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Combining Financial Models with Industry 5.0 and Intelligent Automation: Financial Methods Feed back Technological Innovation

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Abstract: Many majors are currently trending towards integrating and innovating with one another. Today in the 21st century,in order to discover significant value in the prominent sectors of high-tech and finance, it is vital to integrate them. This article employs the method of case analysis to study the development of different high-tech companies worldwide and their incorporation into business. It turns out that in the current global context, the combination of technology and finance is undoubtedly an efficient and resource-saving developmental approach. Moreover, it is also the driving force for the emergence of large enterprises. This essay employs literature analysis and case analysis to examine three instances of utilizing financial approaches to support the technological revolution. The companies mentioned include Tesla, General Motors, Siemens and OPenAI. By analyzing the synergy between emerging high-tech enterprises and their business models, we can gain insights into the future trajectory and utilization of science and technology. This understanding helps us explore how business drives technological advancements and innovation, offering valuable research perspectives for the future growth of both technology and business.

Keywords: High-tech, Financial business model, Enterprise development

1. Introduction

The advancement of global technology and financehas brought about significant transformations in our lives. While numerous advanced industrial sectors have arisen, their operational and maintenance expenses are substantial, and the prices associated with innovation and advancement are considerably greater. Numerous tiny enterprises or individuals may possess the capacity to explore and innovate novel technologies, yet are compelled to relinquish their efforts as a result of environmental and economic constraints. This outcome is not desirable.

The advent of Industry 5.0 and intelligent automation has significantly emancipated humanity. The integration of information and physical systemshas been further enhanced by Industry 5.0 and the increasing use of network applications, particularly “Internet +”, resulting in the establishment of a socio-physical information system. The fundamental components of this system of virtual artificial systems and operating modes that will lead industry into a parallel era [1].

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Artificial intelligence and big data have enhanced and freed humans from their fundamental cognitive tasks, enabling them to dedicate their attention to more complex and demanding research. Europe has introduced the concept of Industry 5.0 to describe the long-term objective of industrial development, which involves the integration of advanced information technology with various industries. This concept is seen as a necessary solution for humanity to achieve social prosperity and stability. ATWELL asserts that technology should handle tedious and repetitive activities, while humans should be given the opportunity to engage in creative activity. Implementing this will not only enable employees to take on additional duties but also enhance oversight of the industrial system, ultimately enhancing overall production quality. PASCHEK and other researchers conducted an analysis and assessment of the potential effects of Industry 5.0 on businesses. They interviewed experts and business representatives and highlighted the significant value that Industry 5.0 will bring to the industry and businesses. They urged enterprises to begin making preparations. Industry 5.0 represents the transition from widespread automation to empowering industrial workers and achieving product customization. which signifies the next level of industrial development. According to NAHAVANDI et al., Industry 5.0 is envisioned as a solution that prioritizes human involvement, with cooperative robots playing a significant role. They provide a specific example of a scenario where cooperative robots are utilized.

Through the research methods of literature analysis and case analysis, this article examines three cases of using financial methods to support the technological revolution [2]. The companies mentioned are Tesla, General Motors, Siemens and OPenAI. The fundamental purpose of scientific and technical advancement is to emancipate individuals. In such a historical background, in order to achieve significant advancements in the field of science and technology, it is necessary to have adequate financial resources to protect it. The concept of "feeding back the scientific and technological revolution through financial methods" is aimed at promoting the development of new technologies.

2. Case studies

2.1. Tesla

The first company to be analyzed is Tesla, originating from the United States. This corporation is an emerging high-tech company that operate in a wide range of industrial sectors. It possesses not only a comprehensive industrial ecological industry chain and assembly lines, but also a fully integrated company system. Not only does it encompass aircraft, but it also encompasses the automobile sector, medical care, biology, and electronic chip computers, all of which are involved in various fields, including Tesla’s new energy vehicles, Starlink and rocket recycling, human brain digitization, etc. The primary factor for Tesla's swift ascent is not only its cutting-edge technology, but also the fact that Tesla is a company with a strong economic foundation. New technologies are just one component of the Tesla Group's development. It possesses numerous lucrative divisions. The company can fund its research and development of new technologies using its robust financial resources. The strategy can be reduced as a cycle of capitalizing on current cash to develop technology and then utilizing the new technology to generate profits. Indeed, Tesla is employing diverse analogous business models and methodologies to sustain the organization.

