Is AI Set to Fuel Massive Semiconductor Demand!?

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Sam Altman, the co-founder of OpenAI, recently announced his intention to raise US$5 to US$7 trillion to reshape the semiconductor supply chain, aiming to address the chip shortage issue faced in the development of artificial intelligence (AI). Altman's engagement with relevant governments, investors, and semiconductor industry stakeholders underscores the significance of this initiative. This article explores the potential impacts and consequences of Altman's plan on the semiconductor industry and the broader AI development landscape, addressing both challenges and opportunities.

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1.BACKGROUND

Recent reports from The Wall Street Journal have revealed Sam Altman's intention to raise between US$5 to US$7 trillion to overhaul the semiconductor supply chain. The primary aim of this initiative is to address the severe chip shortages that are impeding the progress of AI development. Altman has reportedly engaged with various stakeholders, including governments, investors, and key players in the semiconductor industry, in pursuit of this ambitious goal. During the inauguration of TSMC's Kumamoto factory in Japan, TSMC founder Morris Chang discussed a significant increase in demand for production capacity driven by AI, hinting at potential collaboration with Altman. Beyond TSMC, Altman is said to have reached out to officials from the United Arab Emirates, representatives from Intel, semiconductor companies in South Korea, and even Singapore's sovereign wealth fund Temasek Holdings, suggesting broad involvement in this transformative project.

2. THREE BASIC FACTORS OF AI DEVELOPMENT

The rapid advancement of AI has triggered an increased demand for semiconductors, underpinned by three fundamental factors: algorithms, data, and computing power. Despite considerable progress in algorithm development over decades, the acceleration of technological advancements has facilitated the rapid expansion of AI applications. Similarly, advancements in data availability, from the Internet to the Internet of Things (IoT), have provided ample support for AI model training. However, the crux lies in computing power, primarily driven by semiconductor technology advancements. While industry leaders have pushed semiconductor process technology forward, downstream applications have continuously offset computing power gains, necessitating further improvements and increased production capacity. Altman's ambitious project aims to address this demand surge, reflecting the urgent need for semiconductor innovation. This is the reason why Altman proposed such an "audacious" project.

3. CHALLENGES AND OPPORTUNITIES

The underlying assumption of this inference rests on the premise that AI applications can continue to be realized rather than becoming the next tech bubble. Indeed, the recent development of AI differs significantly from past waves of tech bubbles. Relevant applications have been successively implemented and commercialized. Lessons from past tech bubbles, such as the dot-com crash in 2000, should not be forgotten. The capital market often anticipates future profits, and there is a risk of excessive anticipation. When companies boldly engage in highly leveraged investments, expectations of profitability should still be grounded in reality. This is also a significant challenge that the current flourishing of AI will face. Whether it's industry leaders like OpenAI, which can make huge investments in semiconductor fabs, or other companies focusing on AI-based services, the challenge lies in how to convert network traffic into tangible profits, testing the business model innovation and execution capabilities of companies.

Another external constraint within this wave of AI-driven semiconductor computing power demand is the issue of environmental impact and energy consumption. Under the enormous computing power demand, not only semiconductor computing support is needed, but also a large amount of electricity is required to drive the operation of computing power. In addition, heat dissipation demand generated by a large amount of computations also partly relies on electricity assistance. Not to mention that to manufacture semiconductor chips using advanced processes, a large amount of resources such as electricity and water are also required.

However, whether it is the high energy consumption demand brought about by the large-scale expansion of semiconductor manufacturing or the electricity demand brought about by a large number of computations, it will pose a challenge to the goal of achieving net-zero emissions. Of course, the advancement of semiconductor manufacturing processes and breakthroughs in end-products like servers and data centers may help mitigate the related resource consumption issues. However, under the rapid and massive development of global AI and semiconductors, it is still challenging to avoid the issue of balancing technological and environmental development. These related issues are likely to become the key to whether the semiconductor trend driven by AI can achieve long-term sustainable development, requiring interdisciplinary experts, scholars, and industry players to jointly invest and consider holistic development strategies from a macro perspective.

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