Tentative Translation

The Study Group on Competition Policy in Digital Markets

Algorithms/AI and Competition Policy

March 2021

Due to growing importance of algorithms/AI in business activities, based on changes in the business environment and competitive environment brought about by algorithms and AI, this report theoretically organized the challenges/issues on competition policy that may arise in relation to algorithms and AI, in order to contribute to the development of the competitive environment in digital fields.

Member List of the Study Group on Competition Policy in Digital Markets

Chairman	YANAGAWA Noriyuki	Professor, Graduate School of Economics, the University of Tokyo
Deputy Chairman	NAKAGAWA Hiroshi	Team Leader for AI Utilization in Society and Legal System Team, RIKEN Center for Advanced Intelligence Project
	ISHII Kaori	Professor, Faculty of Global Informatics, Chuo University
	OKINA Yuri	Chairperson of the Institute, Japan Research Institute
	KURODA Toshifumi	Associate Professor, Faculty of Economics, Tokyo Keizai University
	SAKIMURA Natsuhiko	Executive Partner, Tokyo Digital Ideas, Co., Ltd.
	TANAKA Michiaki	Specially Appointed Professor, Graduate School of Business Administration Field of Study: Business Administration, Rikkyo University
	TSUCHIDA Kazuhiro	Professor, School of Law, Waseda University
	WAKUI Masako	Professor, Graduate School of Law, Kyoto University

[As of March 8, 2021]

The Study Group on Competition Policy in Digital Markets, Chronology of Discussions

Date of Holding, Etc.	Agenda	Presenter(s)
First Meeting July 29, 2020	・ Holding of "The Study Group on Competition Policy in Digital Markets" ・ Initiatives of the Japan Fair Trade Commission (the JFTC) in Digital Markets ・ Draft on Issues to Be Discussed	-
Second Meeting September 18	・ AI Technologies ・ Trends in AI Usage	NAKAGAWA Hiroshi (the Study Group Member) KOBAYASHI Akiko, Senior Researcher, ICT/Financial Unit, Yano Research Institute Ltd.
Third Meeting October 30	・ Algorithms/AI and Collusion	AIZEKI Tsudoi, COO, Pricing Studio Co., Ltd. TOSA Kazuo, Professor, Faculty of Law, Konan University ARAI Koki, Professor, Faculty of Business, Kyoritsu Women's University
Fourth Meeting November 20	・ Algorithms/AI and Collusion	-
Fifth Meeting December 4	・ Algorithms/AI and Unilateral Conducts: Personalized Pricing	FUCHIKAWA Kazuhiko, Associate Professor, Graduate School of Law, Osaka City University MATSUSHIMA Noriaki, Professor, Institute of Social and Economic Research, Osaka University
Sixth Meeting January 15, 2021	・ Algorithms/AI and Unilateral Conducts: Ranking Manipulation	WAKUI Masako (the Study Group Member) OZAWA Eisaku, Director, PricewaterhouseCoopers Aarata LLC
Seventh Meeting February 8	・ Competitive Advantage Brought About by Algorithms/AI (Perspective of Data and AI Technology Stack) ・ Report on the Study Group on Competition Policy in Digital Markets (Preliminary Draft)	OGAWA Satoshi, Attorney, Nagashima Ohno & Tsunematsu KUROSAKA Tatsuya, Representative Director, Kuwadate, Inc.
Eighth Meeting March 8	・ Report on the Study Group on Competition Policy in Digital Markets (Draft)	-

Report on the Study Group on Competition Policy in Digital Markets
"Algorithms/AI and Competition Policy"

Table of Contents

* This report summarizes the result of discussions at the eight meetings by the Study Group on Competition Policy in Digital Markets from July, 2020 to March, 2021. It is expected that the result of the Study Group's discussions will serve as reference for future law enforcement and policy management by the Japan Fair Trade Commission (the JFTC).

Part 1: GENERAL REMARKS

I. Introduction

In digital markets, which have experienced drastic changes due to rapid technological development in recent years, it is important to effectively and appropriately promote competition policies in line with the actual transaction terms and competitive environment of digital markets in order to secure fair, free competition and stimulate ingenuity by business operators.

In light of this recognition, from July of 2020, the Study Group on Competition Policy in Digital Markets (hereinafter, "the Study Group") was held with the objective of conducting research into various points at issue and problems regarding the Antimonopoly Act and competition policy in the context of digital markets.

The Study Group conducted discussions addressing the theme of "algorithms/AI and competition policy." Many innovations have been created from the digitalization of the economy, and algorithms and AI (artificial intelligence) are key technologies for that process. Many business operators have come to utilize algorithms and AI when conducting business activities; it is thought that by this process, changes are also being brought about in the competitive environments of related markets. With regard to this point, according to "Action Plan of the Growth Strategy," set forth by a cabinet decision in July, 2020, "it has been pointed out that, going forward, AI utilization will enable companies to significantly improve the functions of products and services that they provide and that the business models of companies that make good use of technology will have a competitive edge, and that such factors will lead to customer-oriented services." Furthermore, with regard to digital platform operators as well, it is pointed out that "modern digital platform operators use algorithms based on AI technologies and the like as a vital element of rules and systems, designing and operating platforms by means of analysis (profiling) using these algorithms."[1]

This topic is being discussed in foreign countries as well. In "Algorithms and Collusion,"[2] a report by the OECD published in June, 2017, it is held that "The combination of big data with technologically advanced tools, such as pricing algorithms, is increasingly diffused in everyone's life today, and this is changing the competitive landscape in which many companies operate and the way in

1 "Interim Report of the Study Group for the Improvement of the Trade Environment Involving Digital Platform Businesses" (Japan Fair Trade Commission (the JFTC), Ministry of Economy, Trade and Industry, and Ministry of Internal Affairs and Communications, December 2018)

2 OECD (2017) "Algorithms and collusion: Competition policy in the digital age" (hereinafter, "OECD (2017)") page 3

which they make commercial and strategic decisions." In this way, the report identifies changes in the competitive environment due to big data and algorithms, and the like.

Furthermore, in its report "Algorithms: How they can reduce competition and harm consumers," published in January, 2021, the United Kingdom's Competition & Markets Authority[3] comments as follows: "Machine learning and AI are now employed in a wide range of contexts, industries and applications. Algorithms are at the heart of some of the largest and most strategically significant firms' operations. ... even small businesses are increasingly using machine learning by buying tools developed by third parties. ... these trends seem likely to continue, as businesses both big and small make use of better technologies to enable product innovation and improve their internal processes."[4]

In this way, for players in digital markets, the kinds of algorithms and AI which are designed and operated are an important element with regard to competition with other companies, and it is thought that the influence exerted by algorithms and AI on competition will grow ever larger hereafter.

In point of fact, the market scale of the AI business in Japan[5] was approximately 400 billion JPY in FY2017, and the data indicates that it will exceed 2 trillion JPY in FY2030.

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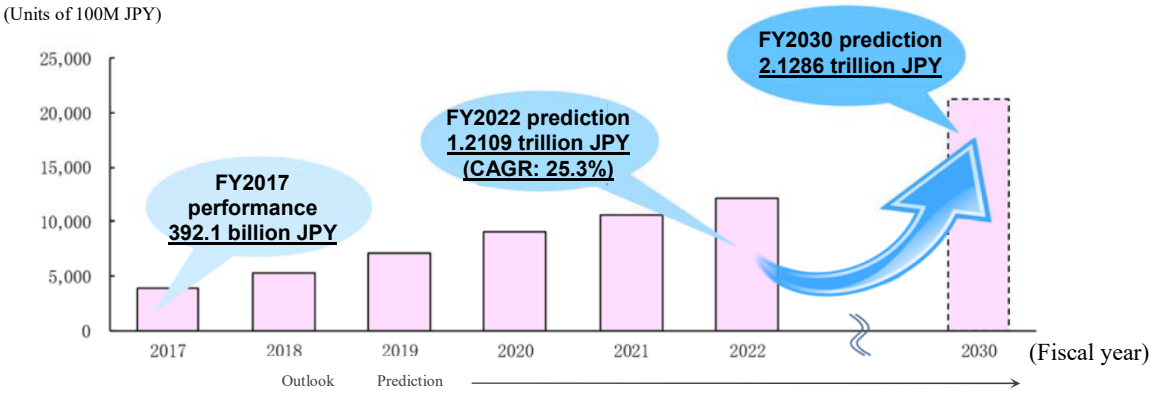
3 CMA (2021) "Algorithms: How they can reduce competition and harm consumers" (hereinafter referred to as CMA (2021)); 1: Introduction

4 In terms of other discussions from foreign countries, "Algorithms and Competition," a report published by Autorité de la concurrence and Bundeskartellamt in November 2019, comments, "There is little doubt that digitalisation is revolutionising many sectors of our economies. Algorithms are among the most important technical drivers of this process," pointing out the importance of algorithms (Autorité de la concurrence and Bundeskartellamt (2019), "Algorithms and Competition" [hereinafter, "German-French Report (2019)"] page 1).

Further, in "Pricing algorithms," a report published by the United Kingdom's Competition & Markets Authority in October 2018, it is held that "Algorithms are increasingly used by firms for a wide range of business decisions" and that "Algorithms and data-based decision making which does not require human involvement are becoming more prevalent. These approaches will continue to develop as access to Big Data and computing power improves," pointing out that the impact data and algorithms have on business activities will increase further (CMA (2018) "Pricing algorithms: Economic working paper on the use of algorithms to facilitate collusion and personalised pricing" page 7).

5 The AI business market refers to analysis services utilizing AI; system integration for the purpose of building AI environments; hardware/software/clouds that support AI environments; the research, development, provision, etc. of applications installed with AI; and systems/services involving AI.

[Figure 1] Market Scale of AI Business



Source: Fuji Chimera Research Institute, Inc., "2019 Comprehensive Study of Artificial Intelligence Business," page 2

In this way, based on the increasing importance of algorithms and AI in digital markets, having an understanding on the changes in business activities and the competitive environment brought about by algorithms and AI is important in order for the JFTC to effectively and appropriately promote competition policy in digital markets.

It can be evaluated that by enabling minute analysis and automating work processes, algorithms and AI will streamline business activities and improve usability for consumers, and that fundamentally, they will bring significant benefit to society as vital tools that bring about innovation.

On the other hand, due to anti-competitive activities being conducted using algorithms and AI, cases of overseas authorities taking measures have emerged. Furthermore, in response to the rising importance of algorithms and AI, discussions and research regarding algorithms and competition policy are being actively conducted by competition authorities in various countries, international organizations, and the like (Attachment 1).

For instance, in an example of overseas measures, in June of 2017, the European Commission levied a fine for a violation of competition law against a general search service provider which had used search algorithms to endeavor to position results for its own comparison shopping service in conspicuous locations on display pages for search results and to scale down the order in which the search results for a competing comparison shopping service was displayed.[6]

In addition, regarding algorithms/AI and concerted practices including cartels, discussions are being held by the OECD and German-French competition

6 European Commission CASE AT. 39740 Google Search (Shopping) (2017. 6). Hereinafter referred to as "the Google Shopping case."

authorities, and in Japan as well, the subject has been taken up as an issue by the JFTC Competition Policy Research Center in "Report of Study Group on Data and Competition Policy" (June, 2017; hereinafter, "Data Study Group Report") and by the Japan Fair Trade Commission (the JFTC); the Ministry of Economy, Trade and Industry; and the Ministry of Internal Affairs and Communications in "Interim Report of the Study Group for the Improvement of the Trade Environment Involving Digital Platform Businesses."[7]

In addition, in conjunction with the development of digital markets, due to it becoming possible to collect personal data and conduct minute analysis using algorithms and AI, it has been pointed out that it is now technologically possible to conduct personalized pricing, in which price settings are individually determined through the use of personalized technology in price settings. From the perspective of competition policy and the like, the OECD and the United Kingdom's Competition & Markets Authority are conducting discussions and considerations regarding this development.

In this context, in Japan, a lateral discussion regarding the problems and points at issue surrounding algorithms/AI and competition policy has still not been conducted.

Thus, with the theme of "algorithms/AI and competition policy," the Study Group sought to organize the problems and points at issue of competition policy relating to algorithms and AI.

The main objective of this report is, upon an understanding being reached regarding the changes in the competitive environment brought about by algorithms and AI, to enable the JFTC to appropriately address the risks to competition related to algorithms and AI.

II. Algorithms/AI and Initiatives of the JFTC to This Point

In order to improve the accuracy of algorithms and AI for utilization in business, large amounts of data are needed.[8] The JFTC has advanced environmental development such that the illicit acquisition/usage of data does not take place in various situations, such as: (1) a case of a business operator collecting data from a counterparty business operator, (2) a case of a business operator collecting data from consumers as compensation for free services, and (3) a case of retaining the data of another party due to business combination.

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7 Footnote 1 (mentioned above), page 13

8 In "Summary of Points at Issue in Competition Policy Regarding Individual Behavior by Digital PF - Meaning of Data Retention Regarding Innovation Competition" (CPRC Discussion Paper, December 2019) by TOSA Kazuo, it is pointed out that the superiority of AI algorithms depends on how much data the corresponding AI has learned.

First, with regard to (1) the case of a business operator collecting data from a counterparty business operator, the stance concerning the Antimonopoly Act has been established in the Data Study Group Report with regard to actions in which, in a business partnership or the like, one party unilaterally makes another party provide data to them.

Furthermore, with regard to (2) the case of a business operator obtaining data from consumers as compensation for free services, based on, e.g., voices of concern regarding the acquisition/usage of consumers' personal information, etc. by digital platform businesses, "Guidelines Concerning Abuse of a Superior Bargaining Position in Transactions between Digital Platform Operators and Consumers that Provide Personal Information, etc." has been established (released December 17, 2019).

Furthermore, with regard to (3) a case of retaining the data of another party due to business combination, in light of, e.g., the rising necessity of accurately handling instances of corporate acquisition in the digital sector, "Guidelines to Application of the Antimonopoly Act Concerning Review of Business Combination" and "Policies Concerning Procedures of Review of Business Combination" have been amended (released December 17, 2019).

Based on these initiatives by the JFTC, from the perspective of algorithms and AI, the Study Group formally engaged in discussions with regard to how, in the first place, data produces competitive superiority in competition using algorithms and AI, and reviewed subjects such as the structures, market trends, and the like of technical hierarchies which support AI.

III. Definitions, Etc. of Algorithms/AI

1. What are algorithms?

The concept itself of "algorithms" has existed since before the emergence of computers, but it is said that there is still no universal definition.[9] Furthermore, the term "algorithm" is not used only in the digital sector; it is held to have an ambiguous meaning.

In this regard, the OECD (2017) quoted a publication by Wilson, et al.[10] in adopting the following definition: "An algorithm is an unambiguous, precise, list of simple operations applied mechanically and systematically to a set of tokens[11] or objects (e.g., configurations of chess pieces, numbers, cake

9 Moschovakis, Y. N.. 2001. "What is an Algorithm? ". in B. Engquist and W. Schmid (Eds.), Mathematics Unlimited — 2001 and Beyond, Springer pp. 919–936 (Part II)
10 Wilson, R. A. and F. C. Keil (1999). The MIT Encyclopedia of the Cognitive Sciences. MIT Press p. 11
11 The minimum unit of source code in programming languages.

ingredients, etc.)."[12]

On the other hand, German-French Report (2019) hold that as a general term, "algorithm" has a meaning such as a "standardized or systematized procedure," but that in the digital sector, it means something like "a sequence of computational steps that transform the input into the output."

As this report conducts discussions targeting the digital sector, similar to German-French Report (2019), "algorithm" shall be defined as "a sequence of computational steps that transform the input into the output."

2. What is AI?

"AI" is an initialism that takes the first letters from the term "artificial intelligence," and retains the meaning of that term.

