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GLOBAL VALUE CHAINS AS AN ENVIRONMENT FOR THE FORMATION OF SPECIFIC FORMS OF INTERNATIONAL TRADE SHADOWIZATION

The aim of the article is to substantiate the interpretation of global value chains as an institutionally organized system of transnational coordination that forms the environment for the emergence of specific forms of shadowing of international trade, as well as to introduce an analytical dichotomy of traditional and specific forms of shadowing according to the criterion of the type of organization of value creation and assignment. The hypothesis of the study is that under conditions of deep transnationalization of production, shadowing is transformed from a peripheral deviation from the formal sector into a systemic property of transnational production networks, in which the use of regulatory differences and the manipulation of intra-firm transactions become tools for increasing competitiveness. The article characterizes the structural transformation of the world economy associated with the transition from the model of exchange of finished goods to functionally integrated transnational production, introduces an analytical dichotomy of shadowing forms, and adapts a configurational approach to their analysis.

It is proven that the spread of global value chains radically changes the logic of the formation of shadow practices, since the fragmentation of production stages between jurisdictions and the dominance of intra-firm trade lead to the emergence of mechanisms of hidden value redistribution, integrated into formally legal corporate structures. It is substantiated that specific forms of shadowing arise from the gap between the functional organization of production and the territorial organization of regulation, giving them a configurational character and determining their structural incorporation into global production networks. A comparative typology of forms of shadowing in the context of classical and technological-digital models of the world economy is proposed, enabling us to move from the description of individual violations to the analysis of the structural conditions of their reproduction.

Unlike practical regulatory approaches focused on countering tax base erosion and quantitative assessments of the scale of hidden financial flows, the proposed approach forms a theoretical framework for explaining shadowing as a derivative of the institutional configuration of global value chains. The results provide a basis for further operationalizing specific forms of shadowing in high-tech sectors and for developing a toolkit to align de-shadowing policies with the real mechanisms of organizing transnational production.

Keywords: *global value chains, international trade, shadowization, transnationalization, competitiveness, transfer pricing, regulatory arbitrage, transnational corporations, intra-firm trade, regulation, asymmetry, fragmentation, informal economy, institutional environment, de-shadowization*

JEL classification: *F14, F23, H26, K34, L22, O17.*

ГЛОБАЛЬНІ ЛАНЦЮГИ СТВОРЕННЯ ВАРТОСТІ ЯК ФАКТОР СТАНОВЛЕННЯ СПЕЦИФІЧНИХ ФОРМ ТІНІЗАЦІЇ МІЖНАРОДНОЇ ТОРГІВЛІ

Метою статті є обґрунтування інтерпретації глобальних ланцюжків створення вартості як інституційно організованої системи транснаціональної координації, що формує середовище виникнення специфічних форм тінізації міжнародної торгівлі, а також введення аналітичної дихотомії традиційних і специфічних форм тінізації за критерієм типу організації створення та присвоєння вартості. Гіпотеза дослідження полягає в тому, що за умов глибокої транснаціоналізації виробництва тінізація трансформується з периферійного відхилення від формального сектору у системну властивість транснаціональних виробничих мереж, де використання регуляторних відмінностей і маніпулювання внутрішньофірмовими трансакціями стають інструментами підвищення конкурентоспроможності. У статті охарактеризовано структурну трансформацію світового господарства, пов'язану з переходом від моделі обміну готовими товарами до функціонально інтегрованого транснаціонального виробництва, уведено аналітичну дихотомію форм тінізації та адаптовано конфігураційний підхід до їх аналізу.

Доведено, що поширення глобальних ланцюжків створення вартості радикально змінює логіку формування тіньових практик, оскільки фрагментація виробничих стадій між юрисдикціями та домінування внутрішньофірмової торгівлі зумовлюють появу механізмів прихованого перерозподілу вартості, інтегрованих у формально легальні корпоративні структури. Обґрунтовано, що специфічні форми тінізації виникають унаслідок розриву між функціональною організацією виробництва і територіальною організацією регулювання, що надає їм конфігураційного характеру та зумовлює їх структурну інкорпорацію у глобальні виробничі мережі. Запропоновано порівняльну типологію форм тінізації в умовах класичної та технологічно-цифрової моделей світового господарства, що дозволяє перейти від опису окремих порушень до аналізу структурних умов їх відтворення.

