СТОПАНСКА АКАДЕМИЯ
„ДИМИТЪР А. ЦЕНОВ“
СВИЩОВ

Катедра „Индустриален бизнес
и предприемачество“

СБОРНИК

с доклади от кръгла маса

ИНДУСТРИАЛНИЯТ БИЗНЕС И ПРЕДПРИЕМАЧЕСТВОТО В УСЛОВИЯТА НА ГЛОБАЛНИ ТРАНСФОРМАЦИИ

16 октомври 2026 г.



СТОПАНСКА АКАДЕМИЯ „Д. А. ЦЕНОВ“ – СВИЩОВ

Сборник с доклади от кръгла маса:

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16 октомври 2026 г.

Академично издателство „Ценов“
Свищов, 2026

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ISBN 978-954-23-2692-2

D. A. TSENOV ACADEMY OF ECONOMICS

Collection of Papers from the Round Table:

INDUSTRIAL BUSINESS AND ENTREPRENEURSHIP AMIDST GLOBAL TRANSFORMATIONS

16 October 2026

Academic Publishing House „Tsenov“
Svishtov, 2026

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ISBN 978-954-23-2692-2

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Доц. д-р Емил Николов[1]

Резюме: *Появата на изкуствения интелект поставя под съмнение концепцията за Индустрия 5.0 и повдига фундаментални въпроси относно бъдещата роля на човека в производството. Докато Индустрия 5.0 акцентира върху човекоцентричността, устойчивостта, резилиентността и взаимодействието между човек и машина, бързото развитие на дигиталните технологии води до появата на производство без хора (lights-out manufacturing или още dark factories). Развитието на изкуствения интелект дава още по-голям тласък на този процес позволявайки индустриалните системи да функционират с минимална, а все по-често и без човешки намеса. В тази връзка настоящото изследване концептуализира Индустрия 6.0 като нововъзникваща индустриална парадигма, характеризираща се с преход към когнитивна автономност и производство, управлявано от изкуствен интелект. Изследването се основава на библиометричен анализ на 55 научни публикации, индексирани в базата данни Scopus, както и на преглед на нововъзникващата литература по темата за Индустрия 6.0. На тяхна база се проследява развитието на концепцията и се идентифицират нейните основни технологични и социо-институционални измерения. Резултатите от анализа разкрива тенденция на пренасочване на изследователите към AI-центрично разбиране за Индустрия 6.0, при което изкуственият интелект се очертава като ключов технологичен фундамент, наред с автономните кибер-физични системи, цифровите близнаци от ново поколение, усъвършенстваната роботика, квантовите технологии и хиперсвързаността. Основавайки се на получените резултати се предлага концепция на Индустрия 6.0, включваща технологично ядро и социо-институционална рамка, като последната обхваща трансформацията на труда, етиката, регулацията, киберсигурността, устойчивостта и необходимостта от сключването на нов обществен договор. Изследването допълнително концептуализира еволюцията на човешката роля като преход от оператор към супервайзор и в крайна сметка към стратег. В този смисъл Индустрия 6.0 не следва да се разбира само като технологичен наследник на Индустрия 5.0, а като по-широка трансформация, при която изкуственият интелект все повече управлява индустриалните операции, докато човекът поема стратегически, архитектурни и етични функции.*

Ключови думи: *Индустрия 6.0, Индустрия 5.0, антропоцентризъм, когнитивна автономия, автономен изкуствен интелект, тъмни заводи*

JEL: O33, L60, M11, O31

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FROM HUMAN CENTRICITY TO COGNITIVE AUTONOMY: CONCEPTUALIZING INDUSTRY 6.0 IN THE AGE OF ARTIFICIAL INTELLIGENCE

