

Chapter 5

Impact of Advanced AI on Society

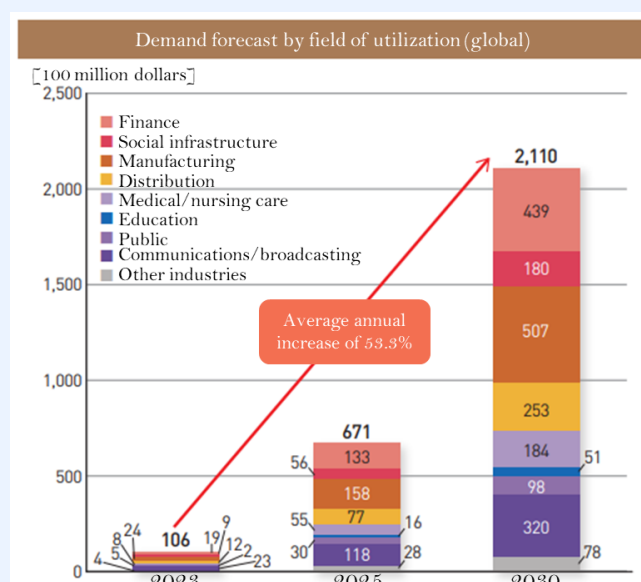
Utilization of generative AI technology and other advanced AI technology is expected to make progress in a wide range of industries and business types, including the public sector and the manufacturing industry (Figure 1-5-1). This is hoped to improve efficiency and productivity and to create new values. In addition, various analyses are being conducted on the impact of such utilization on industrial structures, work styles, and job markets, etc.¹ In such a situation, a variety of empirical research has started to look into the possible use of advanced AI technology in administrative affairs, administrative services, knowledge-intensive fields, etc. In addition, studies and demonstrations aimed at increasing the social

benefits of AI and ensuring that many more people can benefit from them are also progressing. This chapter introduces examples of initiatives implemented by the administrative authorities and private companies, etc. for utilizing advanced AI.

1. Initiatives toward use in administrative affairs

With regard to use of generative AI in work at central government ministries and agencies, the Digital Society Promotion Council formulated the “Agreement on Operational Use of ChatGPT and Other Generative AI.” While assuming that risk management is individually conducted according to the security policy of each ministry or agency, appropriate utilization is carried out, while taking

■ Figure 1-5-1/Demand forecast by field of utilization of generative AI



Source: JEITA, “Trends Survey of Focused Areas 2023” (December 2023).

¹ OECD (2023), “OECD Employment Outlook 2023: Artificial Intelligence and the Labour Market”; Economic and Social Research Institute, Cabinet Office (March 2024), “Jinkō chinō tō no hatten ga rōdōshijō ni oyobosu eikyō ni kansuru sābei” (Survey on the impact of the development of artificial intelligence, etc. on the labor market); Mizuho Industry Research (2023), “Mizuho Industry Research, Vol.74, No.2, [Innovative Technology Series] Trends in Generative AI and Its Impact on Industry: How Does Generative AI Change Industry?”; McKinsey & Company (June 2023), “The economic potential of generative AI: The next productivity frontier,” etc.

into account the trends in discussions over various issues of and ideal regulations for generative AI. The Digital Agency conducted legislative affairs assistance experiments using generative AI from June to October 2023, and held a “Workshop on Leveraging Generative AI to Promote Work Style Reform” together with the Cabinet Bureau of Personnel Affairs in June 2023. Through these and other activities, the Digital Agency advances studies and experimental initiatives for increasing the efficiency of administrative management and improving the quality of administrative services through generative AI.