На відміну від практично-регуляторних підходів, зосереджених на протидії ерозії податкової бази, та кількісних оцінок масштабів прихованих фінансових потоків, запропонований підхід формує теоретичну рамку пояснення тінізації як похідної від інституційної конфігурації глобальних ланцюжків створення вартості. Отримані результати створюють підґрунтя для подальшої операціоналізації специфічних форм тінізації у високотехнологічних секторах та для розроблення інструментарію узгодження політики детінізації з реальними механізмами організації транснаціонального виробництва.

Ключові слова: глобальні ланцюги створення вартості, тінізація, транснаціоналізація, конкурентоспроможність, міжнародна торгівля, трансфертне ціноутворення, регуляторний арбітраж, транснаціональні корпорації, внутрішньофірмова торгівля, регулювання, асиметрія, фрагментація, неформальна економіка, інституційне середовище, детінізація

Problem statement. In the contemporary world economy, global value chains constitute the key organizational form of production and trade, within which a new configuration of economic interaction among states, corporations, and production networks is emerging. Their spread has deepened international specialization while simultaneously transforming the mechanisms through which shadow economic practices take shape [1]. In this context, the shadowization of international trade assumes new structural characteristics, necessitating a distinction between traditional and specific forms of shadowization as analytical categories [2-4].

In classical studies of the shadow economy [4-6] to the large-scale empirical generalizations of F. Schneider and D. Enste [1] and L. Medina and F. Schneider [6], shadowization is predominantly interpreted as a reaction of economic agents to excessive regulatory or tax burden. S. Johnson, D. Kaufmann, and P. Zoido-Lobaton [7] demonstrated that regulatory discretion is a key factor in the scale of the unofficial sector, while B. Torgler and F. Schneider [8] showed the significance of tax morale and institutional quality. These approaches effectively explain traditional forms of shadow activity but have limited

analytical capacity regarding those forms of shadowization that emerge within functionally integrated transnational production systems [9-14].

The scale of the structural transformation of the world economy, which creates the environment for new forms of shadowization, is confirmed by statistical data. According to WTO estimates, the share of intermediate goods in world merchandise trade (excluding fuel) has long exceeded 50%, though in 2022-2023 it fell slightly below that level [15]. At the same time, the trade-based GVC participation rate rose from 35.2% in 1995 to 46.1% in 2008 and, despite some stabilization after the global financial crisis, remains at 44.4% as of 2020 [16]. According to OECD TiVA data, the foreign value added share in exports of OECD countries averages 26.7%, indicating deep integration of national economies into transnational production networks [17]. These indicators reflect the scale of the environment in which specific forms of shadowization are formed: the higher the level of functional fragmentation of production and intra-firm transactions, the greater the scope for hidden value redistribution across jurisdictions.

It should be noted that the problem of hidden value transfer in the globalized economy has already received

recognition in the practically-regulatory domain: the OECD BEPS project (Base Erosion and Profit Shifting) has systematically identified base erosion and profit shifting as a structural consequence of globalization since 2013 [18], while the research of G. Zucman has empirically confirmed the scale of hidden capital movement through offshore jurisdictions [19]. A. Cobham and P. Jansky developed a methodology for estimating illicit financial flows based on the premise that shadowization is a function of the architecture of international transactions [20]. However, these approaches are primarily aimed at solving practical regulatory problems or at quantitatively assessing the scale of the problem and do not propose a holistic theoretical framework to explain the emergence of specific forms of shadowization as a derivative of the configuration of global value chains. That is the problem this study takes up.

Literature review. The issue of the shadow economy has a long research tradition. The fundamental works of F. Schneider and D. Enste [1] systematized knowledge about the scale, causes, and consequences of the shadow economy, forming the methodological foundation for further research. E. Feige [5] proposed an institutional approach to defining and estimating underground and informal economies, emphasizing the role of the institutional environment in shaping shadow practices. N. Loayza [4] developed a formalized model of the informal sector that explains its scale through the ratio of regulatory pressure to institutional quality. Further empirical generalizations by L. Medina and F. Schneider [6] confirmed that the scale of the shadow economy remains significant even in countries with developed institutional systems, thereby raising doubts about the explanatory power of factor models for shadowization.