The "2016 White Paper on Information and Communications in Japan" (Ministry of Internal Affairs and Communications) explains that "AI can be described as 'the science and engineering of making intelligent machines, especially intelligent computer programs,' but researchers are divided on the definition of AI." Further, the OECD (2017) refers to an article by Swarup[13] in stating that "Artificial intelligence refers to the broad branch of computer science that studies and designs intelligent agents, who should be able to carry out tasks of significant difficulty in a way that is perceived as 'intelligent.'" [14]

Considering the above, AI also lacks a universal definition, but the "2019 White Paper on Information and Communications in Japan" (Ministry of Internal Affairs and Communications) describes an understanding with the broad concept that AI refers to "Programs operating in a form similar to human cognitive processes, or information processing or technology that humans consider to be intelligent." As this is considered to be close to the concept understood by business operators[15], in this report, we wish to adopt this definition.

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12 OECD(2017) p. 8

13 Swarup, P. (2012). "Artificial Intelligence". International Journal of Computing and Corporate Research Vol. 2. No. 4

14 OECD(2017) p. 9

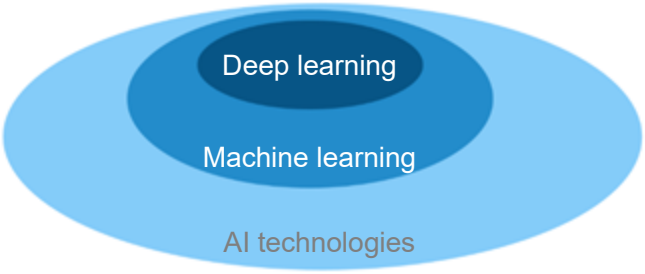
15 AI is sometimes expressed as "strong AI" and "weak AI." AI which is versatile to the point of replacing humans is called "strong AI" or "general-purpose AI," but there are still many things to research regarding "strong AI," and it is held that currently, methods for realizing it are still being explored. On the other hand, AI which handles specific functions such as voice recognition and image recognition is called "weak AI" or "specialized AI." Currently, most things which are called AI and for which practical application is beginning are "weak AI." (Ministry of Internal Affairs and Communications, "2018 White Paper on Information and Communications in Japan," Part 1, Chapter 1, Section 4, 1(4) - "Column 1: Outline of AI/IOT Being Implemented," in "Comparison of ICT Personnel in Japan and America")

3. Categories of AI technologies

The current AI boom is called the "third AI boom."[16] Due largely to the appearance of deep learning, such technologies are expected to bring about innovation in various industries. Deep learning is a type of machine learning; an illustration of AI technologies as a whole is shown in [Figure 2].

In point of fact, technologies such as machine learning other than deep learning, rule bases, and search algorithms are widely used.

[Figure 2] Basic Division of AI Technologies



Source: Information-technology Promotion Agency, Japan - AI White Paper Editorial Committee Volume (2020) (AI White Paper 2020) page 187

Machine learning is "a method in which a mechanism equivalent to human learning is realized on a computer, etc., wherein, based on a certain calculation method (algorithm), a computer discovers patterns or rules in entered data and applies those patterns or rules to new data, thereby making it possible to make discriminations, predictions, and the like for the new data."[17] In the AI boom, it is considered that this machine learning is often used with a nearly identical meaning to that of AI.[18]

Depending on the learning method, machine learning is categorized as shown in [Figure 3].

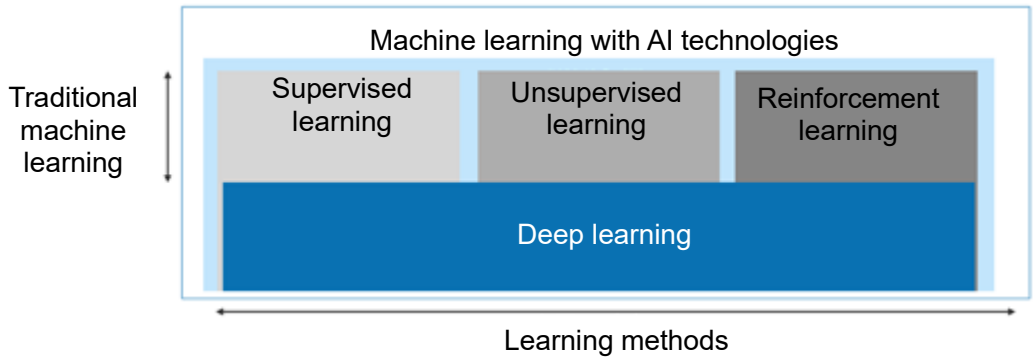
16 The first AI boom took place from the latter half of the 1950s to the 1960s, the major factor for the boom being that computers became able to reason and search, enabling them to present solutions to specific problems.

Furthermore, the second AI boom was in the 1980s: imparting "knowledge" (various information necessary for computers to reason entered in a form that enables computers to recognize it) brought AI to a level where practical use was possible, and many expert systems (programs that behaved like experts in a specialized field using reasoning based on the incorporation of specialized knowledge of that field) (Ministry of Internal Affairs and Communications, "2016 White Paper on Information and Communications in Japan," Part 1, Chapter 1, Section 2, 1(2) - "History of Artificial Intelligence (AI) Research").

17 Ministry of Internal Affairs and Communications, "2019 White Paper on Information and Communications in Japan," Part 1, Chapter 1, Section 3, 2(1) - "Basic Structure Regarding AI"

18 Same as above

[Figure 3] Categories of Machine Learning



Source: Information-technology Promotion Agency, Japan - AI White Paper Editorial Committee Volume (2020) (AI White Paper 2020) page 47
(Revised from "Approach to Machine Learning," originally analyzed by PWC Strategy&)

"Supervised learning" refers to conducting learning by means of learning data to which "correct answer" labels have been affixed, while "unsupervised learning" refers to conducting learning by means of learning data to which no "correct answer" labels have been affixed. For instance, in the case of developing artificial intelligence that executes the task of detecting images of cats from among images of various animals, in supervised learning, learning is conducted using, e.g., data in which a "correct answer" label of "cat" is affixed. In unsupervised learning, learning is conducted using, e.g., data of cat images without supplying the information that the images are of cats (the artificial intelligence will be unable to discern whether the images pertain to an animal called "cat," but will become able to distinguish cats from other animals). Moreover, "reinforcement learning" refers to learning in which behaviors are conducted in a certain environment while engaging in trial and error, wherein repeating a process of supplying a reward for that behavior (information regarding whether the result of the behavior was good or bad) allows the artificial intelligence to learn what kind of behavior is good in the long-term. For instance, a bipedal robot engages in trial and error with regard to walking speed and the way of bending its legs, a process is repeated in which, when it walks a long distance, information indicating the behavior was good is supplied, ultimately leading to the bipedal robot becoming able to walk smoothly without falling over.[19]

As for "deep learning," it is an approach that uses a deep, multi-layered

19 Created with reference to footnote 17 (mentioned above) and Information-technology Promotion Agency, Japan - AI White Paper Editorial Committee Volume (2020) (AI White Paper 2020) (KADOKAWA ASCII Research Laboratories, Inc.), page 46

network of processing as a model to learn, which simulates human neurons. It is characterized by the fact that it requires big data and its behavior is difficult to predict. Furthermore, in the case of deep learning, internal activities cannot be understood using codes or the like; thus, it is also referred to as "black box AI."

In this way, in conjunction with the evolution of technology, AI has become able to work autonomously. Thus, it will become important to think about AI from the perspective of whether humans are inside or outside of the loop—that is to say, from a perspective of considering matters with an awareness of both "the case of humans being inside of the loop," in which systems are extensions of humans and are simply tools for humans; and "the case of humans being outside of the loop," in which, due to systems operating autonomously, humans simply obtain results after initially giving commands.

4. AI technology stack

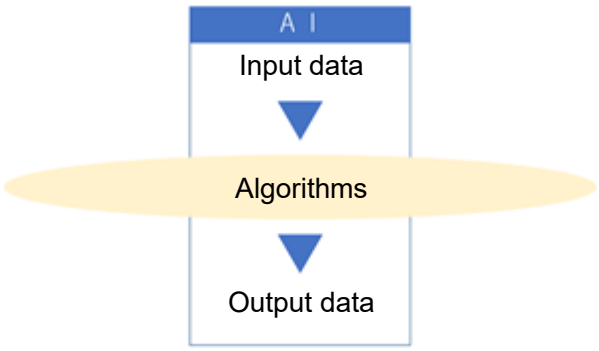
In recent years, AI applications for various types of machine learning, such as image recognition, voice recognition, machine translation, recommendations, and searches, have been developed and put to use. The foundations for such AI application development are the following layers: "AI chips," which are hardware for performing processing such as calculations in accordance with programs; "AI frameworks (also called "ML libraries")", which provide functions and algorithms for machine learning; and "AI platforms," which combine calculating ability using AI chips with AI frameworks to provide environments to develop applications (for more information on AI technology stack, see "2. AI Technology Stack" in Section 2.3 below).

5. Relationship between algorithms/AI and data

Lastly, we would like to treat the topic of the relationship between algorithms/AI and data.

As mentioned in 3.above, technologies other than deep learning and machine learning may be included in AI technologies, but considering machine learning as an example, the relationship between algorithms/AI and data is considered to be essentially as shown below.

[Figure 4] Relationship between algorithms/AI and data



Source: Created by the JFTC

In particular, in the case of product/service competition using machine learning, as there are cases in which learned models, which are obtained by teaching (allowing the learning of) a large amount of data, regulate the quality of products and services, it is thought that enterprises able to access data important for competition may be able to attain competitive superiority (for more information on competitive superiority by means of data, see "1. Data and Competitive Superiority" in Section 2.3 below.)

IV. Situation of AI Usage[20]

While the usage of AI is currently being advanced in many industries, the degree to which AI has developed differs by industry. This degree of development can be divided into three phases: (1) as an implementation phase, a phase in which AI is already being used in business, or an implementation target has taken form; (2) as a proof-of-concept phase, a phase in which introduction has not yet gained momentum; and (3) a phase in which technical possibilities are being researched.

Next, the characteristics of fields in which AI usage advances, roughly divided in two, can be organized into characteristics from an industrial perspective and those from an AI technology perspective. Looking at matters from the industrial perspective, one can conceive of characteristics such as the following: (1) there is plentiful funding ability for investment; (2) the impact that AI usage exerts on the industry is significant, i.e., by utilizing AI, there are merits such as profits growing, competitive power improving, and digital transformations moving forward; and (3) Big Data is retained. Furthermore, looking at matters from the AI

20 Reference made mainly to Yano Research Institute, Ltd., "Trends in AI Usage" (Material 2 of Study Group on Competition Policy in Digital Markets (Second Session), September 18, 2020).

technology perspective, it can be stated that this falls under an area that utilizes data learning, which drives AI development; in particular, utilization is advancing in fields such as image recognition and voice recognition.

For instance, looking at matters by field, AI is being utilized for purposes such as: (1) funding operations, fraud detection, and credit checks in the field of finance; (2) the development of automatic driving systems in the field of automobiles; (3) the transmission of recommendations and digital advertisements in the internet field; and (4) diagnostic imagining and drug development in the fields of medical treatment and medicinal drugs.

Further, looking at matters by technology, AI is being utilized for purposes such as: (1) facial recognition, diagnostic imaging, and automatic driving in the image recognition field; (2) automated voice conversation and speech-to-text in the speech recognition field; and (3) recommendations, prediction analysis, machine translation, and the Search of new drugs and compounds in other fields.

V. Algorithms/AI Targeted for Discussion in the Study Group

Algorithms and AI can be used in various situations in business activities; however, there are some cases in which they exert an effect on competition, and some in which they do not. The Study Group has particularly targeted the below areas for discussion, as it is currently thought that algorithms and AI could exert a major impact on competition in these areas.

Price-searching algorithms and price-setting algorithms

As explained in detail in Section 2.1.1 below, there are cases in which enterprises use algorithms to learn the sales prices of competing enterprises in order to, e.g., oppose the prices of those competing enterprises.

Furthermore, enterprises sometimes use algorithms to set prices. For instance, algorithms are used to collect competing enterprises' prices and set one's own prices accordingly, or to predict demand and then set prices in order to maximize sales. Dynamic pricing conducted based on revenue management in the airline industry is one example of this.

Ranking algorithms

Algorithms are sometimes used to select products and services from a large number of choices and display the items that are highly probable to match a user's needs in a ranked format. In displaying a ranking, items which fulfill query (search keyword) demands are extracted, and the extracted items are ranked in accordance with how well they fit the user’s needs.

It is thought that such ranking algorithms are used in various fields, such as search engines, online retails, app stores, comparison websites, etc.

Personalization algorithms

There are instances in which data such as the attributes and purchasing trends of consumers are collected and analyzed, and product recommendations in online retail platforms, digital advertisings, and the like are personalized for each consumer. It is also conceivable that not only product recommendations, but also price and other transaction terms could be personalized.

Part 2: DISCUSSIONS

Based on the contents on Part 1, this part organize problems and issues on competition policy surrounding algorithms/AI.

As the Study Group conducted discussions with the major divisions of: problems and issues regarding algorithms/AI and collusion (algorithms/AI and concerted practices); problems and issues regarding algorithms/AI and unilateral conducts; and problems and issues regarding algorithms/AI and competitiveness, this report follows the same divisions.

I. Algorithms/AI and Concerted Practices

Due to algorithms/AI being utilized to search the prices of competitors and to set prices for one's own products and services, concerns have developed that cartel agreements and its execution have become easier, and that, for instance, concerted practices appear in forms that cannot be grasped by current competition law. With regard to algorithms/AI and concerted practices, lively discussions are being held in foreign countries by bodies such as the OECD and German-French competition authorities.[21] In Japan, "digital cartels" cited in the Data Study Group Report as a remaining issue. It has been pointed out that moving forward, it will be desirable to focus on the nature of these cartels, and to organize the issues as necessary.

Below, while also touching on major discussions overseas, we organize the problems and issues surrounding algorithms/AI and concerted practices (see note) in Japan.

> Note: In this report, "concerted practices" refer not only to prices being made the same between competitors through explicit agreements, but, as stated in "conscious parallel practices" in 3.1 below, refer also to behaviors such as enterprises monitoring price increases, etc. of competitors, and being the same prices through individual judgment, thereby resulting in both sides' prices exceeding competitive prices.

1. Changes in the business environment and competitive environment brought about by price searching and price setting using algorithms

(1) Types of price-searching and price-setting algorithms, and changes in the business environment[22]

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21 OECD (2017), German-French Report (2019)

22 Reference made mainly to Pricing Studio Co., Ltd., "Basic Structure and Current Situation of Price-Setting/Monitoring Algorithms" (Material 1 of Study Group on Competition Policy in Digital Markets (Third

Due to the development of digitalization and e-commerce, price-searching and price-setting algorithms have come to be used for various purposes, such as grasping competitors' prices, setting prices that are more competitive than those of competitors, and reducing opportunity losses by conducting optimal pricing through demand prediction.

Roughly classifying the algorithms that are used, there are price-searching algorithms that are used to grasp competitors' prices, and price-setting algorithms that are used to automatically set prices when appropriate.[23] Price-setting algorithms include automatic price-updating tools, which automate existing pricing rules; tools which set prices based on demand predictions using machine learning; tools which set prices using reinforcement learning; and others.

[Figure 5] Types of price-searching and price-setting algorithms

	Type	Overview
Price-searching algorithms	Market price searching tools	Searching and grasping competitors' prices
Price-setting algorithms	Automatic price-updating tools	Setting prices with algorithms based on certain pricing rules set by users
	Machine learning (demand prediction)	Predicting demand using machine learning, and setting optimal prices based on that
	Reinforcement learning	Sales, profits, and the like are set as reward, and prices are set using reinforcement learning, in which learning is conducted to maximize that reward

Source: Created by the JFTC based on footnote 22 (mentioned above), on page 9

Price-searching algorithms are also called "market price-searching tools," and are tools which grasp the prices of competitors using APIs[24] and

Meeting), October 30, 2020).

