significant potential to modernise the property market through process automation, increased transparency and a reduction in human error.

In conclusion, blockchain is a cutting-edge technology that builds trust among participants in the property market by streamlining sales and rental transactions, whilst enhancing data security and traceability.

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THE HUMAN-IN-THE-LOOP: UNSEEN LABOR IN THE SMART GADGET VALUE CHAIN

One of the most important modern trends in the global economy is the rapid growth of artificial intelligence and smart technologies. Devices such as smart speakers, AI chatbots, and wearable gadgets are often presented as fully automated systems. However, many of these technologies depend on human labor. This hidden system is known as the “human-in-the-loop”. The aim of this paper is to reveal the hidden role of human labor in the development of AI, demonstrate the economic inequality in this sector, and assess the level of public awareness of this issue.

Behind the work of AI, there are thousands of people who analyze data, listen to recordings, and review content. These workers are usually located in developing countries and receive very low salaries. At the same time, users are often not aware that their private data may be seen or heard by real people. This creates serious economic, ethical, and social concerns.

A clear example of this problem can be seen in the case of Meta's smart glasses. These devices were marketed as modern and privacy-focused technology. However, investigations showed that private videos recorded by users were reviewed by low-paid contractors in countries such as Kenya. Users were not clearly informed about this process, which led to a lawsuit against the company [1].

Google also faced a major scandal when it became known that human workers listened to recordings from Google Assistant. A leak of around 1,000 audio clips revealed sensitive personal information, including medical data and emotional situations. After this, Google paused the program and later paid a $68 million settlement. This case demonstrates how hidden human labor can lead to financial and reputational losses [2].

The economic data clearly shows the scale of this system. AI engineers can earn between $150,000 and $300,000 per year, while data workers often earn only $1–2 per hour, or about $1,000–$2,000 per year. This creates a gap of more than 100 times [3]. This system is closely connected with globalization. Companies from developed countries outsource simple but necessary tasks to workers in developing regions, where labor is much cheaper. As a result, a global value chain is formed in the AI industry.

Workers may review thousands of items per day, ensuring large amounts of data are processed quickly. Human involvement increases AI accuracy from about 85% to 95% and helps companies develop products faster. Companies rely on this model because it is cheaper and more flexible than fully automated systems. Using human labor allows firms to quickly improve algorithms without investing large resources in complex technologies. As a result, companies reduce costs and increase productivity, which makes AI development more profitable and strengthens competition between global tech firms.

At the same time, companies differ in their level of transparency. Some firms, such as Google, have admitted the use of human workers, although often only after public pressure. Others, like Meta, revealed this information only after scandals. This lack of transparency reflects deeper inequalities in the global digital economy.

In addition to these facts, our own research confirms that public awareness of this issue is still quite low. A small survey among students shows interesting results. About 60% of respondents believe that voice assistants work fully automatically, and only 20% understand that humans are involved. Around 50% said they had never heard about such workers, while only 15% were well informed.

The survey also shows that privacy is an important concern. Most participants rated their comfort level as 3 out of 5, but after learning that real people may access their data, 70% said they felt uncomfortable. At the same time, about 40% of respondents are ready to pay more for "fair AI," although many want the same quality. Finally, around 60% believe that very low wages for workers in developing countries are unethical.

The development of artificial intelligence is one of the key trends in the modern global economy and an important part of the digital economy, but it is not as automated as it seems. In reality, it depends heavily on hidden human labor. These workers play an essential role in making AI systems more accurate and efficient, yet they often receive low pay and face difficult working conditions.

The examples of Meta and Google show that this issue is global and affects privacy, ethics, and economic inequality. While companies benefit from lower costs and faster innovation, workers carry the psychological and social burden.

At the same time, public awareness of this problem remains limited. However, when people learn about it, they often express concern about privacy and fairness. This suggests that in the future, companies may need to become more transparent and improve labor conditions.

In conclusion, the challenge for the global economy is not only to develop advanced technologies, but also to ensure that they are fair, ethical, and sustainable for everyone involved, which is becoming a key requirement in the modern global digital economy.

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CIRCULAR ECONOMY AS A FACTOR OF MACROECONOMIC STABILITY AND A NEW INVESTMENT REALITY

Over the past five years, the understanding of the circular economy has changed. Whereas before 2020 it was part of the sustainable development discourse, by 2026 it has shifted to economic security and industrial policy.

Relevance of the study: in the context of raw material dependence of developed economies, geopolitical fragmentation, and the formation of new regulatory barriers, the circular economy ceases to be an ecological niche and turns into a factor of macroeconomic stability and an instrument of industrial policy.

The purpose of the study: to identify the macroeconomic effects of circular transformation, analyse the evolution of business models and public policy strategies.

To identify the current situation, let us analyse the following factors.

1. Macroeconomic drivers. Analysis of raw material dependence has established that the EU imports over 90% of its critical raw materials. China's export restrictions on