Local governments have also started to develop guidelines and conduct experimental initiatives for using generative AI. For example, Tokyo Metropolitan Government created “Guidelines for utilization of text generative AI” for its officials in August 2023, and developed an environment in which Microsoft’s services can be used at work.¹ It also shares examples of utilization cases,² and advances initiatives for utilization that contribute to increasing the efficiency and improving the quality of work. In addition, in October 2023, NEC Corporation (NEC) concluded an agreement with Sagami-hara City in Kanagawa Prefecture for utilization of NEC’s LLM in local government operations. While making individual adjustments, etc. by using Sagami-hara City’s knowledge, NEC built an LLM specializing in Sagami-hara City’s local government operations, and started its demonstration experiment in November 2023.³

2. Initiatives for utilization in administrative services

Experimental initiatives for use of advanced AI that contributes to improving the convenience for administrative service users have already started as well. For instance, the “AI Lab” and “GovTech Development Center” of CyberAgent, Inc. and the University of Tokyo Market Design Center started a demonstration experiment for social implementation of a chatbot using generative AI for ministries, agencies, and local governments in November 2023. As the first initiative, with the cooperation of Saga City, Saga Prefecture, they conducted a demonstration experiment of a chatbot using generative AI, which assists people who come to the child-rearing support counter to enroll their child in a childcare facility.⁴

3. Initiatives for utilization in knowledge-intensive fields

Initiatives for utilization of advanced AI in knowledge-intensive fields, such as medical care and finance, are also progressing. For example, the National Institutes of Biomedical Innovation, Health and Nutrition has launched development of a platform system that supports medical care settings, such as a medical interview system that utilizes generative AI.⁵

Meanwhile, Hitachi, Ltd. has launched a demonstration experiment on the use of generative AI in integrated system operation management to improve operational efficiency and automation. Hitachi is verifying the accuracy of the responses of the generative AI, assuming

¹ Tokyo Metropolitan Government, “Regarding formulation of ‘Guidelines for utilization of text generative AI.’” <https://www.metro.tokyo.lg.jp/tosei/hodohappyo/press/2023/08/23/14.html>

² Tokyo Metropolitan Government, “Regarding publication of ‘Case examples of utilization of text generative AI, full of ideas from the metropolitan government officials.’” <https://www.metro.tokyo.lg.jp/tosei/hodohappyo/press/2024/01/30/22.html>

³ NEC Corporation, “NEC starts joint verification with Sagami-hara City for use of generative AI: Efficiency improvement of operations is verified with NEC’s LLM trained with data held by Sagami-hara City.” https://jpn.nec.com/press/202310/20231020_02.html

⁴ The University of Tokyo Market Design Center, “AI Lab and GovTech Development Center of CyberAgent, Inc. starts a demonstration experiment for social implementation of a chatbot using generative AI targeting central and local government offices.” <https://www.mdc.e-u-tokyo.ac.jp/2023/12/19/ca-chatbot/>

⁵ National Institutes of Biomedical Innovation, Health and Nutrition, “Cross-ministerial Strategic Innovation Promotion Program: Innovative AI Hospital System.” <https://www.nibiohn.go.jp/en/sip/>

operators can efficiently respond to messages that occur during system monitoring, by using a generative AI assistant that allows easy utilization of generative AI in an interactive format.¹

AI has started to be used also in automobile design. Toyota Research Institute. (TRI) develops quick and efficient design techniques using generative AI. For example, they announced that, if a designer inputs conditions (prompts) by text, such as “sleek,” “modern,” etc., the system can generate image generative AI in the direction of optimizing quantitative performance indicators, such as air resistance² (Figure 1-5-2).

In addition, TRI announced a breakthrough generative AI approach based on Diffusion Policy to quickly and confidently teach robots new, dexterous skills. Such approach significantly improves robot utility and is a step towards building “Large Behavior Models (LBMs)” for robots. TRI has already taught robots a large number of difficult, dexterous skills, including pouring liquids, using tools, and manipulating deformable objects without writing a single line of

new code.³

4. Initiatives for further utilization

What should be done to increase the social benefits of AI and ensure that many more people benefit from them?

In December 2023, the Digital Agency compiled the “Action Plan for Public-Private Data Development and Collaboration in the Era of AI,” setting forth that, in order to deal with the rapid progress of generative AI, considerations will be made on matters including opening up government-held data that contributes to the training of generative AI.