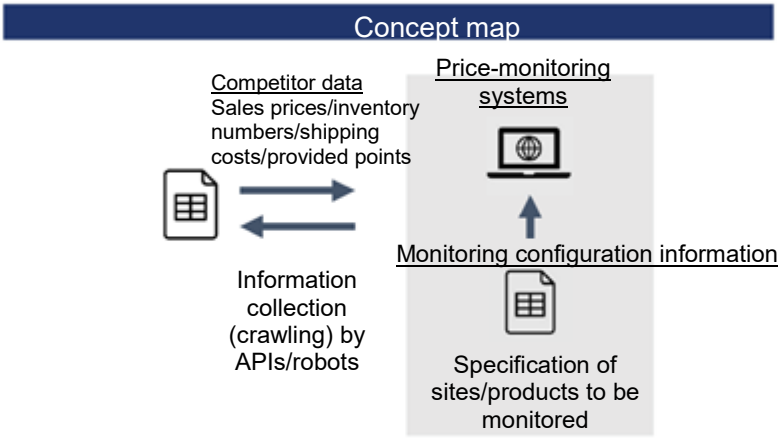
23 With regard to the usage situation of tools which use these algorithms, in the JFTC's "Survey Report on Transaction Situation of Consumer-Oriented e-Commerce" (January 2019), 7% of retailers who conduct online sales and refer to other companies' sales prices when deciding online sales prices responded that they use price-searching tools (software which automatically collects retailers' online sales prices, and displays the results) and the like. Further, of enterprises who conduct online sales, only 4% of enterprises responded that they use software such as automatic price-updating tools, but it is considered that there is a high probability that due to the progression of digitalization, the use of these tools by enterprises will increase hereafter.

24 API is an initialism of "Application Programming Interface," and refers to "a connection method for safely using the functions and/or data of other systems." For example, price data and the like are obtained by using APIs which are provided by online retail platform operators.

crawling systems.[25] It is held that such price-searching tools are often used in the field of e-commerce, in which it is relatively easy to compare prices with competitors.

Price-searching algorithms are algorithms for swiftly and automatically searching the prices of competitors, and compared to manual price searches, they enable prices to be searched more broadly and more easily.

[Figure 6] Overview of market price searching tools



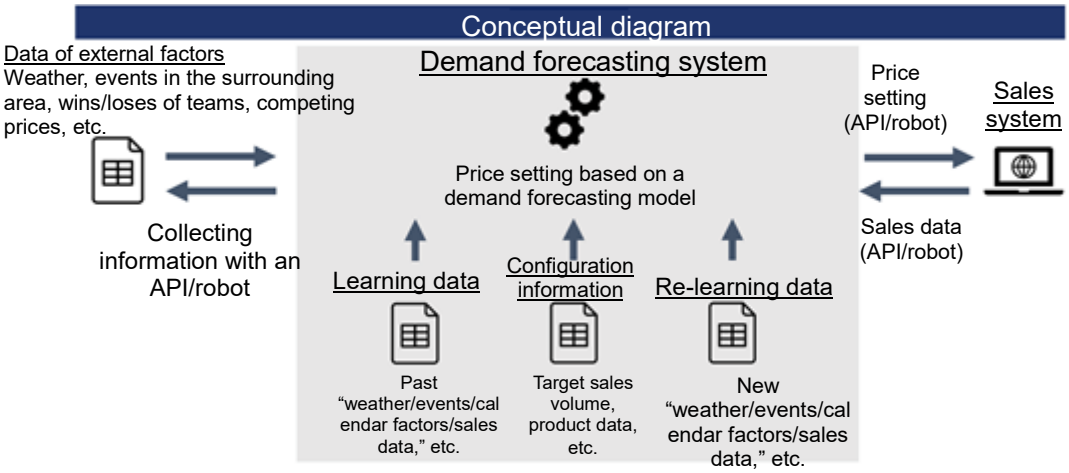
Source: Footnote 22 (mentioned above), page 10

Automatic price-updating tools are tools that set prices using algorithms based on certain pricing rules. One industry in which the introduction of such tools advances is the retail industry, where there are cases of online retail platform operators providing such tools to sellers. For instance, it is possible to use the tools in such a way as to automatically set prices to match the lowest price among prices of competitors collected by an algorithm, enabling to constantly maintain superiority in terms of prices.

In the case of tools which set optimal prices based on demand prediction by machine learning, it is difficult to carry forward stock; thus, there are many cases in which such tools are used in situations where commodities must be sold through within a certain time period (example: hotel lodging charges, airline tickets). By using demand prediction by means of machine learning, it is possible to change prices more accurately in response to, e.g., changes in demand and supply, making it possible to reduce dead stock and to alleviate congestion.

25 Programs which scour the internet to collect information from websites. For example, data for shipping prices and the like can be obtained by using a crawling system developed by a price-searching tool company.

[Figure 7] Overview of a Price-Setting Tool Using Machine Learning (Demand Forecasting) Algorithms



Source: P. 15 of the material under footnote 22 above, partially edited by the JFTC

A price-setting tool based on reinforcement learning uses reinforcement learning to set up rewards such as sales or profits and to learn to maximize those rewards. At this time, there has seemed to be almost no actual use case of reinforcement learning in actual business settings for such reasons as its potential for causing price surging or slump not proportional to demand, the difficulty of creating a training environment for models, and the need for a massive volume of data in the implementation of reinforcement learning.

Today, there are several price-searching and pricing-setting algorithms currently used in markets, and it is easy to enter the market when data can be obtained by such means as crawling or APIs. Accordingly, there is little concern at present that the same price-searching or price-setting algorithm is used by a considerable number of firms.[26] However, for example, there is a possibility pointed out that if an influential online retail platform operator that provides a self-developed price setting tool to its sellers does not provide price data to other price-setting tool providers, such as by refusing to release its API, the price-setting tools used by its sellers may be consolidated into the tool provided by the online retail platform operator.

(2) Changes in the competitive environment

Changes in the competitive environment attributable to algorithmic price search and price setting may differ depending on the situation. In general,

26 However, for some limited fields, there are cases in which a specific company is virtually the only company engaged in the development of algorithms in the given field, and where an enterprise offers algorithms to other competitors.

price-searching and price-setting algorithms enable enterprises to automatically collect information on competitors' prices and automatically set competitive prices against such competitors. This factor is considered promoting price competition among firms.[27]

On the other hand, there is a concern that the use of such algorithms may lead to concerted price setting among competitors depending on how those algorithms are used. For example, while the use and dissemination of algorithms improve market transparency and increase the frequency of interactions among firms, these characteristics may help competing firms implement cartel agreements if such agreements are formed among them. Specifically, the use of algorithms enables the parties having an agreement to monitor each other and help them detect any deviation from the agreement. In addition, as firms are enabled to frequently interact with each other, the parties to a cartel agreement become able to promptly retaliate against those who have deviated from their agreement.

2. Classification of concerted practices by algorithms

(1) Classification used for consideration

In considering concerted practices by algorithms,[28] it is appropriate to classify these practices since there may be several different scenarios of how algorithms are used in concerted practices. Accordingly, for the purpose of consideration, this Study Group classified concerted practices into the following types in accordance with the classification of the OECD (2017): (1) concerted practices by monitoring algorithms, (2) concerted practices by parallel algorithms, (3) concerted practices by signaling algorithms, and (4) concerted practices by self-learning algorithms.[29]

(2) Details of each type and relevant cases[30]

The following sections organize how algorithms are used in concerted

27 When a price-searching algorithm (market price search tool) or rule-based price-setting algorithm (automatic price updating tool) is used, its user tends to pursue prices lower than those of competitors (p. 21 of the information material of Pricing Studio under footnote 22 above).

28 It is possible that concerted practices by algorithms may be performed in relation not only to prices but also to production quantities or sales volumes. In this report, only concerted practices regarding prices are discussed for the sake of simplifying discussions.

29 Regarding the classification of concerted practices by algorithms, there are also other classifications than that of the OECD (2017), including the classification by Ezrachi and Stucke (Ariel Ezrachi/Maurice E. Stucke (2016) "Virtual Competition" Harvard University Press, pp. 35-81) and its slightly revised version published in the France-German Report (2019). For example, under the classification by Ezrachi and Stucke, concerted practices by algorithms are classified into (1) messenger type, (2) hub and spoke type, (3) predictable agent type, and (4) autonomous machine type.

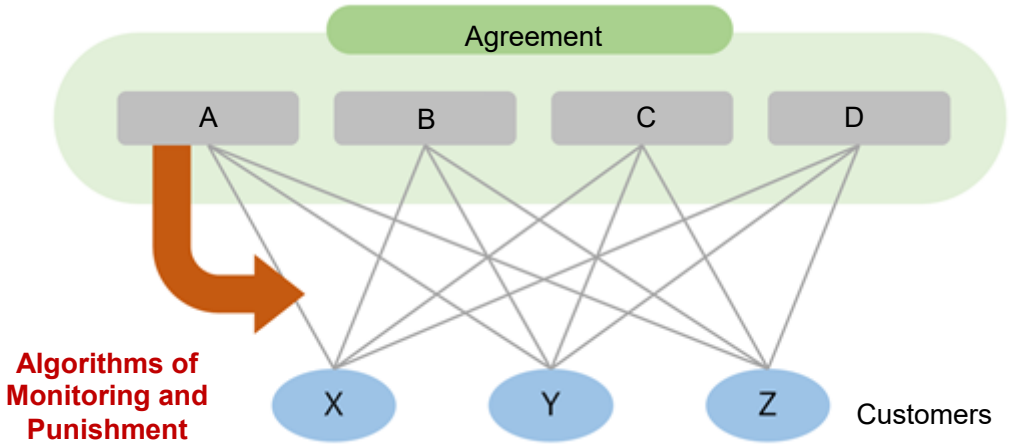
30 Reference: TOSA Kazuo, "Algorithms and Concerted Practices" (Material No. 2 for the 3rd meeting of the Study Group on Competition Policy in Digital Markets on October 30, 2020); and submitted support documents.

practices according to each concerted practice type and also organize overseas cases relevant to each of the types.

A. Concerted practices by monitoring algorithms

With regard to concerted practices using monitoring algorithms, a price-searching algorithm is used in cases where an agreement on a cartel, etc. has been formed among competitors, in order to collect information on the competing firms' prices, etc. or to retaliate against any party having deviated from the agreement, for the purpose of ensuring the effectiveness of the agreement. [31] Utilizing monitoring algorithms, the parties to such an agreement can automatically and continuously monitor the prices, etc. of the other parties and, at the same time, promptly take action in retaliation for any detected deviation. In the case where mutual monitoring and mutual retaliation are implemented with algorithms, it is considered that agreements such as those for price cartels can be stably maintained because there are fewer incentives for the agreement parties to deviate from their agreements.

[Figure 8] Concerted Practices by Monitoring Algorithms



31 Algorithms used to collect information on competitors' prices, etc. are the price-searching algorithms mentioned in 1. (1) above. Although the use of price-searching algorithms itself does not pose problems, those algorithms may be used for ensuring the effectiveness of cartels as shown in this example. In addition, they may be used when manufacturers engage in resale price maintenance practices, in order to search the prices of retailers, etc. and thereby to ensure the effectiveness of such practices. Examples of how price-searching algorithms were used in ensuring the effectiveness of resale price maintenance practices include the European Commission's case involving resale price maintenance by four home electronics manufacturers in online transactions (European Commission AT. 40465 Asus (July 2018), etc.) and the UK Competition and Markets Authority's case involving resale price maintenance by a musical instrument manufacturer (Case 50565-2 (April, 2018), etc.). In addition, the UK Competition and Markets Authority developed its own price monitoring tool to monitor resale price maintenance practices in the musical instrument market.

Source: The figure on the left side of p. 2 of the material under footnote 30 above, reorganized by the JFTC

B. Concerted practices by parallel algorithms

In concerted practices by parallel algorithms, algorithms work to coordinate the prices of firms in competition with each other. In relation to the coordination of the prices of competing firms, this type of concerted practices is further divided into two sub-types according to whether any third party other than those competing firms is involved in such practices.[32]

(a) The first sub-type is a case where an agreement, such as that on a price cartel, has been made among competing firms, and those firms use an algorithm configured to set prices according to the agreement. Utilizing the algorithm, those firms can automatically set prices in conformity with their agreement.

For example, if the parties to such an agreement have made arrangements to use an algorithm that automatically adjusts prices according to market changes, it is no longer necessary for them to renegotiate the particulars of the agreement. In general, in the implementation of a price cartel, it is not easy to make adjustments in response to changes in the market situation, and consequently, it is a general practice that the participants in the cartel frequently contact each other. If the adoption of an algorithm for agreement-based price setting by each firm makes such re-adjustment no longer necessary, it will be easier to implement the agreement concerned, and the risk of being caught by the competition authorities will be reduced. A case falling under this sub-type is the so-called poster cartel case in the United States (Attachment 2).

(b) An example of third-party involvement is where a number of competing firms use an algorithm provided by the same third party (e.g., a vendor [seller] of a price-setting algorithm), and the use of this algorithm leads to the coordination of their prices. For instance, this may be a case where a number of competing firms ask a specific algorithm vendor to develop a price-setting algorithm to coordinate their prices and use this algorithm in their practices.

Furthermore, if the vendor that provides a great majority of the price-

32 In addition to the following two scenarios, the OECD (2017) also suggests a scenario in which if a majority of firms in a specific market use price-setting algorithms that keep pace with the prices of the price leader in the market, and if this price leader sets its prices above competitive levels, this situation will lead the overall market to set prices above competitive prices.

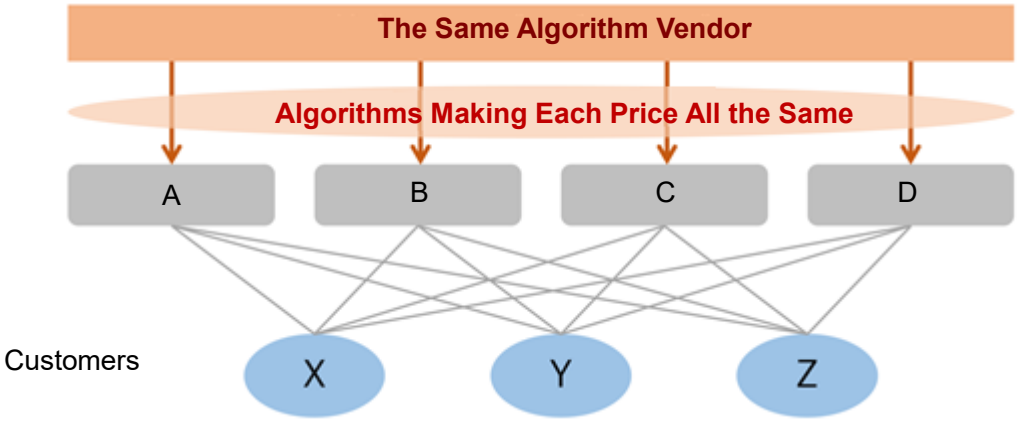
setting algorithms used in a specific market provides algorithm-using firms with an algorithm that coordinates their prices without informing such user firms to that effect, this practice is believed to amount to coordinated price setting even if these firms do not intend to coordinate their prices among themselves.[33]

In such cases where price coordination occurs due to the fact that a number of competing firms use a price-setting algorithm offered by a single third party, the prices of those firms come to be coordinated with each other with the third party acting as the hub. Accordingly, such cases are categorized as “hub-and-spoke” type scenarios.

Unlike regular concerted practices of the hub-and-spoke type (without algorithms used in them), hub-and-spoke type concerted practices with algorithms used in them are characterized by the fact that price coordination occurs even where information is not exchanged among the spokes (algorithm-using firms) or where the spokes are not aware of the presence of any algorithm that coordinates their prices.[34]

A case falling under this sub-type (where a number of competing firms are mutually aware of their use of an algorithm offered by a single third party) is the case of Eturas in Europe (Attachment 2).

[Figure 9] Concerted Practices by Parallel Algorithms
(Hub-and-Spoke Arrangements)



33 It is considered that a vendor of price setting algorithms may have incentives to provide an algorithm that coordinates the prices of algorithm-using firms if the vendor provides most of the algorithms used in the market and has concluded contracts with those firms under which the firms are required to distribute a certain percentage of their sales to the vendor in the form of revenue sharing. Similarly, it is also suggested that such incentives may arise in the case where the commission income of a platform operator that operates an online retail platform and has a high share in the online retail platform market increases according to the sales of its sellers, since this structure is similar to that of revenue sharing.

