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Net Assessment for Economic and Digital Security: Structural Vulnerabilities in the European Videogame Sector

Abstract

The European videogame sector went through a period of accelerated stress between 2022 and 2025, driven by external technological dependencies, volatile energy conditions and fragmented governance[1]. This article uses an updated form of Net Assessment to examine the sector as part of the European Union's broader economic and digital security landscape. Three structural factors emerge as central: the high degree of dependency on non-European GPU supply chains, the role of electricity stability as a critical operational flow and the effects of multi-level regulatory fragmentation[2]. The sequence of disruptions observed from 2023 to 2025 is consistent with a system operating near its structural limits rather than with ordinary market fluctuations. The article argues that Net Assessment offers an appropriate framework for understanding the vulnerabilities of digital creative industries whose stability is now intertwined with EU industrial strategy and legal governance.

[1] *What's the current state of the video games industry in Europe?*, https://www.obs.coe.int/en/web/observatoire/-/what-s-the-current-state-of-the-video-games-industry-in-europe- [accessed: 2.12.2025]; *Study on European video games sector. Shaping Europe's Digital Future*, https://digital-strategy.ec.europa.eu/en/library/study-european-video-games-sector [accessed: 2.12.2025].

[2] H. Farrell, A.L. Newman, *Weaponized interdependence: How global economic networks shape state coercion*, "International Security" 2019, No. 1, p. 42-79.

Keywords: Net Assessment, economic security, digital sovereignty, technology supply chains, video game sector.

Introduction

The videogame industry has become one of Europe's most dynamic digital sectors, combining technological innovation, cultural production and increasingly sophisticated computing requirements. It is a fast-growing domain, but also one closely tied to global supply chains and to the regulatory environment of large online platforms. For these reasons, it sits at a crossroads between industrial policy, digital regulation and economic security[3].

Between 2022 and 2025, the sector faced pressures that revealed structural weaknesses. Export controls introduced outside the Union reduced Europe's access to advanced GPUs at a pace that few firms could absorb. Electricity-price spikes across Member States in 2023 significantly raised operational costs for a field whose work depends on continuous computation[4]. Hardware procurement times rose sharply, and by early 2025, several studios reported delays exceeding one hundred days. At the same time, distribution became even more concentrated: a small number of global platforms held the overwhelming share of market access and revenue visibility for European titles.

Most forward-looking analyses produced during the previous decade underestimated how quickly these pressures could combine. Their tools were designed for gradual change, not for situations where structural bottlenecks and systemic thresholds determine the trajectory. Net Assessment[5], which focuses on long-term constraints and asymmetries rather than short-term events, offers a more suitable approach for this type of environment. While Net Assessment has been widely applied in defense and energy sectors, this article proposes an original application to Europe's videogame ecosystem.

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[3] E. Brunet, R. Guichard, *Digital sovereignty in Europe: From strategic autonomy to industrial policy*, "Journal of European Integration" 2023, No. 4, p. 567-584; T. Rühlig, T. Brink, *Economic security and strategic dependencies: Europe's technology dilemma*, "Journal of Common Market Studies" 2022, No. 6, p. 1506-1524.

[4] *Report on energy prices and costs in Europe*, https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52025DC0072 [accessed: 5.12.2025].

[5] P. Bracken, *Net Assessment: A Practical Guide*, "The US Army War College Quarterly: Parameters" 2025, No. 3, p. 1.

This article applies that method to the European videogame ecosystem. It examines how supply-chain dependency, energy sensitivity and fragmented governance interact to define the system's underlying structure, and how these factors shaped the developments observed between 2023 and 2025.

Structural drivers shaping the system

The European videogame sector relies overwhelmingly on non-European suppliers for advanced GPUs. Europe produces only a marginal share of the high-performance chips required for modern engines, AI-assisted asset generation and network simulation. Between 2021 and 2024, more than eighty-five percent of these components came from two external jurisdictions[6]. When export controls were introduced in late 2022, access to next-generation architectures fell by roughly forty percent.

The effects of this sudden contraction were rapid. Procurement times rose from a matter of weeks in 2021 to more than three months in some Member States by 2025. This level of dependence constitutes what systems theory describes as a high-centrality node: a single point of failure whose disruption affects every downstream process.

EU legal instruments recognise such dependencies in areas such as semiconductors or critical raw materials, but the videogame sector has not yet been integrated into these frameworks. As long as the underlying supply chain remains external, the sector will continue to carry this structural vulnerability.

Game development today depends on continuous and stable access to electricity. Rendering, large-scale simulation, AI training and cloud integration all require predictable and affordable power. When European electricity prices surged in 2023, the computational costs of production increased sharply. For many studios, energy expenses moved from a manageable fraction of the budget to a dominant constraint[7].