Associate Prof. Dr. Emil Nikolov

Abstract: *The emergence of artificial intelligence calls into question the conceptual foundations of Industry 5.0 and raises fundamental issues concerning the future role of humans in manufacturing. Whereas Industry 5.0 emphasizes human centredness, sustainability, resilience and human–machine interaction, the rapid advancement of digital technologies is giving rise to lights-out manufacturing (also referred to as dark factories). The development of artificial intelligence further accelerates this process, enabling industrial systems to operate with minimal – and increasingly with no – human intervention. In this context, the present study conceptualizes Industry 6.0 as an emerging industrial paradigm characterized by a transition towards cognitive and AI-orchestrated production. The investigation draws on a bibliometric analysis of 55 scientific publications indexed in the Scopus database, as well as on a review of the nascent literature on Industry 6.0. On this basis, the study traces the evolution of the concept and identifies its principal technological and socio-institutional dimensions. The findings reveal a discernible shift in scholarly focus towards an AI-centric understanding of Industry 6.0, wherein artificial intelligence emerges as a key technological foundation, alongside autonomous cyber-physical systems, next-generation digital twins, advanced robotics, quantum technologies and hyperconnectivity. Building on the results obtained, the paper proposes a conceptualization of Industry 6.0 that comprises a technological core and a socio-institutional framework, the latter encompassing labour transformation, ethics, regulation, cybersecurity, sustainability and the imperative for a new social contract. The study further conceptualizes the evolving human role as a transition from Operator to Supervisor and, ultimately, to Strategist. In this sense, Industry 6.0 should not be understood merely as a technological successor to Industry 5.0, but rather as a broader transformation in which artificial intelligence increasingly steers industrial operations, while humans assume strategic, architectural and ethical functions.*

Keywords*: Industry 6.0, Industry 5.0, Human-centricity, Cognitive autonomy, Autonomous Artificial Intelligence, Lights-out factories*

JEL: O33, L60, M11, O31

1. Introduction

The evolution of manufacturing has progressed through several critical stages: from mechanization (Industry 1.0) and electrification (Industry 2.0) to computerization (Industry 3.0). In 2011, the inception of Industry 4.0 marked the era of digital connectivity, cyber-physical systems, the Internet of Things (IoT), and Big Data analytics (Kagermann, Wahlster, & Helbig, 2013).

In response to the technocratic nature of Industry 4.0, the European Commission officially framed Industry 5.0 in 2021 (Breque, De Nul, & Petridis, 2021). It established a paradigm built upon three value-driven pillars: Human-

centricity, Sustainability, and Resilience. Within this framework, the human element was re-centered in manufacturing through human-machine collaboration (via „cobots“).

However, the formulation of Industry 5.0 chronologically preceded the mass breakthrough of modern artificial intelligence – autonomous AI agents, generative systems, and cognitive decision-making algorithms. This creates a significant conceptual and practical paradox:

- The Industry 5.0 framework advocates for the operational return of humans alongside machines on the shop floor (Breque, De Nul, & Petridis, 2021).
- Market reality and global competitiveness drive the sector toward fully autonomous environments operating without human presence – so-called „Lights-out factories“ (Dark factories), with historical roots tracing back to early corporate efforts (Keller, 1989) and proven operational adoption by FANUC (Null & Caulfield, 2003).

Empirical practices from modern companies such as BYD, Xiaomi, and FANUC demonstrate that in high-precision and mass-production settings, the human factor remains a limiting bottleneck regarding speed, error rates, and operational costs. This friction between human-centric philosophy and autonomous AI reality necessitates a fundamental revision of current industrial concepts.

This paper **aims** to address this gap by conceptualizing the emerging industrial paradigm of Industry 6.0, defined by the transition from operational human-centricity toward cognitive autonomy in industrial systems. Drawing on a bibliometric analysis of the Scopus database and a review of the nascent Industry 6.0 literature, the paper maps the technological core and socio-institutional framework of this paradigm, illustrates its practical manifestation through the phenomenon of lights-out manufacturing, and proposes a redefinition of the human role – from operational executor to strategic and ethical architect of industrial systems.

2. Evolution of Industrial Paradigms (1.0 – 5.0) and the Emergence of the Conceptual Paradox

The evolution of manufacturing systems is not a simple linear sequence of incremental improvements, but a series of paradigm shifts defined by transformations in core technology drivers and operational philosophies. Establishing the necessity for Industry 6.0 requires a systematic analysis of the historical stages and the structural boundaries of the current model.

The evolutionary trajectory of industry encompasses five main transformation waves:

- **Industry 1.0 (~1784).** Initiated by mechanization powered by steam and water energy (e.g., Watt’s steam engine and early power looms). The human factor functioned strictly as manual physical labor.