34 With regard to regular concerted practices of the hub-and-spoke type (without algorithms used in them), the exchange of information among the spokes through the hub is regarded as a problem.

Source: The figure on the right side of p. 2 of the material under footnote 30 above, reorganized by the JFTC

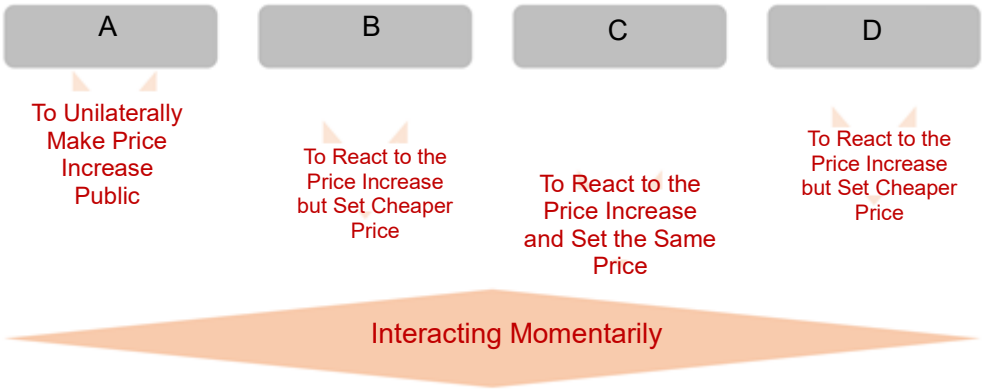
C. Concerted practices by signaling algorithms

In concerted practices by signaling algorithms, algorithms are used to send price increase signals[35] and also to check competing firms' reactions to such signals. A signaling firm keeps sending signals (e.g., information regarding the firm's intention to raise its price in the future) and also monitors signals sent by other firms in reaction to the signaling firm's signals. An agreement is considered reached among these firms after each of them has ultimately sent a signal indicating the same price as those of the other firms.

While signaling may be conducted in any market, signaling any price increase without the use of algorithms may cause the risk of losing customers to the signaling firm, since this means the firm indicates its price increase to customers before other competitors do. On the other hand, when an algorithm is used for signaling, the transmission of signals and the confirmation of competitors' reactions can be performed fast and automatically, making it possible to send price increase signals only to competitors in such a manner that such signals cannot be detected by customers (e.g., sending price increase signals only for a very short period of time at night when customers are not present and in a manner in which only competitors' price-searching algorithms can detect such signals). Thus, there is a concern that the use of such algorithms for signaling may enable competing firms to raise their prices without taking the risk of losing customers, as shown above. A case falling under this type is the ATP case in the United States (Attachment 2).

35 The act of communicating a firm's intention to increase its price, etc. to competitors, for example, by making public its price increase.

[Figure 10] Concerted Practices by Signaling Algorithms



Each firm sends its signal or reacts to other signals repeatedly until all firms set the same price.

Source: The figure on the left side of p. 3 of the material under footnote 30 above, reorganized by the JFTC

D. Concerted practices by self-learning algorithms

It is considered that, in concerted practices by self-learning algorithms, the prices of competing firms are set above competitive prices as a result of each firm using machine learning or deep learning to set its price. In this regard, there is a concern that, even where a firm uses a self-learning algorithm only to set its price without intending to mutually coordinate prices, its price may result in being above competitive prices due to interactions among self-learning algorithms.

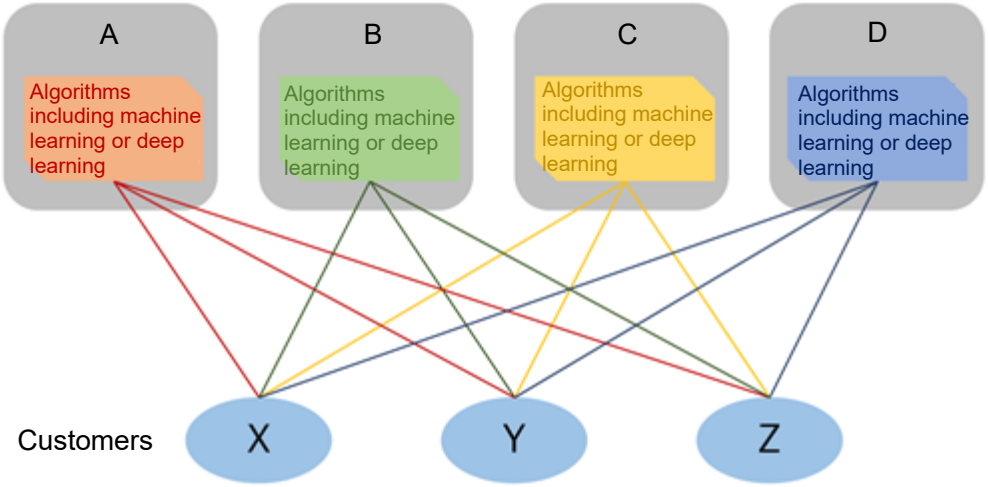
There has been no confirmed specific case example of concerted practices by self-learning algorithms in Japan and abroad. However, a recent economic analysis[36] shows that, as a result of setting price-setting algorithms using Q-learning,[37] a type of reinforcement learning, to repeatedly play a game between them under certain assumptions, those algorithms did not compete against each other but learned to consistently set prices above competitive prices.[38]

Even where concerted practices are possibly conducted among self-learning algorithms, the specific processes of such practices have yet to be

36 Emilio Calvano, Giacomo Calzolari, Vincenzo Denicolò, and Sergio Pastorello (2020) "Artificial Intelligence, Algorithmic Pricing, and Collusion" American Economic Review 110 (10), pp. 3267-97.
37 Q-learning is a method of learning using the action-value function Q (s, a) that represents the expected rewards for "action *a* taken in given state *s*." ("Artificial Intelligence White Paper 2020" edited by the AI White Paper Editorial Board of the Information-technology Promotion Agency (KADOKAWA ASCII Research Laboratories, 2020), p. 95).
38 ARAI Koki "Algorithms/AI and Cartels/Concerted Practices: Perspective of Economic Analysis" (Material No. 3 for the 3rd meeting of the Study Group on Competition Policy in Digital Markets on October 30, 2020), p. 6; and submitted support documents

clarified. In particular, whether any “communication” occurs between algorithms and, if it occurs, the content of such “communication” are still regarded as unclear.[39]

[Figure11] Concerted Practices by Self-Learning Algorithms



Source: The figure on the right side of p. 3 of the material under footnote 30 above, reorganized by the JFTC

3. Thoughts on concerted practices using algorithms under the Antimonopoly Act

(1) Unreasonable restraint of trade and conscious parallel practice

The Antimonopoly Act prohibits, as an unreasonable restraint of trade (Article 3 of the same Act), any firm from mutually communicating with other firms to thereby arrange, in concert with such other firms, the price, sales volume, production quantity, etc. of any product, which each firm should intrinsically determine by itself (cartel).[40] With regard to, among the conditions for unreasonable restraints of trade, those particularly problematic in relation to concerted practices by algorithms, the establishment of “in concert with other enterprises” (Article 2, paragraph (6) of the same Act) requires the “communication of intention” between/among

39 France-German Report (2019), pp. 43-44

40 The term “unreasonable restraint of trade” is defined under Article 2, paragraph (6) of the Antimonopoly Act as, “such business activities, by which any enterprise, by contract, agreement or any other means irrespective of its name, in concert with other enterprises, mutually restrict or conduct their business activities in such a manner as to fix, maintain or increase prices, or to limit production, technology, products, facilities or counterparties, thereby causing, contrary to the public interest, a substantial restraint of competition in any particular field of trade.”

a number of firms when they raise their prices or limit their quantities.[41] However, normally, practices that amount to unreasonable restraints of trade are conducted in a confidential fashion so that they are not apparent from the outside. If the applicability of the regulations is limited to explicitly agreed practices, it means those regulations do not have any significance. Therefore, practices that are regarded as amounting to "agreements" do not necessarily mean only the action of making an explicit offer and that of accepting such offer, but also are understood to include the "tacit communication of intention" through which a firm becomes mutually aware of another firm's action effecting price increase and implicitly accepts such action.[42] In a case where no explicit agreement between competing firms was found, but where price setting was not regarded as independently implemented by each firm (conscious parallel practice), the tacit communication of intention was inferred from, among other matters and in addition to the apparent fact that their price increases had taken place in a parallel manner, the facts eliminating the possibility that their price increases had been implemented through their independent practices.[43]

On the other hand, it is possible that the prices of firms may end up at the same level as a result of their independent price setting without them contacting each other. For example, there may be a case where a firm decides to increase its price upon observing competitors' price increases and judging that it is for its own benefit to follow suit. Such conduct is called "conscious parallel practice," which is not subject to regulation as an unreasonable restraint of trade.

(2) Characteristics of concerted practices by algorithms

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41 Tokyo High Court judgment dated September 25, 1995 (Toshiba Chemical case of seeking to overturn a trial decision). This "communication of intention" is also sometimes expressed as an agreement between/among firms.

42 In the case under footnote 41 above, the court ruled, "The 'communication of intention' means that a number of enterprises mutually recognize or predict that each of them is to implement the same content or type of price increase, and intend to keep pace with each other in relation to their price increases. Although an enterprise's mere recognition or acceptance of another enterprise's price increase does not suffice, an express agreement to bind each other is not necessary; it is reasonable to hold that enterprises' mutual recognition of each other's price increase and their implicit acceptance of such price increases are sufficient (the so-called tacit communication of intention falls under this definition)."

43 In the case under footnote 41 above, the court ruled, "Whether enterprises had mutual and common recognition and acceptance should be judged by considering what recognition and intention they had with the circumstances before and after, and leading to, their price increases taken into account. From this perspective, if a particular enterprise exchanges information with another enterprise with regard to price increase, and if these enterprises take the same or similar action, it is inevitable to infer that there is a relationship between them based on which they expect each other to conduct concerted practices and thus that the above-mentioned 'communication of intention' has taken place, unless there are special circumstances indicating that the above-mentioned action has been taken according to each enterprise's own judgment to the effect that its price could compete against the prices of other enterprises in the relevant market, irrespective of the actions of other enterprises."

Concerted practices conducted by algorithms among competing firms have some specific characteristics.

As described in (1) above, while the establishment of an unreasonable restraint of trade under the Antimonopoly Act requires the mutual "communication of intention" between competing firms, communications between competing firms are not always clear in algorithmic concerted practices.

For instance, through concerted practices of the above-mentioned hub-and-spoke type, it is possible for algorithm-using competing firms to coordinate their prices without exchanging information among them. Furthermore, in the case of signaling algorithms that make price increase public, it is also difficult to distinguish between soliciting competing firms to raise prices and their regular business activities. Additionally, in the case of concerted practices by self-learning algorithms, the same or similar prices may be set merely as a result of the use of such algorithms, and thus there are cases where algorithm-using firms (their employees) do not intend to keep pace with each other in terms of price setting.

Besides, in hub-and-spoke arrangements, the hub (algorithm provider) plays an important role in coordinating competing firms' prices without exchanging information among these firms. Accordingly, it is considered that the algorithm provider may play an active role in hub-and-spoke type algorithmic concerted practices in some cases.

(3) Applicability of the Antimonopoly Act to each algorithmic concerted practice type and relevant issues

Although some types of concerted practices by algorithms may involve explicit agreements as to the coordination of prices by using algorithms, there are cases where it is difficult to find such explicit agreements. However, even in a case where there is no explicit agreement, it is possible to consider that the communication of intention takes place in the situation where a number of firms understand how algorithms work, mutually recognize that they use an algorithm that coordinates prices, and use that algorithm with acceptance that their respective prices are coordinated, since it cannot be said that they independently conduct themselves.[44]

With regard to each of the types of algorithm-based concerted practices

44 In this case, in the sense that, despite the fact that a firm should by nature be able to set its own price at its own discretion, its price setting is restricted by the communication of intention to use an algorithm for price setting, it is possible to consider that the business activities of each algorithm-using firm are virtually restricted and thereby that the part "restrict their business activities" in Article 2, paragraph (6) of the Antimonopoly Act is satisfied.

outlined in 2. above, the following sections organize those cases to which the current Antimonopoly Act may apply and issues involved in handling such practices under the same Act.

A. When using algorithms for monitoring the implementation of an agreement or for price setting based on an agreement

When algorithms are used to monitor the implementation of an agreement, or when algorithms are used in parallel to automatically set prices in accordance with an agreement, these algorithms operate to monitor the implementation status of the relevant agreement or set prices in accordance with the relevant agreement. However, since there is an agreement among a number of firms on engaging in certain practices even prior to the use of such algorithms, this situation may potentially constitute an unreasonable restraint of trade. In these cases, the algorithms play a role in promoting the implementation of the agreement, for example, by monitoring the parties to the agreement for any deviation from the agreement, retaliating against any deviating party, or automating price setting in accordance with the agreement.

B. When prices are coordinated by parallel algorithms provided by a third party (hub-and-spoke arrangements)

Hub-and-spoke arrangements can be divided into the following two cases: where a number of competing algorithm-using firms have a common recognition that their prices are coordinated by using an algorithm provided by a single third party; and where a single third party provides a number of algorithm-using firms with an algorithm that coordinates their prices, although these firms do not recognize that the use of that algorithm leads to price coordination.

(a) Where algorithm-using firms have a common recognition concerning price coordination

In cases where a number of competing firms use a price-setting algorithm offered by a single third party, such as a vendor or trade association, while mutually recognizing that the use of such algorithm leads to price coordination, or where a digital platform operator that provides a price-setting algorithm informs its user firms of the imposition of the same maximum discount rate applicable to the sale prices of all user firms and those user firms use the algorithm with this awareness, it

can be considered that the firms in these cases have a common recognition that their prices are coordinated even without exchanging information directly or indirectly among those firms. If such algorithm is used with such recognition, the algorithm-using firms cannot be found to independently set prices and are found to engage in the communication of intention. Accordingly, this type of arrangements may possibly be regarded as an unreasonable restraint of trade and thus held in violation of the Antimonopoly Act.[45]

(b) Where an algorithm provider coordinates the prices of multiple algorithm-using firms without those firms aware of price coordination

For example, if the enterprise that provides a great majority of the price-setting algorithms used in a specific market provides algorithm-using firms with an algorithm coordinating their prices without informing those firms to that effect, the communication of intention among those firms cannot be found while this practice of the algorithm provider that has led the price coordination of those firms may be held in violation of the Antimonopoly Act in certain cases.

A controlling action in terms of private monopolization by control means the deprivation of another enterprise's free decisions in its business activities by imposing constraints on the enterprise in some manner.[46] Furthermore, there is a precedent in which the practice of designating a successful bidder and of compelling controlled enterprises to submit their bids at the designated prices was found to be a "controlling action."[47] Therefore, if the enterprise that provides a great majority of the price-setting algorithms used in a specific market has algorithm-using firms adopt its specific price-setting algorithm and coordinates the prices of a number of such firms by using the algorithm, the enterprise may be held in violation of the Antimonopoly Act on the ground of private monopolization by control.

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45 In Case 9 of the "Key Consultation Cases concerning Trade Associations' Activities" (March 2002) published by the JFTC, a trade association's facilitation of joint use of an estimation system, into which unit prices, etc. had already been input, among its members was considered posing problems in light of the Antimonopoly Act even if the members did not exchange information on their estimation results among themselves or even if each member made partial corrections at the member's own discretion, since the use of such system was substantially equivalent to the uniform use of common unit prices, leading to price setting under a common price calculation method (Article 8, paragraph (1), item (i) or (iv) of the Antimonopoly Act [prior to its amendment in 2009]).