S. Johnson, D. Kaufmann, and P. Zoido-Lobaton [7] substantiated the link between regulatory discretion and the scale of the unofficial economy, while B. Torgler and F. Schneider [8] expanded the analysis to include tax morale and institutional quality as determinants of shadow behavior. These works form a robust factor-based tradition of shadowization analysis, which, however, has limited explanatory capacity for forms of shadow practices arising within formally legal transnational corporate structures.

In the practically regulatory domain, the problem of hidden value transfer in the globalized economy is addressed by the OECD BEPS project [18], which identified 15 action areas to combat base erosion. G. Zucman [19] empirically demonstrated the scale of hidden capital movement through offshore jurisdictions, while A. Cobham and P. Jansky [20] developed a methodology for estimating illicit financial flows based on the assumption that shadowization is a function of the architecture of international transactions. These approaches identify the problem and assess its scale, but do not propose a theoretical framework for explaining shadowization as a derivative of the configuration of global value chains.

In the context of international trade, the studies of N. Reznikova, O. Ivashchenko, and I. Dvornyk are valuable, as they analyzed regulatory arbitrage as an instrument of shadowization of the global economy [2] and the role of

tax engineering in offshore financial centers [3]. N. Reznikova, O. Bulatova, O. Yatsenko, and O. Ivashchenko [9] examined fiscal instruments of regulatory competition under conditions of challenges to macroeconomic stability, which is directly relevant to understanding inter-jurisdictional incentives for shadowization.

A significant contribution to understanding digital transformations of the global economy is made by works devoted to competition in the digital era and strategic determinants of competitiveness [10], digital trade in global markets [11], financial technologies in the development of e-commerce [12], as well as the conceptualization of the digital media market [13]. These studies capture the transformation of the institutional environment of international trade but do not examine its direct connection with the formation of new forms of shadowization in high-tech sectors.

The empirical dimension of the problem is reflected in data from Global Financial Integrity [14], which documents significant discrepancies in the trade statistics of developing countries, indicating the systemic nature of hidden financial flows. However, these assessments do not differentiate between traditional and specific forms of shadowization, treating them as a homogeneous phenomenon. Thus, the existing literature has developed three research directions: factor-based analysis of the causes of shadowization, a practically regulatory approach to combating base erosion, and research on the digital transformations of international trade. However, these directions remain insufficiently integrated, and the question of how the structural characteristics of globally organized production create qualitatively new forms of shadowization requires separate theoretical treatment.

Despite the growing body of research, no study has yet proposed a unified theoretical framework to explain shadowization as a structural derivative of the organization of global value chains. The present study directly addresses that gap.

The purpose of the study is to substantiate the interpretation of global value chains as an institutionally organized system of transnational coordination that serves as an environment for the formation of specific forms of international trade shadowization, to introduce an analytical dichotomy of traditional and specific forms of shadowization, and to adapt the configurational approach to their analysis.

Research methods. To achieve the stated objective, the study applies a set of general scientific and special methods of economic analysis. The structural-logical method is used to reveal the relationship between the spread of global value chains, the transformation of the organization of international production and trade, and the emergence of specific forms of international trade shadowization. The comparative method is applied to distinguish between traditional and specific forms of shadowization according to the type of value creation and appropriation, and to compare the classical and digital-technological models of the world economy in terms of the reproduction of shadow practices. The systemic approach makes it possible to interpret global value chains as an institutionally organized system of transnational coordination that combines functional, spatial, and

regulatory dimensions of production organization and thereby forms the environment for the emergence of new forms of shadowization. The method of theoretical generalization is used to substantiate the interpretation of international trade shadowization as a derivative of the institutional configuration of global value chains and to formulate the analytical dichotomy of traditional and specific forms of shadowization. The configurational approach is applied to analyze specific forms of shadowization resulting from the interaction among functional fragmentation of production, the intra-firm character of trade, inter-jurisdictional regulatory asymmetries, and multilevel corporate organization. The method of systematization is used to organize theoretical approaches to the analysis of the shadow economy, regulatory arbitrage, transfer pricing, hidden value redistribution, and the role of global value chains in the reproduction of shadow practices. The tabular method is applied to present the comparative characteristics of international trade shadowization under the classical and digital-technology models of the world economy and to visualize their key differences. The statistical method is used to interpret data from the WTO, OECD, and Global Financial Integrity in order to confirm the scale of production fragmentation, countries' participation in global value chains, and the structural environment in which specific forms of international trade shadowization are formed.

