of digital assets in the interests of new user groups or data-driven companies, marginalization or displacement of initial users, forced simplification of digital specialization due to the development of ICT, which allowed us to distinguish platform gentrification, spatial digital gentrification, infrastructure digital gentrification, algorithmic gentrification, cultural digital gentrification, informational gentrification, economic digital gentrification, professional digital gentrification, virtual-spatial gentrification (Fig.1).

Platform gentrification

transformation of digital platforms from community-oriented, non-profit or alternative forms to more commercialized and standardized ones

Spatial digital gentrification

result of the impact of digital technologies on physical space, determining its value and prospects for commercialization (geographical information systems, digital maps that unevenly represent areas and objects, which affects short-term rental platforms and real estate ratings)

Infrastructure digital gentrification

result of uneven distribution and access to digital infrastructure (uneven implementation of broadband internet, 5G networks, concentration of digital hubs, uneven distribution of free internet)

Algorithmic gentrification

the result of discrimination against certain groups of people due to the operation of algorithms used in search engines and recommendation systems, social networks that personalize content and imply bias in data or design

Cultural digital gentrification

the result of the marginalization or displacement of certain groups due to changes in cultural norms, practices, and representation in the digital space, which is expressed in the commercialization of subcultures, the transformation of platforms popular among certain age groups, and the standardization of online aesthetics

Informational gentrification

the result of uneven distribution and representation of information in digital space (bias in geodata; "data deserts" about which little digital information exists)

Economic digital gentrification

the result of the commercialization and monetization of digital devices, platforms, and data, which can lead to the exclusion or marginalization of certain users or practices (paid content; data monetization; digital labor markets that affect working conditions and earnings)

Professional digital gentrification

the result of the transformation of professional and creative spheres under the influence of digitalization and platforms (platforms for freelancers, digital marketplaces for creative works, platforms for professional training, which can change working conditions, competition and career trajectory)

Virtual-spatial gentrification

the result of the transformation of virtual spaces, leading to their commercialization and causing changes in the management and control of virtual assets/metasenses

Fig. 1. Typology of digital gentrification

Source: compiled by K. Oliinyk

Using the technofeudal approach as a theoretical basis for analyzing digital gentrification, we define it as a specific process of transformation of digital spaces that can occur within different economic systems, drawing on historical analogies of urban transformation and recognizing the ambivalent impact on inequality that varies depending on its stage ("pioneer" digital gentrification, when new digital spaces and digital innovations are experimental; popularization stage, when, against the background of improving user experience and accessibility, the first signs of commercialization and potential displacement of initial users or practices are recorded; "corporate" digital gentrification stage, when digital space becomes fully commercialized and integrated into a broader system, which can lead to maximum efficiency, security and accessibility, but also to standardization, restriction of freedom and concentration of power; "digital decline" stage, when, after prolonged commercialization and standardization, digital platforms can lose their innovativeness, leading to a gradual outflow of users and the emergence of new, alternative platforms or spaces, starting a new cycle).

We recognize the interrelationship between physical and digital gentrification, which are mutually reinforcing, as digital technologies act as catalysts for physical gentrification (digital maps, geographic information systems, location-based services that create a digital representation of physical space that influences its perception, use, and value), while changing the use of urban spaces. Physical gentrification often includes the development of infrastructure that supports digital spaces (coworking spaces, startup hubs, high-speed internet).

Conclusions. Digital transformation does not so much eliminate spatial aspects of social inequality as reconfigures them, creating complex interdependencies between the physical and virtual spaces of household life and economic agents' management. Digital transformation modifies the meaning of physical space for establishing interaction between economic agents on both the demand and supply sides. The criterion of proximity to the employer ceases to play a leading role, which affects not only the cost of rent, but in a broader context – on the flows of international migration in the segment of skilled and technologically educated workers. The developed digital infrastructure of smart cities becomes one of the most important criteria for attracting highly productive specialists employed in digital entrepreneurship and the digital platform economy, which allows combining various manifestations of digital employment and, in a broader sense, the gig economy as a specific form of the labor market. Spatial mobility under the influence of digitalization forms processes of multilocality and suburbanization of a new type, which provide for the possibility of remote work, which is extremely important for curbing uncontrolled urbanization, which actualizes the problem of energy security in the conditions of digital transition. As a result, a new glocalization of households is formed – the integration of physical and digital infrastructure in the everyday practice of households. Social mobility in the conditions of digital transformations exacerbates the gap between highly paid specialists who own digital technologies and are not limited by the geography of residence and carriers of low-paid skills, who are implemented in the halo of physical residence. Digital gentrification is a process of transformation of digital interaction spaces and digital platforms, characterized by a change in the nature and intermediary functions of the digital environment, accompanied by a revaluation of digital assets in the interests of new user groups or data-driven companies, marginalization or displacement of initial users, forced simplification of digital specialization due to the development of ICT, which allowed us to distinguish platform gentrification, spatial digital gentrification,

infrastructure digital gentrification, algorithmic gentrification, cultural digital gentrification, informational gentrification, economic digital gentrification, professional digital gentrification, and virtual-spatial gentrification.

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