There are two distinct phases to Tesla's development. First, Tesla itself is also using a modular financial model. Its various industries have formed a complete structure and are well integrated with business. For example, the Tesla automobile production line not only has high-precision production capabilities, but it also has modular construction. Building a production line will consume a lot of money, but subsequent production after completion will greatly reduce costs. Elon Musk adopts this business model to inject capital into his own company. This has the advantage of lowering

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maintenance costs. If there is a problem, people can stop and repair one part separately without delaying the production of the entire production line. Moreover, the modular production line can better restrain bidders from raising prices during the bidding process, which is a successful case of combining business ideas with industry. Secondly, Tesla already has a relatively strong economic foundation. Moreover, it owns Tesla cars that are selling well around the world. This gives Tesla the confidence to carry out research and development of new technologies. Existing funds and special features brought by Tesla's automobile production line gives Musk greater confidence in the development of many new technologies, and makes it very easy for Musk to face failure. It is known that the development of science is based on many failures, and no technology can succeed at one time. Some small technologies can be built on small failures, and everyone can bear them, but for those major inventions that across ages, their failures are also costly and difficult for ordinary people or companies to afford if there are no business methods to assist them, which, undoubtedly lengthened the scientific research cycle. Therefore, more people and capital investment are needed. At this time, if financial means are applied, companies can greatly increase their ability to withstand stress. For example, in Tesla's research on Starlink and rocket recovery projects, the technology of Tesla cars was used to continuously "replenish blood" for them. Moreover, the financial cost of a single rocket disaster is substantial, let alone the necessity of multiple rocket crashes to gather experience. This is a significant expenditure that has the potential to severely impact a company's financial stability. Is it true that only individuals who are wealthy can be relied upon to advance global development with their exceptional intellectual abilities? Once business models and science and technology are integrated, groundbreaking major inventions will no longer be restricted to large amounts of capital. It will enable individuals with average abilities but exceptional talent to achieve extraordinary feats.

2.2. General Motors Corporation of the United States and Siemens of Germany

The second type is General Electric Company of the United States and Siemens from Germany. They are distinguished by their authoritative positions in specific sectors, possession of cutting-edge technology and reputation, as well as their ownership of fundamental technologies. General Electric Company is US-based corporation with a workforce of 100 individuals. This company is a well-established global corporation that has been in operation for many years. Its business operations encompass a wide range of sectors, including services, advanced technology, and manufacturing. Specifically, it is involved in aerospace, engine production, and the fabrication of electrical equipment. Their typical approach is to engage in collaborations with other high-tech industries, leveraging their fundamental infrastructure technology. The field is based on the technology-technology paradigm, which involves utilizing current technologies in exchange for newly produced technologies. This approach facilitates the integration of new and old technologies and offers insights into the application of new technologies [3].

In companies like Siemens and General Motors, their possession of core technology is a significant advantage. Siemens maintains the technological advancement of its goods by ongoing innovation, ensuring excellent quality and strong sales performance in a highly competitive market. Siemens has intensified its research and development endeavors and placed significant emphasis on science and technology as part of its implementation of the science and technology development strategy. With the advent of the knowledge economy, scientific and technological knowledge has emerged as an important factor for enterprise value-added. Siemens attaches great importance to technological innovation, regards the level of scientific research as a symbol of competitive strength, and regards scientific research results as the source of benefits. Throughout the years, the corporation has allocated significant human resources, materials, and financial assets toward research and development [4]. Certain high-tech industries may possess advanced theoretical knowledge, although their manufacturing or fundamental technologies are falling behind. Coincidentally, Siemens is an

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example of such a case. The company has the most sophisticated basic technology and manufacturing capabilities, making it necessary for the high-tech industry to collaborate with such fundamental industry companies. Siemens General Motors America is unequivocally at the forefront of this industry, for example, China's high-speed rail construction, including some of China's latest high-speed rail [4]. The design criteria for vehicle design, track design and high-efficiency high-voltage electric energy technology cannot be met by the current basic track or vehicle construction. Currently, China and Siemens are collaborating, with China contributing innovative ideas and design sketches, while Siemens takes charge of the manufacturing process. Siemens might seize the opportunity to acquire knowledge of China's high-speed rail technology and leverage it for its own objectives.