Main results of the research. In this study, global value chains are interpreted not merely as a set of technologically interconnected stages of production but as an institutionally organized system of transnational coordination of economic activity, within which the distribution of functions, risks, and incomes among participants in international trade is determined. This interpretation combines the approach to global value chains as a network structure of production with their understanding as a mechanism for institutional organization of transnational business, allowing them to be considered simultaneously in functional, spatial, and regulatory dimensions. This multidimensionality is what makes global value chains analytically central to the study of shadowization: shadow practices do not arise solely at the stage of goods movement, but also in the distribution of functions, the determination of value, and the institutional consolidation of income rights within transnational production systems.

This interpretation makes it possible to move from understanding shadowization as a set of isolated illegal acts to its treatment as a derivative of the way global production and trade are organized. Global value chains thus function as more than a channel of international exchange. They constitute an environment that generates structural incentives for hidden redistribution of value, producing specific forms of shadowization embedded within the functioning of the formal sector.

Traditional forms of shadowization are historically associated with circumventing customs and tax regulations within relatively autonomous national economies. These include smuggling of goods, understatement or overstatement of customs value, fictitious re-export, the use of offshore schemes to conceal income, and classical forms of money laundering through trade operations. These

practices were shaped by the model of international trade, in which the production of a good was concentrated in one country, and its movement across borders constituted the final stage of the economic cycle. Accordingly, shadowization was concentrated at the stage of crossing the customs border and had a distinct territorial attachment.

The spread of global value chains radically changes this logic. The production of a good or service is fragmented into a series of functionally separate stages carried out in different jurisdictions and coordinated by transnational corporations. In such a system, international trade ceases to be merely an exchange of final products between national economies and transforms into a complex network of intra-industry and intra-firm flows. This structural transformation creates the preconditions for specific forms of shadowization, which differ from traditional ones not merely in their instruments but in the underlying logic through which they arise.

This transformation has not only an organizational but a systemic character, as it reflects a change in the very architecture of the world economy: a transition from the model of international trade as an exchange of finished goods between relatively autonomous national economies to a model of functionally integrated transnational production. In this new configuration, economic processes are increasingly less correlated with state territorial boundaries, while regulatory regimes remain institutionally tied to them. The mismatch between the transnational character of value creation and the territorial boundedness of regulatory regimes constitutes the structural precondition for the emergence of specific forms of shadowization.

Based on the above, this study proposes an analytical dichotomy of traditional and specific forms of shadowization as an instrument for theoretical reconceptualization of this phenomenon under the conditions of global value chains. This approach makes it possible to move from descriptive classifications, built on the character of violations or the subject composition, to a structural demarcation of forms of shadowization depending on the organization of international production and trade. The criterion for this demarcation is the type of organization of value creation and appropriation in international exchange: in traditional forms, shadowization focuses on the border as a point of control overflows, while in specific forms, it unfolds within transnationally organized production and corporate configurations.

Under traditional forms of shadowization, we propose to understand the totality of economic practices aimed at the direct circumvention of customs, tax, and currency regulation within the classical model of international trade, where the production of a good or service is localized predominantly in one jurisdiction and shadow activity is concentrated at the stage of crossing the state border. Under specific forms of shadowization, we propose understanding the mechanisms of hidden or semi-transparent redistribution of value, income, and risks between jurisdictions integrated into the structure of global value chains, arising from the functional fragmentation of production, the dominance of intra-firm trade, regulatory asymmetries, and multilevel corporate organization. Their distinguishing

feature is their transnational character, structural embeddedness in the formal sector, and the complexity of identification using traditional control instruments.