- **Industry 2.0 (~1870).** Defined by the transition to mass production, electrification, and assembly lines (originated in Cincinnati slaughterhouses and perfected by Henry Ford).
- **Industry 3.0 (~1969).** Introduced computerization and automated control systems via early Programmable Logic Controllers. The human role shifted to system programming and monitoring.
- **Industry 4.0 (2011).** Officially launched at Hanover Messe, integrating Cyber-Physical Systems (CPS), Internet of Things (IoT), and Big Data analytics into the „Smart Factory" archetype.
- **Industry 5.0 (2021).** Formally established via the European Commission's framework (Breque, De Nul, & Petridis, 2021), prioritizing human-centricity, environmental sustainability, and collaborative robotics (cobots) under a *Human-with-the-loop* operational philosophy.

Table 1. Comparative Overview of Industrial Paradigms (1.0 – 5.0)

Industrial Phase	**Era / Framework**	**Primary Technology Driver**	**Role & Position of the Human Factor**	**Core Limitation / Operational Challenge**
Industry 1.0	~1784	Steam power, mechanization, and mechanical looms	**Manual labor executor** under harsh physical conditions	Low output capacity, slow throughput, heavy manual reliance
Industry 2.0	~1870	Electrification, assembly lines, and mass production	**Specialized line worker** executing repetitive shop-floor tasks	High physical fatigue, task monotony, zero product personalization
Industry 3.0	~1969	Computerization, PLCs, and early industrial robotics	**System operator and programmer** supervising fixed automation	Rigid algorithmic logic, lack of adaptive operational flexibility
Industry 4.0	2011	Cyber-Physical Systems (CPS), IoT, and Big Data	***Human-in-the-loop:*** Supervisor of interconnected systems	Technocratic isolation of workers and high architectural complexity
Industry 5.0	2021	Cobots, human-centricity, sustainability, resilience	***Human-with-the-loop:*** Physical collaborative partner alongside machines	Throughput bottlenecks and subjective human errors in ultra-precision setups

Source: compiled by the author.

A fundamental distinction between the first four industrial waves and Industry 5.0 lies in their underlying genesis. While paradigms 1.0 through 4.0 emerged as a direct consequence of organic technological pushes and market-driven imperatives for productivity – ranging from the steam engine to Cyber-

Physical Systems – Industry 5.0 was not spawned by a technological breakthrough, but rather by an administrative and policy directive of the European Commission. Formulated through a top-down approach, Industry 5.0 was conceived as a normative, value-based framework designed to humanize the digital transition and mitigate the technocratic imbalances of Industry 4.0. This institutional provenance explains the core operational paradox: because Industry 5.0 is dictated by socio-political values (human-centricity, sustainability, and resilience) rather than bottom-up manufacturing demand, its integration often collides with hard market realities and the economic efficiency of autonomous systems.

Despite its humanistic merits, the Industry 5.0 value framework faces a profound operational and conceptual paradox when confronted with market dynamics and autonomous cognitive AI:

- **Operational Efficiency Conflict.** In high-precision, semiconductor, and large-scale manufacturing, direct physical human intervention introduces micro-variability, fatigue, and throughput bottlenecks.
- **Economic Drive Toward Lights-Out Manufacturing.** The imperatives of cost minimization and uninterrupted 24/7 cycles accelerate the deployment of fully automated, unstaffed facilities („Lights-out factories“).
- **Misalignment of AI Capabilities.** While Industry 5.0 frames AI as a shop-floor assistant to manual labor, modern cognitive AI agents increasingly absorb real-time analytical and operational decision-making functions.

This friction exposes a critical research gap: *What will be the role of humans in the economy, and in particular in production, with the advent of generative artificial intelligence, allowing for the full automation of all business processes? Will factories without humans become commonplace, or will humans still find their place in the production system?* The answer to these questions is directly related to the conceptualization of Industry 6.0.

3. Conceptualizing Industry 6.0: Cognitive Autonomy and the Redefined Human Role

The term „Industry 6.0“ has entered scientific literature relatively recently and is still at an early stage of conceptual development. A search of the Scopus database using the keyword „Industry 6.0“ currently returns 55 indexed documents, with the first use of the term dating back to 2022. Pioneering in this respect is the article by Chourasia, Tyagi, Pandey, Walia, & Murtaza (2022), titled „Sustainability of Industry 6.0 in Global Perspective: Benefits and Challenges.“ The authors examine Industry 6.0 in the context of the changes brought about by the COVID-19 pandemic, noting that the crisis created new opportunities for manufacturing enterprises and service providers to develop capabilities for a fault-free environment, zero-defect production, and antifragility, as well as to increase production capacity in response to growing demand for personalized products and services. In this and several other early studies,