It is well known that Siemens has a monopoly in the manufacturing field, with manufacturing precision and efficiency far exceeding those of its peers. Similar companies include General Motors from the United States, ASML from the Netherlands, and TSMC. In the field of computer chips, some companies may have exceptional chip designs, but they are unable to produce such high-precision chips and they must find other companies to manufacture these chips. Currently, foundry businesses have the option to utilize their high-precision production equipment in exchange for high-precision chip design, or they can employ it to enhance their own production technology, thus ensuring their consistent dominance in this manufacturing sector. ASML not only makes products for chip firms but also consistently acquires knowledge and enhances current technology, enabling it to uphold a monopoly in the sector. For example, Nvidia will soon become the new owner of Arm. Arm primarily possesses the intellectual property rights to the design of microprocessor cores. They grant licenses to customers, allowing them to manufacture microprocessors, microcontrollers, and other related products. The process of developing a chip's intellectual property (IP) is highly intricate and costly, necessitating substantial investment in engineering. The development of microprocessor IP is extremely expensive. In addition to the core, development also requires a hardware compiler. Regular maintenance of the compiler is required during semiconductor development rounds. Furthermore, it is necessary to investigate techniques that enable the central processing unit (CPU) to effectively communicate with various components of the chip, including memory, cache, and interfaces. Simultaneously, it is important to take into account any additional intellectual property possessed by the licensee, as well as the requirements for processor manufacture in the plant. These investments are substantial. Instead of the processor core being considered an intellectual property (IP), it can be better described as an interconnected ecosystem of components. If you manage to establish and dominate such a system, the firm will generate substantial profits. However, if you fail to do so, the expenses associated with maintaining technological progress will be exorbitant. Reports indicate that NVIDIA purchased Arm for a staggering sum of US$40 billion, highlighting Arm's remarkable achievement in this industry [5]. NVIDIA's acquisitions have positioned it significantly ahead of its competitors in the realm of artificial intelligence, solidifying its monopolistic status.

Original equipment manufacturer (OEM) businesses will actively pursue advancements in both new and existing technologies, hence creating chances for the implementation of innovative technologies. Typically, this can be categorized into two scenarios, where either new departments are established, such as Siemens' energy department or General Motors' new energy department. The integrated application of both new and ancient technology, in collaboration with emerging firms, is being utilized.

This collaboration is also a valuable business tool. The robust alliance enables them to concentrate solely on their respective domains, with the development department and manufacturing department carrying out their individual responsibilities, thereby avoiding any entanglement in fundamental technology. The complexity of innovating new technology has diminished. Emerging enterprises are not required to confront the challenges of fundamental manufacturing anew, but rather should

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concentrate solely on the exploration and advancement of novel technologies. It is evident that corporate collaboration expedites the advancement of new technology.