One of the key characteristics of global value chains is the dominance of intra-firm trade. A significant share of international transactions is carried out between divisions of the same corporations located in different countries. Such transactions do not fall under the classical model of market price formation, as their parameters are determined by corporate strategies rather than competition among independent agents. This creates opportunities to set transfer prices that deviate from market prices and are used to redistribute profits between jurisdictions. The OECD BEPS project [18] directly identifies transfer pricing in intra-firm trade as one of the key channels for base erosion but treats it predominantly in a regulatory context as a problem requiring practical solutions, rather than as a structural property of a specific configuration of global value chains. In such a configuration, shadowization acquires a specific form that combines the formal legality of corporate operations with the *de facto* concealment of part of the value.

Another specific form of shadowization in global value chains is functional segmentation of production. The division of the production process into separate stages allows companies to locate the most profitable functions in jurisdictions with favourable tax regimes, while labour-intensive and resource-intensive operations are localized in countries with low labour costs. This division creates opportunities for the artificial understatement or overstatement of the value of intermediate products and services that move between links of the chain. As a result, hidden profit redistribution occurs, making it difficult to identify using traditional control methods.

Specific forms of shadowization are also formed at the level of contract manufacturing and subcontracting relations. In many industries, global corporations transfer a significant portion of their production operations to independent suppliers operating in different institutional environments. This organization of production dilutes responsibility for compliance with regulatory norms and creates conditions for the use of informal or semi-formal practices. Informal employment, the hidden use of production capacities, and unregistered component supply can be integrated into formal supply chains, forming hybrid forms of shadowization. Of particular importance is the interaction of global value chains with regional integration processes. Regional trade agreements and free trade zones reduce barriers to the movement of goods and capital within integration groupings, but they also create new opportunities to circumvent regulatory restrictions at external borders. This stimulates the development of so-called transit schemes, in which goods move through several jurisdictions to change their origin or value. Within global value chains, such operations can be integrated into legal production processes, which complicates their detection.

The theoretical conceptualization of specific forms of shadowization in global value chains requires the

configurational approach. The configurational approach, as a methodology for analyzing complex social phenomena, has its own research tradition, primarily associated with the QCA methodology of Ch. Ragin. Its key idea is that social outcomes are determined not by individual factors but by specific combinations of conditions. In this study, this approach is adapted to the analysis of shadowization in global value chains.

Unlike traditional factor analysis, which explains shadowization through individual factors [1; 4; 7], the configurational approach views it as arising from interactions among several structural conditions. These include the functional fragmentation of production, the intra-firm character of trade, regulatory asymmetries between jurisdictions, and the multilevel nature of corporate structures. Specific forms of shadowization arise precisely from the combination of these conditions, which cannot be reduced to classical schemes of illegal trade. This approach explains the heterogeneity paradox: why identical regulatory conditions across different configurations of global value chains give rise to different scales and forms of shadowization. This explains why the empirical observations of L. Medina and F. Schneider [6] record the persistence of significant scales of shadow activity even in countries with developed institutional systems, and why the link between regulatory discretion and shadowization established by S. Johnson, D. Kaufmann, and P. Zoido-Lobaton [7] manifests unevenly across different sectors.

The systematization of the presented characteristics enables a comparative analysis of classical forms of shadowization and those emerging under the conditions of the digital technology shift and geopolitical competition (Table 1). This comparison demonstrates that we are dealing not with a simple expansion of the arsenal of shadow practices but with a qualitative change in shadowization, from episodic circumvention of regulatory restrictions to a systemic property embedded in the functioning of high-tech sectors of the global economy.

This points to a broader conceptual thesis: the structural incorporation of shadowization into global value chains. Its essence is that under conditions of deep transnationalization of production, shadowization ceases to be an external deviation from the formal sector and becomes an internal mechanism of its functioning. The use of regulatory differences, manipulation of transfer prices, and integration of informal segments into formal supply chains are transformed into instruments of enhancing competitiveness on a global scale. This thesis resonates with the conclusions of the OECD BEPS project [18] and the empirical data of G. Zucman [19] and Global Financial Integrity [14], which capture the systemic nature of hidden value transfer. However, unlike these approaches, which identify the problem and propose regulatory solutions, the interpretation proposed here explains shadowization as a derivative of the specific configuration of structural conditions in global value chains, rather than as a reaction to an individual institutional defect.