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[6] K. Van Wieringen, *Strengthening EU chip capabilities How will the chips act reinforce Europe's semiconductor sector by 2030?*, https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733585/EPRS_BRI(2022)733585_EN.pdf, [accessed: 5.12.2025].

[7] S. Bishop, *Video Games, Data Centers, & Demand Flexibility*, https://www.energycentral.com/energy-management/post/video-games-data-centers-demand-flexibility-QMtm6gwN10amspV [accessed: 5.12.2025].

Most European mid-sized studios maintain operational reserves covering only a few weeks. If electricity prices remain volatile or if access becomes less reliable, these reserves erode quickly. Once reserves fall below the threshold needed to absorb a prolonged disruption, operations cannot continue. In this sense, electricity functions as a critical flow: a reduction does not merely slow production but destabilises multiple interconnected processes at once. For example, some mid-sized European studios reported that GPU procurement delays exceeded 100 days in early 2025.

Although EU energy regulation provides mechanisms to stabilise markets in exceptional circumstances, it does not currently classify digital-creative industries among sectors requiring priority safeguards[8]. This leaves the industry exposed to fluctuations that can cascade through the entire production ecosystem.

The videogame sector lies at the intersection of several regulatory domains. Cultural funding mechanisms are national. Competition and platform regulation are EU-level. Industrial policy instruments vary by Member State. Labour law, tax incentives and data-protection regimes all operate on different timelines and with different priorities[9].

This fragmentation produces long delays in support delivery, uneven access to public instruments and inconsistent regulatory expectations. Studios often compensate for this by relying on global platforms that provide distribution, analytics and monetisation. In practice, this shifts part of the sector's governance from public law to private infrastructure.

In a Net Assessment perspective, this constitutes an internal amplifier. When a system is already dependent on a single technological input and vulnerable to a critical flow, weak coordination across authorities accelerates the impact of external shocks.

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[8] J. Langlois-Berthelot, *Tackling the post Covid-19 economic recession with science, technology and innovation: challenges for countries of the European Union*, https://philpapers.org/rec/LANTTP-6 [accessed: 7.12.2025].

[9] D. Helbing, B. Frey, G. Gigerenzer, A. Zwitter, *Will Democracy Survive Big Data and Artificial Intelligence?: Essays on the Dark and Light Sides of the Digital Revolution*, "Scientific American" 2019, No. 2, p. 54-59.

System dynamics of the 2023-2025 contraction

The contraction observed in the European videogame ecosystem did not arise from a single event. It followed a sequence that aligns with known models of system stress under high dependency and low autonomy.

The reduction in advanced GPU availability created an immediate constraint on production capacity[10]. Electricity-price volatility compressed operational buffers. Hardware costs increased, delays accumulated and long project cycles became financially harder to sustain. At the same time, platform concentration intensified, limiting the bargaining power of European studios and reducing visibility for many titles.

By early 2025, these pressures converged. Several studios temporarily suspended projects because the compute infrastructure required for engine testing or asset production was unavailable or too costly. Others adapted by reducing scope, shifting to less compute-intensive workflows or delaying releases. The fragmentation of regulatory and support mechanisms offered limited mitigation because responses were delayed, partial or uncoordinated across Member States.

This pattern is consistent with a system approaching structural thresholds. When input dependency, critical flow sensitivity and governance fragmentation align, stress propagates rapidly through the system. Net Assessment helps identify these mechanisms before the visible decline, which is precisely the point of applying it to economic-security questions.

Implications for european governance and economic security

The videogame sector illustrates a broader issue facing Europe: technologically advanced cultural and digital industries can carry strategic vulnerabilities similar to those found in more traditional sectors such as energy,

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[10] C. Young, *The Semiconductor Shortage: an Analysis of Potential and Ongoing Remediation Efforts and their Implications on the Industry & Macroeconomy*, https://pdxscholar.library.pdx.edu/cgi/viewcontent.cgi?article=2374&context=honorstheses [accessed: 7.12.2025]; T. Bradshaw, M. Heikkilä, *Europe's AI computing shortage 'will be resolved' soon, says Nvidia chief*, https://www.ft.com/content/36cb69e3-822b-4e3b-bb6d-04b617ca78ab [accessed: 7.12.2025]; J. Langlois-Berthelot, *The Ecological Transition Income: Current Academic Debates*, https://eaepe.org/summer-school-archive/ [accessed: 7.12.2025].

telecommunications or defence. Their contribution to GDP, employment, data flows and technological development makes them relevant to economic-security policy.