46 Case of Noda Shoyu (Tokyo High Court judgment dated December 25, 1957)

47 Case of the Fukui Prefectural Economic Federation (the JFTC cease and desist order dated January 16, 2015); case of Paramount Bed (the JFTC recommendation decision dated March 31, 1998)

C. Concerted practices by signaling algorithms

The transmission of price information, such as making price increase public, is generally conducted in normal business activities, and transmitted information is often useful for the purchasing activities of consumers. Accordingly, the transmission of price information itself does not constitute an unreasonable restraint of trade. Moreover, since it is possible that any firm raises its price based on its independent judgment in response to a competitor's price increase, it is difficult to find the communication of intention conducted merely on the ground that any action taken after the unilateral transmission of information coincided with another firm's price increase. It is considered necessary to establish some facts leading to the view that such a practice as price increase could not be implemented by each firm's independent action.

In the case of signaling, a firm's price increase may not potentially be regarded as its independent practice, but the communication of intention may be inferred depending on its signaling and the forms of competitors' reactions to such signaling. In this regard, there are two overseas precedents in which some questions were raised as to signaling in light of competition laws (the ATP case in the United States (Attachment 2) and the container shipping case in Europe[48]). For instance, the distribution of price information was conducted in a manner not beneficial for consumers, such as including information that was not valuable for consumers or unnatural symbols as signals, or postponing or changing already published prices. In light of these factors, it was concluded that the information distribution concerned was a practice for collaboration among the relevant competing enterprises. Such finding can be a useful reference for Japan, as well. Whether it is possible to find the communication of intention conducted requires the comprehensive consideration of the circumstances of each

48 European Commission Case At. 39850 Container Shipping (July, 2016). The fourteen operators of sea container liner shipping services regularly announced their intended future increases of shipping prices on their websites, etc. This announcement of a simultaneous price increase, known as a GRI (General Rate Increase), was usually made three to five weeks before the scheduled implementation date of the price increase. Until the scheduled implementation date, some or all of the other shipping operators announced their intention to increase prices on the same or similar routes. Announced GRIs were sometimes postponed or modified by some of the operators and aligned with the GRIs announced by the other operators in some cases. With regard to simultaneous price increases, the European Commission indicated its concern that such announcements of price increase were not intended to provide complete information on new prices to consumers but rather allowed the shipping operators to adjust their own prices while mutually seeking out their respective intentions relating to price setting, which might constitute a concerted practice among those operators. As a result, the shipping operators in this case decided and gave assurance that they would not announce GRIs in the future.

individual case. Nonetheless, if the transmission of price increase information is carried out in such a manner that it is difficult for consumers, but not for competitors, to distinguish that information from other information, and if those competitors similarly raise their prices in reaction to the transmitted price increase information, these facts may potentially infer that the signaling is aimed at the competitors, and that, through the signaling, the communication of intention is constituted.

As described in 2. (2) C. above, particularly when an algorithm is used for signaling, the algorithm may interact with other algorithms momentarily and highly frequently, which poses a concern that competing firms may be able to raise prices by means of signaling without taking the risk of losing customers as a consequence of these customers' realization of such practice. Therefore, in relation to price increases among competing firms by using algorithms for signaling, paying attention particularly to the usefulness of such signaling to customers is considered beneficial.

D. Concerted practices by self-learning algorithms

There has been no specific case of concerted practices by self-learning algorithms up until today, as explained in 2. (2) D. above. However, since a recent economic analysis[49] achieved the result that price-setting algorithms using reinforcement learning took concerted actions, there are some concerns that algorithm-using firms may manage to have their prices set above competitive levels through the interaction of self-learning algorithms even where those firms do not intend to engage in concerted practices.

However, it has also been pointed out that the result of the economic analysis concerning concerted practices by the interaction of self-learning algorithms is not likely at present to be materialized in actual markets. For example, (1) since, according to the analysis, a significant number of algorithmic interactions is required before algorithms reach an equilibrium of concerted practices, there is a doubt that firms can tolerate long-term losses in the real world; (2) while the analysis assumes that the competitive environment is stable to a certain degree, the actual competitive environment is unstable and ever-changing. On these grounds, at present, questions have been raised about whether concerted practices by self-learning algorithms will be realized in real markets.[50] Furthermore, it is considered today that there has been virtually no case in which any

49 The same material as that under footnote 36 above
50 France-German Report (2019), pp. 45-52

reinforcement learning algorithms are actually used for actual price setting.

If concerted practices based on the interaction of self-learning algorithms are realized in a real market, and if prices are coordinated only as a result of mutually autonomous price setting by multiple self-learning algorithms, it is possible to suppose that this fact alone will not constitute an unreasonable restraint of trade.[51] However, at the present moment, in relation to concerted practices by self-learning algorithms, it is not clear whether the result of the economic analysis concerned will actually be materialized in reality, and there is still only an insufficient accumulation of cases and experience that can form the basis of discussions on whether self-learning algorithms will conduct concerted practices in a real market and, if they will, what processes such algorithms will go through. Therefore, with regard to concerted practices among self-learning algorithms, it is necessary first of all to focus on the feasibility and conditions of such practices and relevant technological trends.

- COLUMN -

Relationship between Actions Corresponding to the Communication of Intention between Algorithms and the Communication of Intention between Firms

It has been discussed whether consequences caused by black box algorithms, the behavior of which algorithm-using firms are not able to understand in detail, may be deemed as consequences caused as a result of the actions of algorithm-using firms.

This aspect has been discussed overseas, covering, for example, the following view and standpoint: the view that actions by algorithms can be regarded as the actions of algorithm-using firms by treating algorithms in the same manner as firms' own employees engaged in concerted practices[52]; and the standpoint that responsibility should arise only where there is a violation of any duty of care or reasonable standards for foreseeability, taking account of any potential discouragement of algorithmic development or utilization.[53]

Although discussions such as those above are not necessary in cases not involving concerted practices by black box algorithms, there may be various discussions, not limited to the realm of the Antimonopoly Act, on whether the behavior of algorithms/AI not intended by algorithm/AI-using firms can be considered as the actions of such firms. Accordingly, there remains a possibility that actions of algorithms/AI corresponding to the communication of intention (for example, self-learning algorithms' action of autonomously communicating future price information with each

51 As an exception, the communication of intention may potentially be found among firms in competition with each other if they use self-learning algorithms with a mutual recognition that the use of their algorithms leads to price coordination.

52 France-German Report (2019), p. 58

53 France-German Report (2019), pp. 57-58

other in some manner) may be construed as satisfying the requirement of "in concert with other enterprises" in the future.

If, for instance, concerted practices by black box algorithms can be interpreted as unreasonable restraints of trade, it is extremely difficult for algorithm-using firms to predict the results of such practices. Therefore, when the realization of black box algorithms' concerted practices which potentially constitute unreasonable restraints of trade becomes highly probable in the future, it is considered appropriate to raise the attention of algorithm-using firms by such means as fact-finding surveys in the initial stage.

Moreover, it is not considered appropriate in the first place, in terms of governance, to let the possibility arise that AI-using firms use AI while it is still a black box and thereby cause damage to their customers.[54] Therefore, when the realization of concerted practices by black box algorithms becomes highly probable, algorithm-using firms are expected to be able to explain the behavior of their algorithms to the extent possible by such means as explainable AI (a technology to enable humans to understand the basis of AI's reasoning). Furthermore, it is considered desirable that black box algorithms should be designed so that a firm using such an algorithm can promptly stop the operation of the algorithm when the firm identifies any action of the algorithm that can be a problem in light of the Antimonopoly Act.

4. Summary

The above sections provide an overview of the changes in the business and competition environments resulted from algorithmic price setting and price searching and outline the applicability of the Antimonopoly Act to each type of concerted practices by algorithms and relevant issues. As set out above, basically, the current Antimonopoly Act can cope with concerted practices by algorithms in many cases. However, at present, since concerted practices by self-learning algorithms, in particular, are still unclear in many aspects, such as how those algorithms are to be used for price setting in the market and what processes those algorithms go through before leading to concerted practices, it is necessary to continue to pay close attention to relevant technological developments and the ways those new technologies are employed, as well as to relevant cases.

Furthermore, in relation to concerted practices by algorithms, it is concerned that there may be an increase in the number of violation cases in which enterprises are involuntarily involved since, for example, there are

54 The "Social Principles of Human-Centric AI" of the Integrated Innovation Strategy Promotion Council, Cabinet Office holds up the principles of "Fairness, Accountability, and Transparency," stating, "Appropriate explanations should be given on a case-by-case basis depending on the application of AI and each particular situation, including such things as when AI is being used, how the AI data is obtained and used, and what measures have been taken to ensure the appropriateness of results obtained from AI operations."

a few contacts between enterprises. Therefore, from the aspect of preventing the occurrence of concerted practices by algorithms/AI, it is desirable that certain principles of governance over algorithms/AI should be disseminated, and that relevant enterprises should consider, in the stages of algorithmic development and utilization, algorithmic systems which can ensure prevention of violations of the Antimonopoly Act.[55]

55 For example, in relation to concerted practices using price-setting algorithms, Commissioner Vestager of the European Commission (for competition) (the designation as of the time of the event concerned; currently Executive Vice-President [for digital policies] and Commissioner [for competition]) proposed the concept of "compliance by design" to ensure compliance with competition laws in the design stage of such algorithms (speech in the Bundeskartellamt 18th Conference on Competition [Berlin, March 16, 2017]). https://wayback.archive-it.org/12090/20191129221651/https://ec.europa.eu/commission/commissioners/2014-2019/vestager/announcements/bundeskartellamt-18th-conference-competition-berlin-16-march-2017_en

II. Algorithms and unilateral conducts

This section covers problems and issues related to algorithms/AI and unilateral conducts.

With the development of e-commerce, various rankings have been provided to help consumers efficiently select products that meet their needs from a vast number of options, and the rankings have become an important factor in competition. In the Google Shopping case in Europe and other cases, arbitrary manipulation of rankings has been regarded as a problem under competition law, so we discussed the manipulation of rankings.

Next, one of the changes associated with the development of digital markets is that it has become possible to collect vast amounts of data about consumers, analyze it using algorithms/AI, personalize it, and use it in business activities. In this Study Group, we discussed personalized pricing as an example of business activities that use such personalization.

1. Ranking manipulation

(1) Changes in the business environment and competitive environment brought about by rankings

The development of e-commerce has enabled businesses to gain access to new sales channels and new markets, and as a result, more and more products and services are being offered to consumers at competitive prices. Meanwhile, since it takes a lot of time and effort for consumers to extract products and services that meet their needs from a vast number of options, various services that use algorithmic ranking are provided as a means for consumers to effectively extract products and services that meet their needs. Typical examples of such various ranking services include services for widely searching contents existing on the internet, rankings on online malls, and rankings on comparison shopping sites.[56] In addition, ranking is now possible based on searches using audio or image data as well as text.

Due to the nature of ranking, users (consumers) pay more attention to the top results.[57] For example, according to the Google Shopping case released by the European Commission, consumers click more frequently on the top results among the displayed search results. Specifically, in the

56 Some services that use rankings aim to provide ranking results themselves, such as search services, while others provide rankings as part of intermediation services, such as online malls. In this report, these services in which rankings are used are collectively referred to as "ranking services."

57 CMA (2021) also points out that due to the effects of ranking and ordering or position bias, the order in which search results are presented matters and consumers are more likely to choose options near the top of a list simply by virtue of their position, irrespective of the relevance, price or quality of the options.

case of general search results, the number of clicked times the top 10 results displayed on the first page accounts for about 95 percent of the total number of clicks.[58] Also, according to the estimates of private businesses, consumers tend to click on the top-ranked results.[59] Therefore, it is considered that the order of rankings has a considerable impact on the choices of users (consumers) who use the rankings to search for products and services, and on the sales of businesses that use the rankings to sell their products and services.[60]

Especially when a ranking service provides an important sales channel, it is an important factor in competition for a seller to have its products and services appear higher in the rankings.

(2) Comments related to algorithmic ranking

A. Ranking transparency

Although the order of rankings can be important in competition, the details of ranking mechanisms such as ranking algorithms are not clear for user businesses and consumers.[61] [62] In this regard, the "Interim Discussion Paper: Improvement of Trading Environment surrounding Digital Platforms"[63] states: "today's digital platform operators place algorithms supported by technologies including AI as an important factor of their rules and systems, and design and operate platforms based on analysis (i.e. profiling) using such algorithms. It is pointed out that this type of market tends to be essentially highly manipulative and non-transparent because digital platform operators can easily change the disciplines of the market based on their market power, or can provide information which is seemingly neutral but is actually biased by

58 Ibid. 6, p. 124.
59 E.g., a report by SEO firm Sistrix, "Why (almost) everything you knew about Google CTR is no longer valid" (https://www.sistrix.com/blog/why-almost-everything-you-knew-about-google-ctr-is-no-longer-valid).
60 In this Study Group, we have focused on the ranking order as a typical example. However, it is considered that there may be cases where the manner of displaying a ranking result influences the user's (consumer's) choice, for example, when contents other than the ranking result (e.g., advertisements) are displayed further above the ranking result on the page where the ranking result is displayed. It was also pointed out that "query recommendation," which is an additional keyword recommended when a user (consumer) enters a search query, may have the same effect as the ranking order, since it affects the query that the user (consumer) selects and ultimately affects the results that the user (consumer) sees.
61 According to the JFTC's "Report regarding trade practices on digital platforms (Business-to-Business transactions on online retail platform and app store)" (October 31, 2019), some service providers have revealed part of their ranking mechanisms, such as the main factors that determine search rankings. In addition, some service providers explain that the reason why they do not reveal the details of their search algorithms is to prevent unauthorized measures by user businesses from influencing the search results.
62 It was also pointed out that for some of the rankings, the population on which the rankings are based may not be clear to the users.
63 Ibid. 1.

manipulating parameters."[64]

- COLUMN -
Domestic and international efforts to improve the transparency of rankings

Regarding the ranking transparency, efforts are being made for some improvement both in Japan and abroad.

In Japan, the "Act on Improving Transparency and Fairness of Digital Platforms" requires the providers of specified digital platforms to disclose the basic matters that determine the search rankings.

Overseas, for example, the "Regulation on promoting fairness and transparency for business users of online intermediation services[65]" in Europe requires online intermediation service providers and online search engine providers to disclose the main parameters that determine the rankings.

B. "Dual role" in ranking

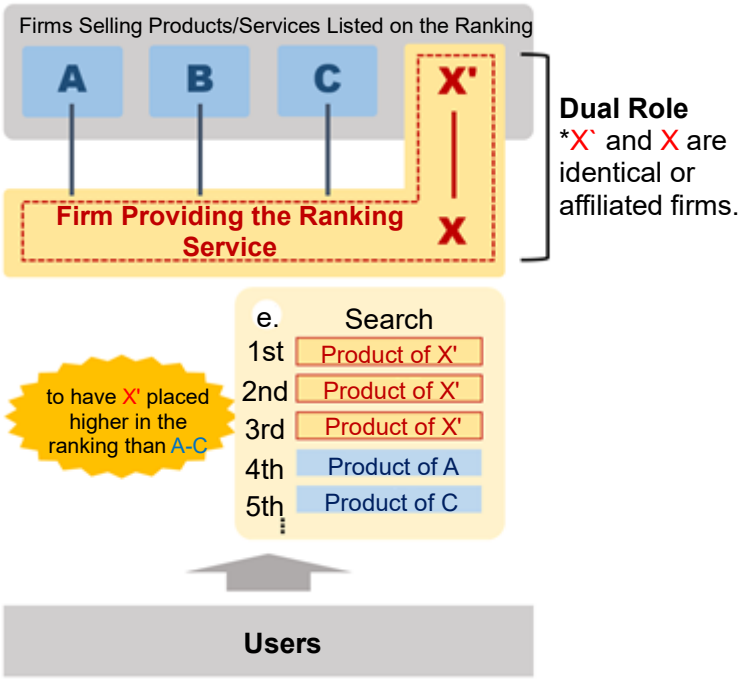
A ranking service provider may include its own products or services or those of its affiliates in the rankings. In the case that a ranking service provider includes its own products or services or those of its affiliates in the rankings along with products or services that compete with them, there is a concern that the service provider may use its position as a ranking service provider to arbitrarily manipulate ranking algorithms to treat its own or its affiliates' products or services favorably by displaying them at the top of the rankings, thereby enabling to eliminate[66] competitors from the supply market of such products or services.