2.3. OpenAI

The third category comprises companies similar to OpenAI, which do not possess substantial capital or operate as monopolies. The business model involved in OpenAI includes the ABS model of technology as capital mortgage credit. The digital wave and artificial intelligence emerged in 2015, bringing revolutionary developments to human technology. Since OpenAI announced ChatGPT in November 2022, the development of generative artificial intelligence has ushered in explosive growth. Over the past few months, generative artificial intelligence has continued to push boundaries, enabling automated and intelligent generation of text, images, and audio. Not only that, but thanks to the rapid development of related technologies, the intelligence of large language models (LLM) currently on the market has made a qualitative leap. The best-performing among these products is GPT-4 (generative pre-training transformer-4), which is the latest model that OpenAI further optimizes and expands based on ChatGPT. Professor Dimitris utilized a mere two prompts, and GPT-4 produced outcomes that aligned with the sorting algorithm disclosed by DeepMind's AlphaDev in the scientific journal Nature.The amazing performance of GPT-4 triggered a strong response in the global artificial intelligence (AI) field, and also prompted many scholars to invest in LLM-related research. The development history of LLM is inseparable from the contributions of Google and OpenAI, as the leaders in the field of AI, Google and OpenAI have launched fierce competition on a global scale. All of them have deep AI research foundations and massive data resources, giving their overwhelming advantages in this field. Google first proposed the “Transformer” structure as the basic building block of LLM. Subsequently, LLM gradually evolved in three directions: encode-only, encode-decode, and decode-only. Google focuses on encode-only and encode-decode structures, and is far ahead at this stage. The proposed BERT (Bidirectional Encoder Representations from Transformers) model dominates almost all natural language processing fields. To match OpenAI's progress in the LLM competition, Google transferred Blue Shift, a team dedicated to LLM, to DeepMind, and subsequently combined Google Brain and DeepMind, two leading AI teams. Simultaneously, rival products Bard and PaLM-2, which serve as benchmarks for ChatGPT and GPT-4, were introduced. The emergence of ChatGPT not only triggered changes in the field of AI abroad, but also set off a craze in China. Domestic Internet giants and universities have flocked to this track and released their own ChatGPT-like models: Alibaba's Tongyi model, Baidu's Wenxin model, SenseTime's SenseChat, and wall-facing intelligence's Luca, etc. The emergence of these products relies on the huge private databases behind their publishers: Alibaba’s e-commerce logistics data, Baidu’s content retrieval data, SenseTime’s large-scale business data, and Zhihu’s question and answer data. Different from foreign countries that are committed to developing more intelligent language models, China pays more attention to the integration and layout of the industrial chain, and makes efforts in multiple fields such as chips, model bases, pretraining LLM, and intelligent applications o achieve balanced development of basic research and product applications[6].

Table 1: Projects or papers links of LLMs in different fields [7]

iFlytek Spark	https://xinghuo.xfyun.cn/
MathGPT	https://www.mathgpt.com/
SurgicalGPT	https://arxiv.org/pdf/2304.09974.pdf
ChatCAD	https://arxiv.org/pdf/2302.07257.pdf
Med-PaLM	https://arxiv.org/pdf/2305.09617.pdf

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Table 1: (continued).

Xuanyuan large model	https://github.com/Duxiaoman-DI/XuanYuan
BloombergGPT	https://arxiv.org/pdf/2303.17564.pdf
LawGPT	https://github.com/pengxiao-song/LaWGPT
ChatLaw	https://github.com/PKU-YuanGroup/ChatLaw
PromptAppGPT	https://github.com/mleoking/PromptAppGPT
HuggingGPT	https://arxiv.org/pdf/2303.17580.pdf
ChatGPT Academic	https://github.com/binary-husky/gpt_academic

Initially, OpenAI operated as a non-profit company, with one of its early founders, Samuel Harris Altman, possessing expertise in knowledge data and computer artificial intelligence. The initiation of human labor commences with the creation of tools, and production tools are crucial in the process of production. Computer programming languages and codes have consistently garnered significant attention as essential instruments in the realm of artificial intelligence production. The technological innovation showcased by Codex, a fundamental technical component of ChatGPT, represents a significant advancement in "production tools" [6], which brings about a paradigm shift in the provision of code production tools in the field of artificial intelligence. ChatGPT users will greatly benefit from this innovation. The machine dialogue model offers a novel technical approach to address the ethical concerns related to the governance of artificial intelligence [4]. Nevertheless, OpenAI encountered a predicament in its initial stages due to the absence of both financial and technological backing. The industry faced a challenging development trajectory and the constant risk of a potential capital chain rupture. His ascent might be viewed as a fundamental technology-capital paradigm.