the primary emphasis is placed on diversity and inclusion (Doyle-Kent & Kapacek, 2023), sustainability (Almusaed, Yitmen, & Almssad, 2023), and cyber-physical systems and quantum technologies (Thirupathi, Bandari, K, & Gangula, 2024). Notably, these early conceptualizations of Industry 6.0 do not explicitly associate the concept with artificial intelligence or the transformative capabilities it enables. This is hardly surprising, as several of these studies were conducted before the emergence of ChatGPT, the first widely adopted generative AI chatbot, introduced by OpenAI on November 30, 2022. Consequently, they do not capture the unprecedented acceleration in generative AI development and its profound impact on manufacturing, industrial automation, and decision-making processes.

History demonstrates that every industrial revolution has been triggered by the emergence and widespread adoption of disruptive technologies. Following this historical trajectory, it can be argued that the transition to Industry 6.0 will likewise be driven by advances in artificial intelligence. This perspective is most explicitly articulated by Samuels (2024), who identifies AI as the primary technological catalyst of the next industrial era. His findings show that AI integration significantly enhances supply chain management by improving demand forecasting, inventory optimisation, and decision-making capabilities. Moreover, within the Industry 5.0 paradigm, AI strengthens human–machine collaboration, enables greater production customisation, and promotes sustainability through more efficient resource utilisation and reduced environmental impacts.

An even more comprehensive AI-driven vision of Industry 6.0 is presented by Lykov et al. (2025), who position artificial intelligence not merely as an enabling technology but as the foundational element of the new industrial paradigm. In their framework, AI underpins autonomous industrial systems, intelligent decision-making, self-optimising manufacturing processes, and adaptive industrial ecosystems. Consequently, Industry 6.0 represents a fundamental shift from the human-centric philosophy of Industry 5.0 toward an AI-driven paradigm, in which artificial intelligence assumes the role of the principal orchestrator of industrial operations while humans increasingly define strategic objectives, ethical boundaries, and governance principles.

This conceptual shift in the understanding of Industry 6.0 is also presented by Ivanov (2026). In contrast to earlier studies that consider artificial intelligence as one of several enabling technologies, Ivanov positions AI as the defining technological foundation of the next industrial revolution. He argues that the unprecedented capabilities of generative and agentic AI, together with their deep integration into manufacturing, logistics, and supply chains, fundamentally transform industrial systems and justify the emergence of a new industrial paradigm. Accordingly, Ivanov conceptualises Industry 6.0 as a *cyber-physical, digital twin-enabled value creation ecosystem built upon the technological foundations of Industry 4.0 and the viability-centred socio-ecological principles*

of Industry 5.0, while placing human–AI collaboration at its core. Within this framework, Industry 6.0 is characterised by the replacement of supervisory intellectual work – including reasoning, planning, and complex decision-making – through generative and agentic AI, whereas Industry 7.0 is expected to extend this transformation toward creative intellectual work.

Roshid, Waaje, and Karim (2025) conducted a bibliometric analysis based on 26 publications indexed in the Scopus database to examine the emerging research landscape of Industry 6.0. Their findings reveal that the current literature is structured around several major thematic areas, including advanced technologies such as artificial intelligence, quantum computing, and robotics aimed at enabling hyper-personalisation and zero-waste manufacturing, circular economy principles and resource efficiency, as well as human–machine integration extending the human-centric paradigm of Industry 5.0. In addition, the authors identify significant challenges associated with the development of Industry 6.0, particularly regarding technological infrastructure, ethical considerations, and the skills required by the future workforce. They conclude that Industry 6.0 remains an emerging and highly fragmented research field, characterised by conceptual uncertainty and the absence of a universally accepted definition.

These findings are further corroborated by our own bibliometric analysis, based on 55 publications from the Scopus database identified through a keyword search for „Industry 6.0." The results reveal an exponential growth trend in publications on the topic – from just 1 in 2022, through 3 in 2023 and 11 in 2024, to 24 in 2026 alone – demonstrating steadily increasing research interest in the concept. Keyword analysis shows that „Artificial Intelligence" is the second most frequent term after „Industry 6.0" itself, appearing in 23 of the 55 documents, followed by „Industry 4.0" (20) and „Industry 5.0" (15) – a result that confirms the thesis that, although the earliest conceptualizations of Industry 6.0 did not place AI at their center, the literature has quickly shifted toward an AI-centric framework. Other leading themes in the sample include sustainability („Sustainability" – 9, „Sustainable Development" – 9), smart manufacturing (7), circular economy (6), digital transformation (6), and digital twins (6).