64 Search and display algorithms are also discussed in "Chapter 2 Section 4-4. Acts which could lack fairness or transparency" (Ibid. 61), which provides thoughts on competition policy, arguing "in order to increase fairness and transparency of trade and ensure a fair competitive environment, digital platform operators need to 1) disclose main parameters and weights determining search rankings, and 2) give a notice to consumers if the digital platform operators put ads spot on the top of the search results so as not to give consumers mistaken impression."

65 Regulation (EU) 2019/1150 of the European Parliament and of the Council of 20 June 2019 on promoting fairness and transparency for business users of online intermediation services

66 Under the Antimonopoly Act, a violation can be recognized if there is a risk that new entrants or existing competitors will be excluded or that their trading opportunities will be reduced, and it does not require complete exclusion of competitors from the supply market of the relevant products or services.

[Figure 12] Dual role in ranking



Source: Created by the JFTC

For example, the JFTC's "Report regarding trade practices on digital platforms (Business-to-Business transactions on online retail platform and app store)" (October 31, 2019) states: "If a digital platform provides its own products and services, they may compete with businesses which open a store or sell products and services on the digital platform. Since a digital platform operator can basically set the conditions for usage of the digital platform, they could exclude competitors by using their status."[67]

(3) Cases where competition may be restricted in relation to algorithmic ranking

There have been several cases of conducts restricting competition related to ranking algorithms in other countries (Attachment 3), and the JFTC has also indicated conducts that may violate the Antimonopoly Act in its fact-finding report (Attachment 4). Based on these, the cases in which competition may be restricted due to an conduct by a business providing a ranking service (hereinafter in Section 2-1 referred to as a "provider") using

67 In addition to this, regarding transparency and dual role, METI's "Questionnaire Survey of Online Platform User Businesses" (2018), which was conducted of businesses that use online platforms (digital platforms) to do business, shows many respondents agree that "the method of determining the rankings and display positions of search results for products or services is arbitrary or opaque" and that "products and services directly sold by online platform operators themselves on their platforms are given preferential treatment."

a ranking service are organized as follows:

First, when a provider that holds an influential position in the ranking service market includes its own or its affiliates' products or services in the rankings as well, it may unfairly interfere with transactions between consumers and competing user businesses in the supply market of such products or services by, for example, arbitrarily manipulating the ranking algorithm to favor its own or its affiliates' products or services by placing them high in the rankings, or ensuring the provider or its affiliates have an advantage when the algorithm is modified.[68]

Next, there are cases where a provider that holds an influential position in the ranking service market treats a specific user business differently from other user businesses when determining the rankings, such as placing the products or services of the specific user business low in the rankings without any reasonable grounds, and such an act directly and significantly affects the competitive function of the specific user business in the supply market of the products or services listed in the rankings, and has an adverse effect on the order of fair competition among user businesses.[69]

In addition, as a result of positions in the rankings acting like penalties, they may be used to ensure the effectiveness of other contractual provisions and trading conditions, etc. For example, a provider that holds an influential position in the ranking service market may ensure the effectiveness of conditions that restrict competition by including compliance with unreasonable restrictive conditions, such as exclusive terms or parity terms that restrict transactions with other companies, in the ranking considerations.[70] Also, a provider that holds an influential position in the ranking service market may favor the ranking of sellers who use other products or services (e.g., payment and delivery services) provided by the provider itself or its affiliates, and may disfavor the ranking of sellers who do not, thereby unfairly interfering with transactions between competing businesses and their counterparties in the market of such other products

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68 Under the Antimonopoly Act, it could fall under "Interference with a Competitor's Transactions" constituting unfair trade practices, or private monopolization.
It should be noted that, for example, the act by a platform operator to favor the products or services of its own or a company closely related to it is called "self-preferential treatment," but the act of self-preferential treatment is not limited to manipulation of rankings, but also includes the act of using its position as a platform operator to sell its own products or services more favorably by using data obtained from the transactions of user businesses.

69 Under the Antimonopoly Act, it could fall under "Discriminatory Treatment" and others constituting unfair trade practices.

70 Under the Antimonopoly Act, it could fall under "Trading on Exclusive Terms," "Trading on Restrictive Terms," and others constituting unfair trade practices.

or services.[71] There may be other cases in which a provider in a superior position to user businesses, without any justifiable reason, goes beyond the normal setting and operation of algorithms, and sets and operates algorithms that discriminate against user businesses that do not comply with its requests, and thereby lowers the rankings of such user businesses. The provider, then, may unfairly disadvantage such user businesses in light of normal business practices, for example, by forcing them to change the terms and conditions of transactions favorably for the provider in exchange for improving their rankings.[72]

In addition, the act of arbitrarily manipulating a ranking algorithm is also problematic from the perspective of the possibility of unfairly distorting consumers' choices.[73]

(4) Investigation of the performance of algorithms

When competition authorities, such as the JFTC, investigate cases in which the conducts indicated in (3) above are suspected, it may be useful to investigate the performance of algorithms. Also, in other algorithm-related cases including concerted practices by algorithms, it may be useful to investigate the performance of the algorithms. Deciding on the methods to investigate the performance of algorithms is a challenge in this case, but the methods used by organizations that perform algorithm validation can be used as reference.

The first method is to check input data and output data of the algorithm. With regard to the training data to be input when constructing an algorithm, we may check whether there is anything unnatural in the data acquisition period or population, or check the data selection criteria or whether arbitrarily selected data is included. For example, if a ranking algorithm uses users' log data as training data and changes the results for each user, it may be useful to check the records and see if the training-data selection criteria is appropriate or if there is any arbitrary selection of training data. In addition, it may be useful to check the output data against the data actually input to the constructed algorithm, to see if there is any output data that is

71 Under the Antimonopoly Act, it could fall under "Interference with a Competitor's Transactions" and others constituting unfair trade practices.

72 Under the Antimonopoly Act, this case could fall under "Abuse of a Superior Bargaining Position" constituting unfair trade practices.

73 An act of distorting consumers' choices is considered to be a problem from two possible perspectives: the perspective of competition policy when it adversely affects competition, and the perspective of consumer policy. There have been cases in other countries too where it was considered a problem from the perspective of competition law (the Naver case in South Korea [October 2020], Attachment 3) and from the perspective of consumer protection (by the Netherlands Authority for Consumers and Markets and others regarding the Booking.com commitments [December 2019]).

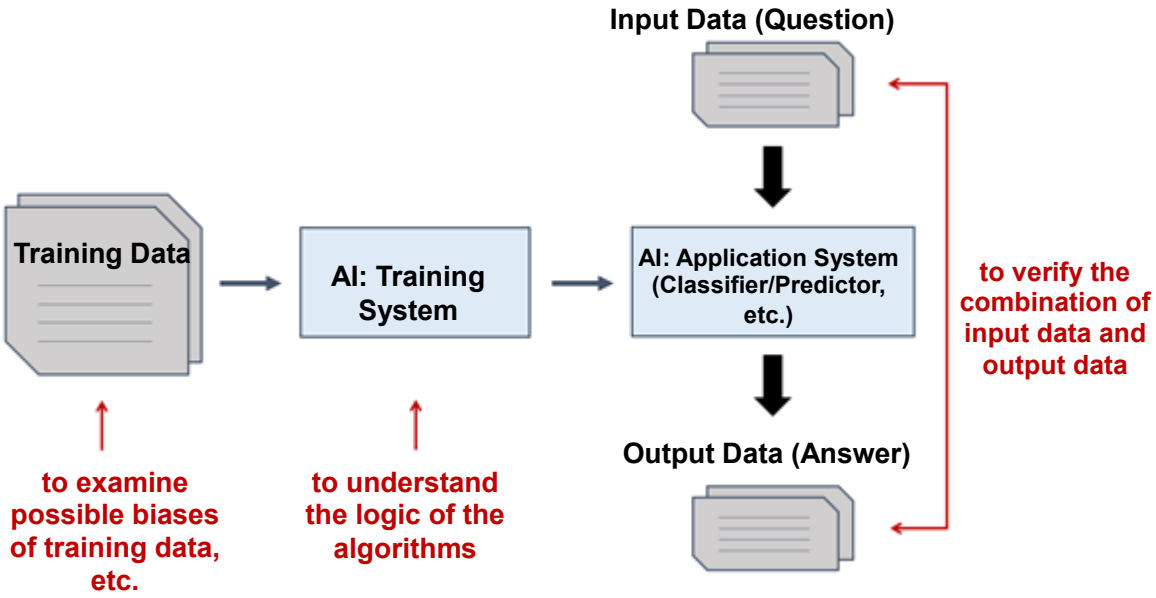
clearly unreasonable, or if anything feels wrong.

It is also possible to understand the logic of an algorithm from internal documents or source codes. For example, if it is a ranking algorithm, we may try to obtain from the provider something that explains the characteristic values (parameters) of the rankings.

Also, if there is no problem with the algorithm's logic, we may verify numerically whether there is any discrepancy between the logic and the actual operation, and narrow down the operations that cannot be explained by the logic. Possible methods include: (1) the competition authority building a model with the same logic, comparing the results of that model with the results of the algorithm to be verified, and checking the differences; (2) checking the output data when varying the input data at certain intervals, and verifying that there is no unnatural operation (if exhaustive input is difficult, it may be possible to create a certain scenario based on the logic, and check whether the output data for the input data generated by the competition authority is in accordance with the logic); (3) for a complex algorithm, using a simpler model, such as a linear model, to approximate the algorithm, thereby separating the parts that can be explained by the simpler model from the parts that cannot.

When verifying the operations, especially of complex algorithms, it may be useful to statistically check the output data against the input data. For example, if information related to the attributes of individual users is used as a parameter for a ranking, it is possible to actually generate data of users with various attributes, check the gap in the output data against it, and verify the gap statistically.

[Figure 13] Searching the operations of algorithms (image)



Source: Created by the JFTC based on p.3 of Nakagawa Hiroshi, "AI Technology" (Document 1 of the second meeting of the Study Group on Competition Policy in Digital Markets, Sept. 18, 2020)

In the digital field, there are many cases in which businesses operate across national borders. Therefore, in such investigation of algorithm operations, it is believed to be an important challenge of the JFTC to work with overseas competition authorities in the future.

- COLUMN -

Reports by overseas competition authorities on methods for investigating the performance of algorithms

Methods for investigating the performance of algorithms have been discussed in several reports by foreign authorities. The contents of these reports have something in common with the methods discussed in this Study Group ((4) above).

(1) German-French Report (2019)[74]

In the German-French Report (2019), the following methods were identified as analytical approaches to investigate the functions and operations of algorithms:

- ○ Analyzing the code. Particularly in descriptive algorithms, it is considered to focus on the function in question and then analyze the relevant parts of the code.
- ○ Obtaining actual input and output data of the past and analyzing the

74 German-French Report (2019) pp. 67-73

relationship between them

- ○ Generating input data and simulating the algorithm's operation. Specifically, competition authorities generate the most suitable input to understand the algorithm's operations, and then simulate the algorithm's operations based on that input.
- ○ In the case of very complex machine learning, approximating the algorithm to a simpler algorithm to make it understandable to humans (explainable AI).

(2) CMA (2021)[75]

CMA (2021) divides the methods to investigate harms caused by algorithms in two ways: those not requiring the regulator to access the data and algorithms of a business, and those requiring the data of a business.

In the former case, it is difficult to isolate and analyze a specific algorithm from a system, etc. in which the algorithm is used, but it is possible to analyze the input and output data of the entire system. Thus, the report suggests that it is useful to investigate a system without accessing the code of the algorithm, and also presents several methods, e.g., obtaining the cooperation of consumers as digital mystery shoppers, and points to keep in mind.

For the latter case, the report states that it is possible to audit a decision-making system through a more thorough and comprehensive investigation, and lists available methods when the code is accessible: dynamic analysis, where the code is analyzed automatically through its execution; static analysis, where the code is isolated from its environment and format errors are identified; and a manual code review. The report also notes that when analyzing data and code, it is important to obtain the organization's internal documents, pseudocode, and general explanations to understand the context of the development and use of the algorithm. The report also points out that it is also useful to analyze input and output data, and that in the case of machine learning, investigating the training data may reveal bias issues.

(5) Summary

In the above, the Study Group has organized the cases in which restrictions of competition may occur in relation to algorithmic rankings, and discussed possible ways for competition authorities to investigate the performance of algorithms.

In digital markets, as the role of digital platforms is becoming more important, the ranking order is also becoming more important for competition. The JFTC should take strict action against the conducts of providers that restrict competition by, for example, arbitrarily operating

75 CMA (2021) Chapter 3

algorithmic rankings in favor of themselves. To this end, it is desirable for the JFTC to actively co-operate with external experts and train its own employees to develop and accumulate relevant knowledge, such as knowledge on algorithms/AI and statistics, so that the JFTC could properly verify conducts restricting competition that use complicated algorithms such as ranking algorithms.

2. Personalization

(1) Changes in the business and competitive environments brought about by personalization

With the development of the digital market, it has become possible for businesses to collect a vast amount of personal data online, such as consumer attribute information and behavioral history. Using various consumer data collected, businesses can conduct highly accurate analysis with algorithms/AI to provide more precise personalization [76] in the distribution of advertisements, proposals of products and services (recommendations), and display of search results.

In order to achieve highly accurate personalization, it is important for businesses to collect data on consumer characteristics and behavior. The collected data includes (1) data that consumers provide to businesses by filling out online forms, such as name, address, telephone number, date of birth, and occupation (volunteered data), (2) data observed by businesses, such as cookie information, IP address, operating system (OS) information, and past purchase history (observed data), and (3) data about consumer characteristics obtained from these data through data analysis and machine learning (inferred data). [77] [78] With the advancement of digitalization, it has become possible to use not only data that consumers intentionally provide directly to businesses, but also observed and inferred data at a high level, and it has been pointed out that personalization may take place beyond the scope of consumers' full understanding.[79]

While algorithmic personalization contributes to the interests of consumers by allowing businesses to provide products, services, and information that meet the needs of each consumer, it can also be viewed as discriminatory treatment of consumers in terms of price and other transaction terms. As described in (2) B below, goods provided in the digital market are considered to meet the conditions that facilitate the implementation of price discrimination using algorithmic personalization.

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76 Here, "personalization" refers to the act of analyzing information about the other party in a transaction and optimizing the company's products and services, its presentation methods, prices, and other transaction terms, etc., according to the interests, concerns, and preferences of the other party.

77 For the distinction between volunteered, observed and inferred data, see World Economic Forum (2011), "Personal Data: The Emergence of a New Asset Class," p. 14.

78 In addition, there may be cases where a business acquires data from a third party. Such data will be utilized, if there is other data already held by the business concerned, after a process called "entity resolution," which brings together the data of the same person.

79 OECD (2018) "Personalised Pricing in the Digital Era" (hereinafter in Section 2-2 referred to as "OECD (2018)") pp. 10-11

Therefore, the study group discussed personalized pricing, which estimates willingness-to-pay of consumers for a product or service offered in digital markets and sets the prices based on these estimates. Since the OECD and the UK competition authority have also discussed or studied personalized pricing, we organized issues and discussion points based on these prior discussions.[80]

(2) Overview of personalized pricing

A. Definitions, etc.

There are multiple definitions to personalized pricing. In a narrow sense, it is the first-degree (perfect) price discrimination[81], which is the setting of individual prices for each consumer.