OpenAI engaged in communication with specialists from Silicon Valley and leveraged its advanced technology as an asset, successfully attracting substantial investments from individuals such as Musk and entities from Silicon Valley. They immediately understood the groundbreaking nature of this new technology and offered either money or technical support. It is evident that once the fundamental technology is fully understood, it can be utilized as collateral for loans, similar to physical assets like as buildings or cars. This business concept provides individuals with increased prospects.

OpenAI needs both financial investment and technological resources to sustain its operations. Collectively, investors such as Tesla and Apple are ideal ones. They own not only a substantial quantity of wealth, but also an abundance of fundamental information and advanced technologies. A single investment can provide dual assistance, effectively addressing two objectives simultaneously.

The success of OpenAI is a testament to its ability to effectively integrate commercial ideas and procedures with advanced technology. Furthermore, it demonstrates the viability of integrating business and industry, as well as the compatibility of business with high-tech sectors. Applicable to several sectors.

3. Challenges and opportunities

Industry 5.0 is a highly complex procedure. The company's enhanced production capacity and efficiency are evident to everyone, but, the initial construction and research and development also serve as a test for the company's financial and technological prowess. Currently, the impediments to the advancement of Industry 5.0 primarily lie inside its own domain[8]. The threshold is too elevated

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and the expense of experimentation is substantial, yet, the advantages it yields are also significant and warrant investigation and study.

Currently, there is a significant lack of comprehensive knowledge among individuals regarding intelligent automation and Industry 5.0. The current development mostly centers on self-exploration. Currently, there is a lack of clarity regarding the integration of intelligent automation and Industry 5.0 with other industries. However, we are unable to do so. If you lack sufficient comprehension, it is advisable to abandon further exploration of this particular element. As we expedite the advancement of intelligent automation and Industry 5.0, it is crucial to aggressively investigate their applications and synergies.

In today's market, many companies are more inclined to integrate with technology, computer and other industries. They are willing to see and solve the current problem - insufficient technology reserves. They believe that as long as the technological research and development capabilities are strong enough, they can make up for the shortcomings in business choices, and this kind of thinking is precisely "thankless." If companies want to go forward in the longer term, the financial business model is the compass. Such a model requires a huge amount of energy to plan in the early stage, but the combination of business and technology often plays a huge role in the later stage, when the various departments of the enterprise have basically taken shape. IUnder such circumstances, few companies will spend a lot of time planning their business in the early stage. But without preparation in the early stage, it is difficult to find a model that suits the company later. These companies often cannot realize the importance of business model to the development of the enterprise.

Although there are many resistances to the combination of financial models and high-tech enterprises, it is also an opportunity for companies' development. Today, there are more emerged companies and enterprises, among which high-tech enterprises are springing up like mushrooms after a rain. Intelligent automation and Industry 5.0 are still in their early stages, presenting a favorable opportunity for business models to enter the market. The current market conditions are quite favorable. Thus, the robust alliance between the two parties is inevitably poised to become the prevailing trajectory of future development. In the future, new large firms will use a strategy of departmentalization, where distinct departments will be established to oversee certain areas such as market financial planning and technology research and development. The benefit of this is that the two entities cannot impede each other but can instead enhance each other. The business operation model is robust and promotes good health.

4. Conclusion

The advancement of high-tech frequently influences the allocation of financial resources in society, and the continual introduction of novel technologies consistently generates value. Many individuals tend to focus solely on the impact of new technology on social finance, while disregarding the influence of finance in fostering the development of new technology. In order for new advancements in science and technology to emerge, it is imperative that they arise from a multitude of unsuccessful attempts. Failure incurs additional expenses, while the availability of capital imposes restrictions on failure, creating an inherent contradiction. The process of inventing new technology necessitates a cost, which is why each time novel technology emerges, it holds great value. Developing new technology is a challenging process, but it is absolutely commendable for humans to confront and overcome problems. The fusion of money and science is the optimal trajectory. It enhances the exploitation of diverse societal resources and also stimulates and expedites the creation of new scientific advancements.

The deficiency of this paper lies in the absence of thorough empirical inquiry and scrutiny, as well as the insufficient level of depth in the research. If given the chance in the future, I will perform on-

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site inspections at the premises of the companies mentioned above. These findings will be more persuasive.

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