An effective approach to conceptualizing Industry 6.0 is to partition the framework into a „technological core" and a „socio-institutional framework." This conceptual structure is visually mapped in Figure 1.

The former constitutes the technological pillar upon which Industry 6.0 is constructed. Currently, the most promising technologies driving industrial transformation include the following domains:

- *Artificial Intelligence serves as the core technology,* enabling the industrial transition from mere automation to true autonomy. This encompasses Generative AI for generating engineering designs and production scenarios, Agentic AI featuring autonomous agents that plan, execute, and monitor complex tasks, and, in a longer-term perspective, Artificial General Intelligence (AGI).

• *Autonomous Cyber-Physical Systems (ACPS)* represent an advanced evolution of Industry 4.0 concepts, incorporating intelligent machinery, autonomous mobile robots, collaborative robots (cobots), swarm robotics, and autonomous manufacturing cells. The fundamental distinction lies in the shift where Industry 4.0 relied on machines executing pre-programmed tasks, whereas Industry 6.0 enables systems to autonomously analyze context and determine optimal actions.

• *Next-Generation Digital Twins* expand beyond individual machine models to encompass enterprise-wide digital twins, supply chain digital twins, product lifecycle digital twins, and full-ecosystem digital twins. The integration of digital twins with artificial intelligence yields predictive and autonomous decision-making systems.

• *Robotics and Physical Autonomy* – including humanoid robots, autonomous mobile robots (AMRs), drones, and intelligent manufacturing systems – facilitate the physical execution of AI-generated decisions.

• *Quantum Technologies* - may not serve as the primary short-term driver, but they represent a critical element through quantum computing, quantum optimization, and quantum communication, with applications spanning complex system optimization, logistics, materials science, and cryptography.

• *Hyperconnectivity and Intelligent Infrastructure* underpin this technological foundation through 6G networks, the Industrial Internet of Everything (IIoE), edge computing, cloud computing, and blockchain technology to ensure operational trust and traceability.

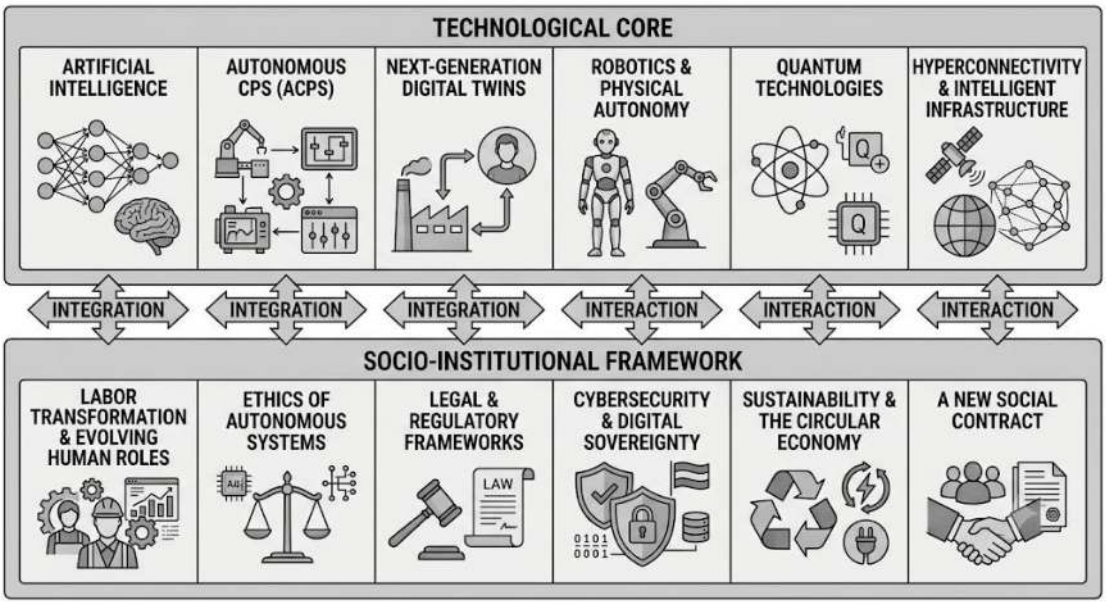

Figure 1. Industry 6.0 Conceptual Framework: Technological Core and Socio-Institutional Framework