In this study group, we used a broader definition than the first-degree price discrimination, just like the definitions[82] used in OECD and other countries' reports. Specifically, personalized pricing is defined as "the setting of different prices (for the same product or service) by a business for each consumer or group of consumers based on their characteristics and behavior, so that the prices correspond to the estimated willingness-to-pay of each." This includes cases of discrimination not only by individual consumers, but also by categories of consumers, as well as cases of not only charging the full amount of the consumer's willingness-to-pay, but also offering a price corresponding to that amount.[83]

On another note, the so-called dynamic pricing is a mechanism to change prices in accordance with changes in supply and demand. For example, similar products may be priced differently depending on the timing of the consumer's purchase, but this does not mean discrimination based on the characteristics of individual consumers. In this respect, it differs from personalized pricing, which is pricing based on the characteristics of individual consumers.[84]

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80 OECD (2018), OECD(2016) "Price Discrimination", CMA (2018) "Pricing algorithms-economic working paper on the use of algorithms to facilitate collusion and personalised pricing", and OFT (2013) "The economics of online personalised pricing" (hereinafter in Section 2-2 referred to as "OECD (2016)," "CMA (2018)," and "OFT (2013)," respectively) were the primary references. In the following, we may have referred to these previous studies without providing any particular footnotes.

81 For the first- to third-degree price discrimination used in economics, see, for example, Hanazono Makoto, "Industrial Organization and Business Economics" (Yuhikaku, 2018), Chapter 2 Price Discrimination.

82 E.g., OECD (2018) p. 9, CMA (2018) p. 36

83 Note that not only the price, but both the price and the product may be customized to consumers (versioning, the second-degree price discrimination) (OECD (2018), p. 8). In digital markets, it is believed that a product itself is often customized or comes with additional services based on consumer data.

84 OECD (2018) p. 9

B. Market conditions, etc. favorable to the implementation of personalized pricing

It is said that there are three basic market conditions that facilitate the implementation of personalized pricing:[85] (1) it is possible for the business to estimate the willingness-to-pay of each consumer for a product or service, (2) resale (arbitrage) of the product is not possible, and (3) the business has a minimum level of market power[86].

In light of these conditions, we examine whether personalized pricing is likely to be implemented in digital markets.

First, with regard to condition (1), in digital markets, it is easy to collect a wide variety of data from various sources, and it is thought analyzing the collected data with sophisticated algorithms/AI makes it easy for businesses to estimate each consumer's willingness-to-pay with relative accuracy. For example, data tends to be concentrated in digital platform operators due to network effects, economies of scale, and economies of scope, and these operators are thought to possess a large amount of information on each user, such as address, age, occupation, location information, OS information, browsing history, and purchase history. When information about an individual is concentrated in a specific business like this, it is thought to be possible to estimate the willingness-to-pay more precisely by analyzing the data using algorithms/AI. An example of using personal information to fluctuate prices is found in China, where digital platform operators effectively fluctuate the price of services they offer based on the credit score of each consumer.[87]

Next, with regard to condition (2), in digital markets, there are many cases where the provision of products and services is strongly linked to online personal IDs, for example, in subscription services, and as a result, it is considered that there are increasing cases where products that were previously resalable are no longer resalable.

As for condition (3), in digital markets, especially in the market of digital platform operators, customers tend to be further concentrated in operators that have secured a certain number of customers due to characteristics such as two-sided markets, network effects, low marginal

85 Fuchikawa Kazuhiko "Evaluation of Personalized Pricing under Competition Law" (Document 1 of the fifth meeting of the Study Group on Competition Policy in Digital Markets, Dec. 4, 2020) p. 10 (See OECD (2016) p. 9, OECD (2018) pp. 12-13)

86 A minimum level of market power is required because in a competitive market, competition results in a reduction of prices to marginal costs, thereby making price discrimination impossible.

87 Ibid. 15 (MIC "The 2020 White Paper on Information and Communications in Japan"), Chapter 1 Section 2 Addendum, pp. 95-96

costs, and strong economies of scale. In addition, the concentration of the market tends to increase after a certain number of years because the concentration of data causes high switching costs for users and the lock-in effect occurs.[88] [89]

Based on the above, it is thought that the conditions are relatively favorable for the implementation of personalized pricing in digital markets.

C. The state of implementation of personalized pricing

There is no comprehensive survey on the state of implementation of personalized pricing in Japan. It is thought that many businesses may be cautious about implementing personalized pricing, which sets a main unit price for each consumer, because consumers may react negatively to such pricing as being unfair. Meanwhile, there is a possibility that personalized pricing is implemented in a way that is more acceptable to consumers, e.g., by issuing different discount coupons for each consumer, or changing the rate of reward points based on customer information such as purchase history, or by differentiating the prices of various costs associated with the transaction of the main unit.

OECD (2018) presents several cases from abroad. According to a survey of more than 500 businesses conducted by Deloitte, 40% of businesses using AI to personalize the customer experience used AI to personalize pricing and promotions in real time.[90] Also, in an experiment conducted by Northeastern University in 2014, they prepared a large number of virtual accounts with various attributes such as different cookies, browsers, OSs, IP addresses, etc., and compared the prices given by e-commerce websites displayed on each account in a method that eliminated the effect of price differences caused by factors other than personalization. As a result, they found that four general retailers and five travel websites engage in some form of personalized price discrimination.[91] In addition, the report presents a case where some consumers noticed that Uber was charging different prices for driving the same route at the same time in 2018, and a case of Amazon around the

88 See Section 4-1 (1) below.
89 In relation to the condition (3), it was pointed out that in digital markets, products and services themselves tend to be customized for each consumer, and proposals of them to consumers (recommendations), sales conditions, and sales methods are personalized, which tends to fragment the market, so appropriate market definitions (scope of products and services) may become an issue.
90 Deloitte (2018) "Consumer Experience in the Retail Renaissance" p. 11
http://dmi-org.com/downloads/2018_03_consumer-experience-in-the-retail-renaissance.pdf
91 OECD (2018) p. 16
Aniko Hannak et al. 2014. "Measuring Price Discrimination and Steering on E-commerce Web Sites"
https://www.ftc.gov/system/files/documents/public_comments/2015/09/00011-97593.pdf

year 2000 where the prices of DVDs and some other products which had been sold to general consumers at high price fell when cookies were deleted. With regard to the latter case, Amazon later explained that the difference in price was the result of random price testing (not personalized pricing) and refunded the excess to all who purchased the products.[92]

(3) Efforts in other fields related to personalized pricing

Personalized pricing has been pointed out as an issue from the perspective of consumer exploitation, fairness, and transparency, and since it is an act using data about individuals, it can be also relevant to consumer policies and personal information protection policies, as well as competition policies.

A. Consumer policies

The Consumer Affairs Agency's "Study Group on the Improvement of the Environment for Consumer Transactions Involving Digital Platform Companies" examined personalized pricing as an issue related to display of information based on personal data profiling. According to the summary of the discussion points[93], this Study Group recognized issues regarding personalized pricing, such as whether consumers should be informed of whether prices are personalized or not, and how personalized pricing should be viewed in the first place. The summary then states that since the actual situations in Japan are not clear, it is necessary to grasp the actual situations by examining what kind of personal data should be used and when it should not be used in order to benefit consumers, as well as to further study the situations in the future.

As an example of regulations in other countries, the EU Consumer Rights Directive states that if prices are personalized based on automatic decisions, businesses must provide its information to consumers.[94]

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92 OECD (2018) pp. 16-17
Abnett, K.. 2015. "Will Personalised Pricing Take E-Commerce Back to the Bazaar?". Business of Fashion. https://www.businessoffashion.com/articles/fashion-tech/personalised-pricing-turns-e-commerce-online-bazaar.
More cases can be found in p. 12 of footnote 85 above.

93 "Summary of Discussion Points by the Study Group on the Improvement of the Environment for Consumer Transactions Involving Digital Platform Companies" (Consumer Affairs Agency, Aug. 24, 2020) pp. 21-23

94 Article 6 (ea) (For Japanese translation, Document 4 of the seventh meeting of the "Study Group on the Improvement of the Environment for Consumer Transactions Involving Digital Platform Companies" was consulted.)

B. Personal information protection policies

The "Act on the Protection of Personal Information" in Japan has no provisions that directly regulate personalized pricing or profiling[95].[96] As an example of foreign regulations, the EU's General Data Protection Regulation (GDPR) includes provisions on profiling, which state: "The data subject shall have the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her."[97]

(4) Economic effects of personalized pricing

Personalized pricing is a type of price discrimination in which prices are changed for each individual consumer based on his or her characteristics and other factors. The economic effects of price discrimination (including the effects on total surplus and consumer surplus) can be summarized as follows:

A. Effects of increased output

If a business with a certain level of market power implements personalized pricing, it will be able to sell products and services at lower prices to consumers who have a willingness-to-pay less than the normal uniform prices if personalized pricing were not implemented. As a result, more consumers will have access to the products and services, and output will increase (total surplus [consumer surplus + producer surplus] will also increase).[98]

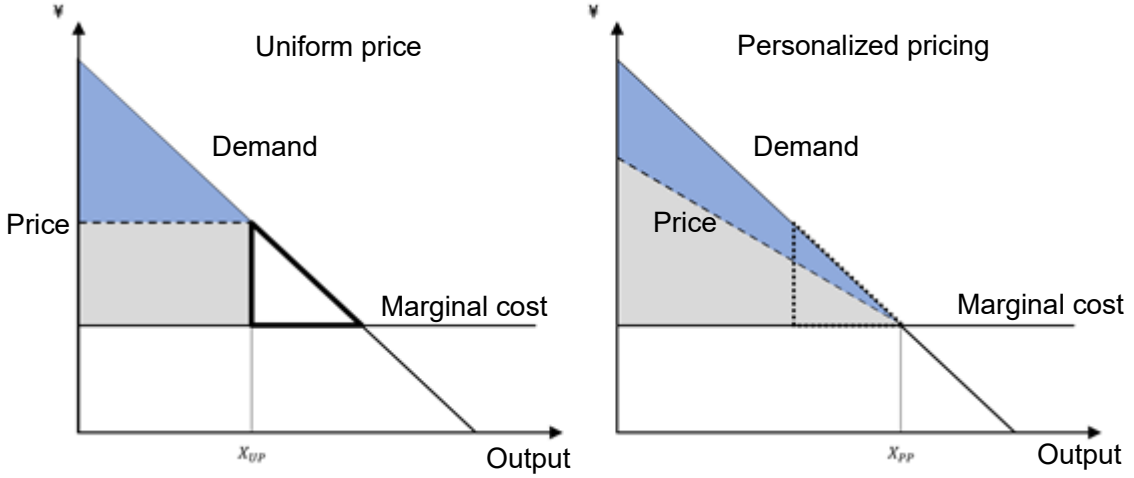
95 Article 4 (4) of EU's General Data Protection Regulation (GDPR) defines profiling as "any form of automated processing of personal data consisting of the use of personal data to evaluate certain personal aspects relating to a natural person, in particular to analyze or predict aspects concerning that natural person's performance at work, economic situation, health, personal preferences, interests, reliability, behavior, location or movements".

96 The Personal Information Protection Commission is currently discussing the possibility of requiring businesses to specify the purpose of use of personal information to the extent that the individual can reasonably predict how his/her personal information will be handled, including profiling, in the Guidelines of the Personal Information Protection Act (Document 1, the 155th meeting of the Personal Information Protection Commission [October 14, 2020]).

97 Article 22, Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 (For Japanese translation (tentative translation), the Personal Information Protection Commission's website was consulted.)

98 Matsushima Noriaki "Overview of individual prices" (Document 2 of the fifth meeting of the Study Group on Competition Policy in Digital Markets, Dec. 4, 2020) p. 3, OECD (2018) pp. 18-19, OECD (2016) p. 10, OFT (2013) pp. 23-24

[Figure 14] Effects of increased output in personalized pricing



Source: Created by the JFTC based on the diagram on p. 19 of OECD (2018). Blue indicates consumer surplus, and gray producer surplus. The total surplus is represented by "blue + gray." Comparing the left and right figures, in the case of personalized pricing (right figure), the total surplus (blue + gray) increases (by the area enclosed by the bold line in the left figure) because consumers who were not supplied with products and services in the case of a single price (left figure) will now be supplied with products and services.

B Distribution effect

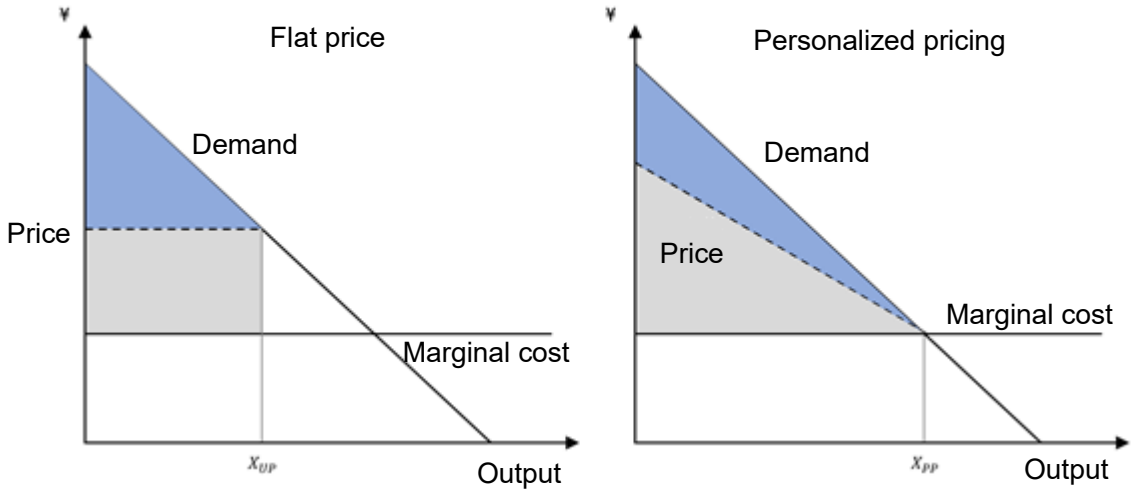
If a firm with a certain market power exercises personalized pricing, consumers who have a willingness-to-pay more than the uniform price if personalized pricing were not implemented are more likely to pay for a higher price. Accordingly, at least some of consumer surplus is transferred to producer surplus[99] [100].The degree of distribution effect varies depending on the degree of perfection of personalized pricing. If personalized pricing is perfect, or if a firm can identify individual consumers and accurately estimate each consumer's willingness-to-pay (if first-degree price discrimination is implemented), the firm captures all surplus (or the total surplus is equal to the producer surplus) ending up with no consumer surplus. On the other hand, if the firm's ability of personalized pricing is not perfect, the consumer surplus increases more than when its ability is perfect. Taking [Figure 15][Figure 1as an example, the slope of the personalized pricing curve varies depending on the firm's

99 See the footnote 98 above (Noriaki Matsushima "Overview of individual prices") p. 3, OECD(2018) p. 20, OECD(2016) p. 10, OFT(2013) pp. 21-22

100 With regard to the possibility that a firm can capture more producer surplus due to personalized pricing, it was pointed out that a firm with a larger amount of data collected/owned can accurately implement personalized pricing, and if the firm can get more profit and then invest the profit, it can be more influential than its competitors, which facilitates further monopoly or oligopoly.

ability of personalized pricing, and the lower the firm's ability of personalized pricing, the gentler the slope of price curve and the greater the consumer surplus.

[Figure 15] Distribution effect from personalized pricing



Source: Prepared by the JFTC based on the figure on Page 21 in OECD (2018)
The blue and gray parts show the consumer surplus and producer surplus, respectively.

C Pro-competitive effect

In a competitive market where multiple firms compete with each other, price discrimination including personalized pricing has the pro-competitive effect to win competitors' customers because they can set low prices only to customers of their competitors. In this case, under certain conditions, all consumers can make purchases at a price lower than the usual flat price with no personalized pricing applied[101]. Thus, at least in a market with price competition with multiple firms, it is pointed out that it is unrealistic that price discrimination such as personalized pricing can be unprofitable for consumers[102].