In addition, as services with interfaces that allow use by non-experts, such as conversational generative AI, became widely available, the so-called “AI democratization” has been occurring, and AI is becoming a familiar technology which anyone can use. Under such circumstances, the importance of literacy education has been pointed out, which enables not only AI system developers, but also technology/service users in a wide range of generations and positions, to take responsible actions, while recognizing the AI’s characteristics such as its complexity and its black box nature, and being aware of the possibility of intentional abuse.⁴

In some of the “generative AI pilot schools”⁵ designated by MEXT in FY2023, there were initiatives in which students in junior high school technology classes created original chatbots using generative AI, and experienced first-hand how

■ Figure 1-5-2/Car body design using generative AI

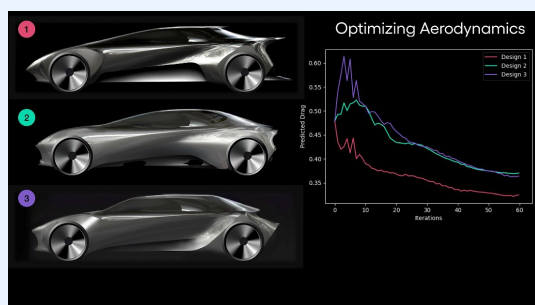


Photo courtesy of Toyota Research Institute.

- 1 Hitachi, Ltd. “Hitachi started a demonstration experiment in integrated system operations management ‘JP1 Cloud Service’ for improvement of operational efficiency and automation by using generative AI: the accuracy of the responses of generative AI was verified for increasing the efficiency of failure handling.” <https://www.hitachi.co.jp/Prod/comp/soft1/jp1/notice/2024/0201.html>
- 2 Toyota Research Institute, “Toyota Research Institute Unveils New Generative AI Technique for Vehicle Design.” <https://www.tri.global/news/toyota-research-institute-unveils-new-generative-ai-technique-vehicle-design>
- 3 Toyota Research Institute, “Toyota Research Institute Unveils Breakthrough in Teaching Robots New Behaviors.” <https://www.tri.global/news/toyota-research-institute-unveils-breakthrough-teaching-robots-new-behaviors>
- 4 *Supra* AI Strategic Council (2023), “Tentative Summary of AI Issues.”
- 5 MEXT, “Leading DX school: generative AI pilot school” project. https://leadingdxschool.mext.go.jp/ai_school/



useful generative AI is for creative problem solving, and also experimental initiatives such as experiencing “hallucinations” and understanding how they work while checking whether the

information is correct, and learning the necessity of having AI learn data in order to improve the accuracy of the generated information.

Column 1-6

Education and generative AI

ChatGPT, released by OpenAI (U.S.) in November 2022, dramatically increased its users due to adopting an easy-to-use interface. An extremely large number of people used it in a short period also in Japan. Such an environmental change that enables us to casually use AI has also rapidly affected the educational field.

In response to such a situation, MEXT issued an office communication, “Regarding future response to use of ChatGPT and other generative AI in school settings,” to boards of education, etc. in May 2023 for school staff to use as a reference when determining whether use of generative AI is appropriate.

After that, in July 2023, MEXT published “Tentative guidelines on the use of generative AI in the elementary and secondary educational phases.” These guidelines do not impose uniform obligations or restrictions on schools, but were tentatively compiled based on knowledge as of the end of June 2023. They indicate a tentative concept that “the determination will be made, in principle, based on whether the use of generative AI is effective for achieving the objective of educational activities or learning assessment in light of the children’s developmental stages and actual conditions.” Given that the National Curriculum Standards specify “information literacy” as qualities and competencies that form the basis of learning, these Guidelines require all schools to strengthen the development of “information literacy.” The Guidelines also set forth that an experimental initiative will be promoted in schools that can take sufficient measures against the concerns and risks of generative AI to accumulate knowledge. In FY2023, 52 schools in 37 municipalities nationwide were designated as generative AI pilot schools that use generative AI in their educational activities and school affairs, and knowledge is being accumulated (as of the end of March 2024).