Source: created with ChatGPT, based on the author's conceptual design

The most critical discussions surrounding Industry 6.0 pertain not so much to its technological core, but rather to its *socio-institutional framework*. The risk of human displacement not only from operational production – as already evidenced by fully automated „lights-out“ factories operated by pioneers such as Fanuc, BYD, and Xiaomi – but also from core business and managerial processes presents severe challenges for policymakers and regulatory bodies. On the one hand, Industry 6.0 carries the potential for widespread structural unemployment. On the other hand, a fundamental economic question arises: who will consume the produced goods and services if the population lacks primary income? It is precisely this dilemma that drives the growing academic and practical interest in concepts such as universal basic income. Under these conditions, the role of human capital undergoes a fundamental redefinition. Human functions are increasingly shifting toward Artificial Intelligence (AI) oversight, strategic planning, and the resolution of ethical dilemmas. In this context, the socio-institutional framework of Industry 6.0 encompasses the following key domains:

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- *Labor Transformation and Evolving Human Roles*. The transformation of labor addresses the fundamental question of what unique functions humans retain when AI assumes cognitive tasks. This involves replacing routine cognitive labor, managing the rapid evolution of occupations, acquiring novel AI competencies, emphasizing lifelong learning, and advancing human-AI collaboration. Within this evolution, human agency progresses through three distinct stages, transforming from an Operator to a Supervisor, and ultimately to a Strategist.
- *Ethics of Autonomous Systems.* The ethics of autonomous systems raises critical questions regarding legal and moral liability for AI-driven

decisions, the mitigation of algorithmic bias, the boundaries of autonomous decision-making in high-stakes scenarios, and the necessity of system transparency. Addressing these concerns relies on fundamental principles such as Explainable AI (XAI), Trustworthy AI, and mandatory human oversight through Human-in-the-Loop mechanisms.

- *Legal and Regulatory Frameworks.* Governance of next-generation technologies demands comprehensive legal and regulatory frameworks. Key areas include establishing liability for damages resulting from autonomous decisions, safeguarding intellectual property rights regarding generative AI, enforcing data governance, and setting regulatory standards for autonomous robotics. Regulatory frameworks in the European Union, such as the Artificial Intelligence Act (AI Act), Data Act, and Cyber Resilience Act, serve as primary benchmarks in this domain.
- *Cybersecurity and Digital Sovereignty*. Cybersecurity and digital sovereignty present new challenges, as security threats in Industry 6.0 target autonomous decision-making systems rather than static data alone. Major risks include model manipulation through algorithmic poisoning, cyberattacks against digital twins, and the potential loss of control over autonomous agents.
- *Sustainability and the Circular Economy.* Building upon the human-centric and ecological principles of Industry 5.0, sustainability and the circular economy expand to emphasize net-zero production operations, optimized resource efficiency, green energy integration, circular economy principles, and resilient supply chains.
- *A New Social Contract.* A new social contract serves as the foundational pillar for this systemic transformation. It addresses structural questions regarding the equitable distribution of economic value generated by AI, the prevention of hyper-concentration of technological power, and the guarantee of universal access to advanced AI infrastructure.

The architectural transition from Industry 4.0 and 5.0 to Industry 6.0 is fundamentally characterized by the shift from mechanical and digital automation toward cognitive autonomy. While previous paradigms integrated cyber-physical systems to execute pre-programmed tasks or enhance human-machine collaboration, Industry 6.0 introduces autonomous systems capable of contextual reasoning, self-optimization, and real-time operational execution. This advancement in cognitive autonomy fundamentally alters the organization of labor within the production process across several interconnected dimensions.

First, cognitive autonomy penetrates higher-level operational decision-making, significantly disrupting both physical and routine cognitive production tasks. Whereas traditional automation primarily replaced routine manual labor, Autonomous Cyber-Physical Systems and Agentic AI in Industry 6.0 absorb tasks previously reserved for engineers and floor managers. These include dynamic scheduling, predictive quality control, real-time supply chain re-routing, and generative process adaptation. Consequently, the shop floor evolves

into a self-governing ecosystem, diminishing the need for direct operational intervention.