Several EU legal instruments are indirectly relevant. The Digital Markets Act[11] addresses dominant platform behaviour but does not moderate Europe's dependence on foreign compute infrastructures. The Data Act[12] supports data access and portability but does not resolve hardware scarcity. The European Chips Act[13] targets semiconductor resilience but has not yet incorporated creative-industry compute needs. State-aid rules allow support in exceptional circumstances, but fragmented implementation reduces effectiveness. Relevant literature also offers useful insight into how these regulatory measures connect in practice[14].

Net Assessment suggests that structural alignment requires three priorities. First, reducing the centrality of external GPU supply lines by diversifying suppliers and integrating the sector into broader semiconductor strategies. Second, stabilising electricity access for computation-dependent industries to raise operational autonomy above critical thresholds. Third, improving coordination between national and EU frameworks to mitigate governance asymmetry.

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[11] Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act), http://data.europa.eu/eli/reg/2022/1925/oj [accessed: 10.12.2025].

[12] Regulation (EU) 2023/2854 of the European Parliament and of the Council of 13 December 2023 on harmonised rules on fair access to and use of data and amending Regulation (EU) 2017/2394 and Directive (EU) 2020/1828 (Data Act), http://data.europa.eu/eli/reg/2023/2854/oj [accessed: 10.12.2025].

[13] Regulation (EU) 2023/1781 of the European Parliament and of the Council of 13 September 2023 establishing a framework of measures for strengthening Europe's semiconductor ecosystem and amending Regulation (EU) 2021/694 (Chips Act). http://data.europa.eu/eli/reg/2023/1781/oj [accessed: 10.12.2025].

[14] M. Mueck, S. Du Boispean, C. Gaie, *Overview on European Digital Legislations*, [in:] *European Digital Regulations*, M. Mueck, C. Gaie [eds.], Cham 2025; G. Frosio, *From Horizontal to Vertical: An Intermediary Liability Earthquake in Europe*, https://ssrn.com/abstract=3009156 [accessed: 18.12.2025].

Conclusion

The European videogame sector's difficulties between 2022 and 2025 were not random fluctuations or isolated market failures. They reflected structural vulnerabilities embedded in the system's design. A high-centrality technological dependency, sensitivity to energy volatility and fragmented governance combined to create conditions in which small shocks produced rapid and disproportionate effects.

Net Assessment provides a structured way to analyse such environments. It directs attention to long-term constraints, internal asymmetries and the architecture of dependence rather than short-term events. For a sector increasingly linked to Europe's digital sovereignty agenda, applying such a framework is not optional. It is necessary for designing policies capable of preventing similar disruptions in the future.

By understanding the European videogame ecosystem as a strategic subsystem rather than a purely cultural industry, policymakers can begin to address its vulnerabilities with more coherence and precision. The stability of Europe's digital creative capacity depends on this shift. Importantly, this perspective can be extended to the entire technology sector. Reducing similar dependencies, stabilising critical flows, and addressing governance fragmentation are essential to protecting Europe's digital economy.

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Net Assessment dla bezpieczeństwa ekonomicznego i cyfrowego: strukturalne podatności europejskiego sektora gier wideo

Streszczenie

Europejski sektor gier wideo w latach 2022–2025 doświadczył okresu nasilonych napięć wynikających z zewnętrznych zależności technologicznych, zmienności warunków energetycznych oraz fragmentacji systemu zarządzania. W artykule wykorzystano zaktualizowaną metodę Net Assessment do analizy tego sektora jako elementu szerszego krajobrazu bezpieczeństwa ekonomicznego i cyfrowego Unii Europejskiej. Analiza wskazuje na trzy podstawowe czynniki strukturalne: wysoki poziom uzależnienia od pozaeuropejskich łańcuchów dostaw procesorów graficznych, znaczenie stabilności dostaw energii elektrycznej jako krytycznego strumienia operacyjnego oraz skutki wielopoziomowej fragmentacji regulacyjnej. Sekwencja zakłóceń obserwowanych w latach 2023–2025 wskazuje na funkcjonowanie systemu blisko jego granic strukturalnych, a nie na zwykłe wahania rynkowe. W artykule argumentuje się, że Net Assessment stanowi adekwatne narzędzie do oceny podatności cyfrowych sektorów kreatywnych, których stabilność jest coraz silniej powiązana z unijną strategią przemysłową i systemem regulacyjnym.

Słowa kluczowe: Net Assessment, bezpieczeństwo ekonomiczne, suwerenność cyfrowa, łańcuchy dostaw technologii, sektor gier wideo.