Also in the higher educational phase, MEXT has composed an office communication “Handling generative AI in education at universities and colleges of technology” and informed the founders of each university and college of technology in July 2023. This document stated that “it is important for universities and colleges of technology to take the initiative in dealing with the educational handling of generative AI, including reviewing the content of guidelines, etc. in light of future changes in circumstances, in accordance with the actual state of education at each institution.” In order to serve as a reference for universities and colleges of technology, the document compiles and disseminates examples of situations where the use of generative AI is expected and points to consider, etc., and encourages each university to take voluntary initiatives.”

Column 1-7

Example of a column created by generative AI^{1, 2}

Please create a column about the “future of AI and science” for non-experts with about 500 words.



Artificial intelligence has been a buzzword for the past few years, and it's not going anywhere. It has infiltrated many aspects of our lives, from smartphones to social media to the way businesses operate. It is also quickly becoming a key player in scientific research, as it allows scientists to analyze and interpret data in ways that were previously impossible. The future of AI and science is a bright one, and it holds the potential to revolutionize the way we live and work. Here are some ways that AI is already being used in scientific research, and how it will continue to shape the future of science:

1. Data Analysis: AI can quickly and accurately analyze large amounts of data, which is a huge advantage in scientific research. For example, AI can be used to analyze the data from telescopes to identify new planets or galaxies. It can also be used to analyze medical data to identify patterns and trends that could lead to new treatments for diseases.

2. Predictive Modeling: AI can be used to create predictive models that can forecast outcomes and trends. For example, AI can be used to predict weather patterns, or to forecast the spread of diseases.

3. Drug Discovery: AI is being used to help discover new drugs and treatments for diseases like cancer and Alzheimer's. AI can quickly analyze large amounts of data to identify potential drug candidates, and can also be used to test the effectiveness of those drugs in a lab.

4. Robotics: AI is being used to develop robots that can perform tasks that are dangerous or difficult for humans. For example, AI-powered robots are being used in the medical field to perform surgeries, and in the military to defuse bombs.

5. Climate Change: AI is being used to analyze the data related to climate change, and to create models that can predict how climate change will affect different parts of the world.

As you can see, AI is already playing a crucial role in scientific research, and it will continue to shape the future of science in many ways. However, as with any new technology, there are also challenges and ethical considerations that need to be addressed. For example, AI algorithms can be biased if the data they are trained on is biased. It is important to ensure that AI is used in a way that is fair and unbiased, and that it is used to benefit all of humanity.

In conclusion, the future of AI and science is a bright one, and it holds the potential to revolutionize the way we live and work. However, it is important to use AI in a way that is ethical and unbiased, and that benefits all of humanity.



Please summarize the column above to about 200 words.



Artificial intelligence (AI) is playing an increasingly important role in scientific research, from data analysis and predictive modeling to drug discovery and robotics. AI can quickly and accurately analyze large amounts of data, identify patterns and trends, and create predictive models that can forecast outcomes and trends. It is being used to develop robots that can perform dangerous or difficult tasks, and to analyze data related to climate change. However, there are also challenges and ethical considerations that need to be addressed. AI algorithms can be biased if the data they are trained on is biased, and it is important to ensure that AI is used in a way that is fair and unbiased. It is also important to use AI in a way that benefits all of humanity, and to ensure that it is used ethically. In conclusion, the future of AI and science is a bright one, with the potential to revolutionize the way we live and work. However, it is important to use AI in a way that is ethical and unbiased, and that benefits all of humanity.

¹ Large language model “LLM-jp-3 172B beta2” with about 172 billion parameters developed by LLM-jp hosted by NII.
<https://huggingface.co/llm-jp/llm-jp-3-172b-beta2>

This model can also search a document that is the closest to the generated text from the training data.

² As the text is generated probabilistically, the same text is not necessarily generated even if the same prompt is given.