Second, as algorithms manage real-time production mechanics, human capital undergoes a structural elevation rather than mere elimination. Human agency progresses from direct execution toward architectural oversight and maintenance, where humans step away from process control to focus on AI system engineering, model architecture, data governance, continuous validation, and fine-tuning to combat algorithmic drift and system degradation. Simultaneously, human effort shifts from routine optimization toward strategic innovation, concentrating on non-algorithmic domains such as intuitive creativity, long-term vision, human-centered design, and complex stakeholder alignment. Furthermore, in scenarios characterized by high ambiguity, unprecedented environmental disruptions („black swan“ events), or ethical paradoxes, human judgment remains the indispensable decision-making anchor.

Finally, this rapid redefinition of production labor exposes a critical lag in socio-institutional readiness. The displacement of both manual and cognitive routine labor creates a profound risk of structural skill mismatches. To prevent systemic labor polarization, institutional frameworks must proactively drive the modernization of educational curricula focused on AI literacy and systems thinking, establish sustainable public-private frameworks for lifelong learning, and develop adaptive social policies – including mechanisms such as universal basic income – to ensure an equitable distribution of economic value generated by this industrial transformation.

4. **Conclusion**

While most companies have not yet implemented Industry 4.0, and Industry 5.0 is still developing, scientific literature is already talking about 6.0, and even about Industry 7.0. This apparent paradox – conceptual acceleration outpacing practical adoption – is not a contradiction but a reflection of how deeply generative and agentic AI has already begun to reshape the trajectory of industrial thought, even before the previous paradigm has been fully absorbed by practice.

The analysis presented in this paper demonstrates that the transition from Industry 4.0 to 5.0 was fundamentally different in nature from all prior industrial revolutions: it was not driven by an organic technological breakthrough but imposed as a top-down, policy-driven framework by the European Commission. This institutional origin is precisely what generates the operational paradox at the heart of Industry 5.0 – a humanistic, human-with-the-loop philosophy colliding with the economic logic of lights-out manufacturing and the rapidly expanding capabilities of autonomous cognitive AI. It is this unresolved tension, rather than a single disruptive technology, that has created the conceptual space in which Industry 6.0 has emerged.

The bibliometric evidence gathered here confirms that Industry 6.0 remains an early-stage, fragmented, and contested construct, yet one undergoing rapid consolidation around artificial intelligence as its defining technological foundation. What began in 2022 as a concept centered on sustainability, diversity, and antifragility has, within just a few years, shifted decisively toward an AI-centric paradigm, in which generative and agentic AI are positioned not as auxiliary tools but as the principal orchestrators of industrial decision-making. The proposed framework – distinguishing a technological core (AI, autonomous cyber-physical systems, next-generation digital twins, advanced robotics, quantum technologies, hyperconnectivity) from a socio-institutional framework (labor transformation, ethics of autonomy, legal and regulatory structures, cybersecurity, sustainability, and a new social contract) – offers a structured lens through which the true novelty of Industry 6.0 can be assessed: not merely as an incremental technological upgrade, but as a redefinition of the human role in production itself.

This redefinition unfolds along a clear trajectory – from Operator, to Supervisor, to Strategist – in which humans progressively withdraw from routine execution and even routine oversight, and instead concentrate on system architecture, ethical governance, crisis resolution, and long-term strategic direction. Yet this evolution is not without risk. The same forces that promise productivity gains, zero-defect manufacturing, and resilient supply chains also raise the specter of structural unemployment, algorithmic opacity, and a dangerous lag between technological capability and institutional readiness. The recurring appearance of concepts such as universal basic income in this emerging literature is symptomatic of a deeper, unresolved question: if autonomous systems increasingly generate economic value without proportional human labor input, what social contract will govern its distribution?

Industry 6.0, therefore, should not be understood merely as a successor label to Industry 5.0, but as the conceptual space in which the industrial and economic consequences of autonomous AI are being confronted directly – years, in some cases, before the technologies themselves are fully deployed at scale. Whether this anticipatory theorizing will translate into coherent policy and educational reform, or whether it will remain, as Industry 5.0 did, a top-down normative aspiration running ahead of market reality, remains an open question – and one that future research, particularly empirical and industry-specific studies, will need to address as the transition from human-with-the-loop to AI-orchestrated production continues to accelerate. While most companies have not yet implemented Industry 4.0, and Industry 5.0 is still developing, scientific literature is already talking about 6.0., а дори и за индустрия 7,0.

Notes: *During the preparation of this work the author used Claude AI for translation and language editing purposes. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the content of the published article.*

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