Table 1

**Comparative characteristics of forms of international trade shadowization
under classical and technology-digital models of world economy organization**

Comparison criterion	Classical forms of shadowization	Forms of shadowization under the technology-digital shift and geopolitical competition
Object of shadow operations	Physical goods, currency funds	Intangible assets (IP, data, algorithms, licenses), digital services, dual-use technologies
Localization of shadow activity	Stage of crossing the customs border	The entire length of the value chain, including R&D, design, marketing, and financial settlements
Typical mechanisms	Smuggling, customs value manipulation, fictitious re-export, and documentary origin substitution	Transfer pricing of intangible assets, artificial functional distribution of profit operations, algorithmic pricing, and circumvention of supply schemes for technologies
Subjects	Individual importers/exporters, intermediaries, and organized groups	Transnational corporations, digital platforms, contract manufacturers, subcontracting networks
Relationship with the formal sector	Predominantly outside the formal sector; a clear boundary between legal and illegal	Integration into the formal sector; blurred boundary between optimization and shadowization
Role of the regulatory environment	Circumvention of national customs, tax, and currency regimes	Systemic use of inter-jurisdictional asymmetries, regulatory arbitrage as an element of corporate strategy
Role of technologies	Technologies as auxiliary tools (document forgery, cargo concealment)	Technologies as the environment of shadowization (digital platforms, cloud services, algorithmic systems)
Geopolitical dimension	Limited; associated mainly with embargoes and sanctions on specific goods	Systemic; driven by fragmentation of technological ecosystems, sanctions regimes, and technology export controls
Complexity of detection	Identified through customs control, documentation verification, and physical inspection	Requires analysis of corporate structures, transfer prices, flows of intangible assets, and data
Nature of reproduction	Episodic, situational	Systemic, embedded in business models

Source: compiled by the authors.

Conclusion. Global value chains form a specific institutional environment within which new forms of shadowization of international trade emerge. Their distinction from traditional forms lies in their transnational character, functional integration into the formal sector, and the use of complex corporate structures as instruments of hidden redistribution of value, which necessitates a revision of traditional approaches to the analysis of shadowization and the development of new analytical frameworks capable of accounting for the structural features of the global economy.

Interpreting global value chains as an institutionally organized system of transnational coordination, rather than simply a set of production stages, shifts the analytical frame. Shadowization is no longer a collection of isolated illegal acts but a derivative of how global production and value distribution are structured. The specific forms it takes reflect a deeper architectural change in the world economy: the replacement of finished-goods exchange between national economies by functionally integrated transnational production.

The dichotomy between traditional and specific forms cuts across descriptive classifications based on the character of violations and redirects analysis toward the structural conditions that reproduce them. Shadowization emerges as an evolutionary phenomenon whose dominant forms track the transformation of global value chains and regulatory regimes, not as a fixed set of illegal schemes but as a moving target tied to the organization of international production.

The configurational approach, drawing on the Qualitative Comparative Analysis (QCA), provides a tool for this analysis that factor-based models cannot. Where linear-causal models attribute shadowization to individual

conditions, the configurational framework treats it as an outcome of coordinated interaction among fragmentation of production, intra-firm trade, inter-jurisdictional regulatory asymmetry, and multilevel corporate hierarchy. This explains what factor models leave unresolved: why identical regulatory conditions produce different scales and forms of shadowization across different configurations of global value chains.

Unlike the practically regulatory approaches (*OECD BEPS*) that identify the problem and the quantitative assessments that measure its scale, the proposed approach provides a theoretical framework for explaining these phenomena through the prism of the institutional configuration of global value chains. The research results provide a theoretical and methodological basis for further operationalizing specific forms of shadowization in high-tech sectors, for developing methodological tools for their quantitative assessment, and for aligning de-shadowization instruments with the real mechanisms of global value chains. The most immediate next step is empirical: testing the configurational approach with QCA instruments on sectoral data from individual chains, where the interaction of fragmentation, intra-firm trade, and regulatory asymmetry can be observed directly rather than inferred from aggregate statistics.

Declaration on the use of AI tools. In preparing the manuscript, the authors used Grammarly for Windows (Grammarly Inc.) exclusively for grammar correction, stylistic refinement, and language editing. The tool was not used to generate scientific content, develop arguments, analyze sources, interpret findings, or prepare conclusions. Authors are fully responsible for the accuracy, reliability, and integrity of the presented scientific data.

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