101 See the footnote 98 above (Noriaki Matsushima "Overview of individual prices") pp. 4-8 (Thisse, J.-F. and X. Vives. 1988. On the strategic choice of spatial price policy. American Economic Review 78(1) 122-137), OECD(2016) pp. 10-11, OFT(2013) pp. 25-26 for the case where prices offered to consumers are lower than the flat prices due to price competition promoted by individual prices

102 OECD(2018) p. 20, OECD(2016) p. 11. It was pointed out that it must be considered that decrease in consumer surplus may occur due to personalized pricing in some cases even in cases with price competition with multiple firms. For example, besides a previous research that shows the possibility that all the consumer surplus may be exploited due to personalized pricing when individual firms exclusively own their customer information (Chen, Z., C. Choe, and N.Matsushima. 2020. Competitive personalized pricing. Management Science 66(9) 4003-4023), another previous research that the consumer surplus decreases due to price discrimination under the model where consumers can purchase the goods in multiple units can also apply to personalized pricing (Curtis Taylor a, Liad Wagman Consumer privacy in oligopolistic markets:Winners, losers, and welfare. 2014. International Journal of Industrial Organization 34 (2014) 80–84).

Additionally, in a market with a high switching cost, if a new entrant can reduce its prices only for a customer who it wants to take away from its competitors, entering in the market becomes easier[103]. In this regard, however, it is pointed out that enough data on consumers is required for precise personalized pricing, and as it generally unrealistic that new entrants to the market have an advantage in data collection over existing firms, situations where the pro-competitive effect like this works are limited[104].

In addition, personalized pricing can make it difficult to concertedly fix prices based on agreements between firms, and mutually monitor their prices to ensure the effectiveness of concerted practices[105].

(5) Cases where personalized pricing could be problematic in terms of competition policy

The Study Group discusses the cases where personalized pricing for products/services provided in digital markets could be problematic in terms of competition policy[106].

Personalized pricing is a way of price discrimination which differentiate prices by consumers based on the features of individual consumers, etc. and as mentioned in (4) above, price discrimination may not only increase the efficiency by expanding output but also be both pro-competitive and anti-competitive[107]. In the general way of thinking of discriminatory considerations, in economic activities, differences in transaction prices depending on the transaction amount, payment conditions and delivery conditions are commonly seen, and if different transaction prices or conditions are reflecting the supply-demand relationship, it is not appropriate to suggest that such differences may essentially have a risk of impeding fair competition[108]. Based on these discussions, it is not appropriate for personalized pricing for products/services in digital markets to be uniformly regulated as harmful.

First of all, as mentioned above, in a competitive market with multiple firms, as competitions are often promoted by personalized pricing, basically it could be problematic in terms of competition policy when an influential

103 CMA(2018) p. 36
104 It was pointed out that in order for such pro-competitive effects to occur effectively, a mechanism such as data portability involving transaction data may be necessary.
105 See p. 23 shown in the footnote 85 above (See OECD(2018) p. 21, CMA(2018) pp. 43-44, 46)
106 See pp. 18-19 shown in the footnote 85 above
107 Besides, it is pointed out that personalized pricing may be problematic in terms of fairness and reliability in the markets (p. 9 shown in the footnote 85 above).
108 The JFTC “Guidelines Concerning Unjust Low Price Sales under the Antimonopoly Act” 5 (1) B.

firm in the market exercises personalized pricing.

In the general way of thinking of discriminatory considerations, it could be problematic under the Antimonopoly Act when an influential firm sets low prices only to customers of its competitors to exclude the competitors from the market, resulting in adverse effects on the fair competitive order[109]. In digital markets, collecting consumer attribute and transaction data and analyzing such data by means of personalization methods allow an influential firm in the market to easily identify highly potential consumers of its competitors. If the firm attempts to exclude its competitors including new entrants from the market by offering low prices only to customers of its competitors using the ability of individually setting prices, it could be regulated by the Antimonopoly Act (called “selective pricing”)[110].

Besides the above, as for products/services provided in digital markets, it is pointed out that exploitation from consumers is likely to occur due to personalized pricing. For example, if a normally-resalable product is sold by being linked to an individual ID online in digital markets, resale between consumers becomes difficult, and if resale is possible, the consumer could purchase the product at lower price, however, has no choice but to purchase at higher price, which leads to potential exploitation. [111].

As mentioned earlier, it is thought that in the general way of thinking of discriminatory considerations, selling a product to specific consumers at a higher price does not necessarily directly lead to interference with fair competition, and there is a thought that addressing exploitation from consumers by policy response from the perspective of consumer protection is more appropriate. With regard to exploitation from consumers associated with personalized pricing in digital markets, further discussions on the following issues are required: specifically how personalized pricing can be exercised in digital markets; in what kind of situations personalized pricing has adverse effects on consumers; and out of personalized pricing strategies adversely affecting consumers, which should be dealt with under

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109 See the footnote 108 above

110 For example, this may fall into private monopolization or “discriminatory consideration”, “unjust low price sales” or “interference with a competitor's transactions” constituting unfair trade practices. Also in Japan, not a case in digital markets, but there was a case of pricing strategy targeting competitors’ customers, which was problematic under the Antimonopoly Act. For example, Usen Broad Networks case (the JFTC Decision, 13 October 2004 and Tokyo District Court Judgment, 10 December 2008) and Tokyo Juki case (the JFTC Decision, 9 January 1963) where Tokyo Juki unjustly interfered with transactions between other firms by inducing them to change their suppliers to Tokyo Juki by discounting all or some receivables. (See p. 18 shown in the footnote 85 above)

111 It was pointed out that, in relation to exploitation-type pricing strategy, especially for billing high prices only to vulnerable consumers who have no choice but to purchase from the firm in question, it is significant to see it as a social issue (Relevant literatures include: Alex Schofield. (2019). "Personalized pricing in the digital era". Competition Law Journal Volume: 18 Issue: 1 p. 39 [pp. 35-44 in the entire literature])

the Antimonopoly Act.

It is pointed that transparency of personalized pricing needs to be ensured in order to reduce the risk of negative impact on consumers[112]. In consideration of the issues of personalized pricing pointed out from the perspective of exploitation from consumers and fairness, in order to help consumers make an appropriate choice and promote competitions, firms are expected to voluntarily disclose information of personalized pricing if it is introduced and provide how to opt out of it from the perspective of competition policy.

(6) Summary

The earlier sections provided an overview of personalized pricing as an example of personalization used in the business activities while discussed economic effects of personalized pricing and possible responses through competition policy related to personalized pricing. The actual situation of personalized pricing has yet to be clear so far, and the JFTC needs to pay attention to potential changes in pricing, which vary as personalized pricing-related technologies evolve[113].

It is also important for the JFTC to co-operate with the relevant authorities to address problems regarding personalized pricing, where necessary.

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112 OECD(2018) "Executive Summary of the discussion on Personalised Pricing in the Digital Era" p .3. In addition, as mentioned earlier, in EU, personalized pricing is regulated in Article 6 (ea) of the Consumer Rights Directive, “the trader shall provide the consumer with the following information (…) where applicable, that the price was personalised on the basis of automated decision-making”.

As mentioned in the footnote 96 above, in Japan, the Personal Information Protection Commission is proceeding with its discussion.

113 With regard to this matter, recently there are movements to limit the use of third-party cookies used for displaying ads according to users’ interests, intents and attributes and to develop alternative systems by web browser providers from the perspective of protecting users’ privacy (the JFTC, Fact-finding Survey Report on Digital Platform Operators' Trade Practices (Final Report Regarding Digital Advertising) (February 17, 2021) pp. 97-99). It is necessary to pay attention also to changes in these technologies related to personalized pricing.

III. Algorithms/AI and Competitiveness

As the use of algorithms and AI becomes increasingly important in competition, it is useful to discuss the factors supporting the competitiveness of algorithms and AI. From this perspective, we discussed how data can create competitive advantage in competitions using algorithms/AI. At the same time, we also discussed the structure of AI technology stack and market trends.

1. Data and competitive advantage

With the increased use of algorithms/AI in the business activities, cases where algorithms/AI contribute to increased competitiveness in a specific product/service market are on the rise, greatly affecting improved quality/performance of the product/service[114]. Under the Antimonopoly Act, it is not problematic at all that a firm obtains competitive advantage by fair competitive means, it is useful, however, to discuss how algorithms/AI can contribute to the competitive advantage in the market, in order to properly determine, for example, the influential position of the firms using algorithms/AI, barriers to entry, and established, maintained and enhanced market power and others. There are some cases[115] in other countries, where the competitive advantage through the application of algorithms/AI is considered.

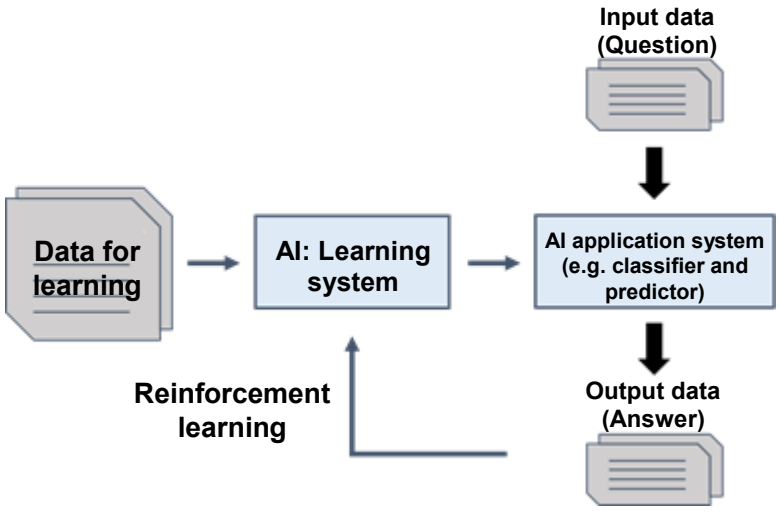
Generally the competitiveness of algorithms/AI comes from “an advantage in terms of technology” [116] with algorithms/AI highly capable of analyzing/processing data, which have been constructed with a significant amount of time and resource invested, and “an advantage in terms of data” generated by the accessibility to competitively important data[117].

Especially in competition in products/services using machine learning, as a trained model with a huge amount of data learned may define the quality of

114 Data Study Group Report points out the possibility that machine learning can expand the range of products to be improved in quality due to high accuracy of mechanical identification/analysis of things and sounds as machine learning and deep learning have developed (p. 8).
115 Examples include the Google Shopping case mentioned in the footnote6 above and the U.S. Department of Justice's antitrust lawsuit against Google (United States v. Google LLC (Oct. 20, 2020)).
116 In the Google Shopping case mentioned in the footnote 6, in the dominance assessment of Google for the market for general search services, the European Commission concluded that the significant investments in terms of time and resources required to establish a fully-fledged general search engine can be barriers to expansion and entry in the general search services market (p. 62). Also in the U.S. Department of Justice's antitrust lawsuit against Google, the plaintiff pointed out that establishing and maintaining a general search engine require significant investments, high and complex technologies, effective access to logistics and sufficient scale, which are barriers to entry in the general search services market (p. 31).
117 Satoshi Ogawa “Algorithms, AI and competitive advantage” (Material 1 for the Study Group on Competition Policy in Digital Markets [7th meeting] on Feb. 8, 2021) p. 5. Read the column titled "Algorithms and market power" in the joint paper pp. 22-23 (2019) by French and German competition authorities.

products or services[118], it is assumed that the competitive advantage of algorithms/AI comes also from the accessibility to competitively important data (those with high relativity in terms of improvement in the quality of products/services)[119]. For example, in the Google Shopping case in EU, it is pointed out that in order to effectively function in a market, it is necessary for general search engines to have a certain amount of search queries entered, and the more the search queries entered, the faster the detection of changes in users' behavior and the higher the relativity of search results[120].

[Figure16] Relation between algorithms/AI and data



Source: Restructured by the JFTC based on NAKAGAWA Hiroshi “AI Technology” Page 3 (in Material 1 for the Study Group on Competition Policy in Digital Markets [2nd meeting] on Sept. 18, 2020)

For evaluating the competitive importance of data, the degree of advantages of data owned/collected by a firm is considered, in comparison with those available to its competitors from the perspective of the so-called 4Vs of data: (1) amount/scope of collection of data owned by the firm (Volume): (2) frequency of data collection (Velocity); (3) type/diversity of owned/collected data (Variety); and (4) relationship with improvement in value of owned/collected data and in quality of products/services (Value)[121]

118 Machine learning has a feature that helps improve the quality of products/services using machine learning because in general, the better data is learned, the higher the accuracy of identification.
119 In “Social Principles of Human-Centric AI” of Integrated Innovation Strategy Promotion Council, the Cabinet Office, the principle of “ Ensuring Fair Competition” states “There must not be unreasonable data-collection or infringement of sovereignty under a dominant position of a particular country by concentrating AI resources” and “There must not be unreasonable data-collection or unfair competition under a dominant position of a particular company by concentrating AI resources”.
120 As mentioned in the footnote 6 for the Google Shopping case p. 62
121 To the same effect as Article 6 2(2) in “the Guidelines to Application of the Antimonopoly Act Concerning Review of Business Combination”

[122].

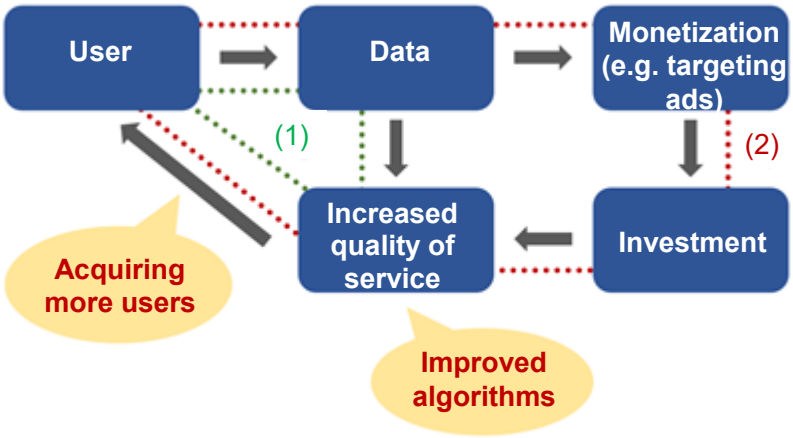
With regard to the competitive advantage of algorithms/AI that can be created more in terms of data, due to a feature called “data-driven network effect”, a firm with a certain number of users can increase the quality of its services using data obtained from the users, leading to acquiring more users generating a virtuous cycle for competition, which makes it difficult for new entrants to effectively compete with existing firms with many user bases[123].

This “data-driven network effect” is a network effect specifically derived from the following two feedback loops:

User feedback loop ([Figure17] (1)): A cycle where the more data a firm with many user bases can collect from its users, the better it can increase the quality of its services (including improvement in algorithms), leading to acquiring more users; and

Monetization feedback loop ([Figure17] (2)): A cycle where the more data a firm with many user bases can collect (e.g. by increasing the accuracy of targeting ads), the better it can monetize its services, which allows the firm to make further investments using obtained funds to acquire more users

[Figure17] Data-driven network effect and two feedback loops



Source: Restructured by the JFTC based on OECD (2016) p. 10 Figure 1 in the footnote 123 above

This feedback loop is generated by data that can be collected from users and can work more strongly when a firm collects relevant data from the

122 The joint paper on “Competition Law and Data” (May 2016) published by French and German competition authorities says “Provided that access to a large volume or variety of data is important in ensuring competitiveness on the market, the collection of data may result in entry barriers when new entrants are unable either to collect the data or to buy access to the same kind of data, in terms of volume and/or variety, as established companies.”

123 OECD(2016) "Big data: Bringing competition policy to the digital era" p.10, report by the European Commission "Competition Policy for the digital era" (2019) pp. 31, 36

market for various products/services, e.g. not only when certain products/services provided by the firm are used by many users but also when multiple products/services are provided by the firm in a vertically integrated/conglomerate manner[124] [125].

A characteristic of this feedback loop is that after an enterprise reaches a certain scale (critical mass), data collection tends to improve continuously and incrementally. This not only creates a barrier for rivals entering or expanding their market, but can also sway the market toward a specific operator, which makes it easier for monopolies or oligopolies to form. In the same way as the network effects[126] of multi-sided markets, when this characteristic arises it is vital to ensure that a business has a certain scale and user base compared to its market rivals. In contrast, the market can actually sway in favor of rivals if they grow to a certain scale and user base, resulting in enterprises with the current leading market power to quickly lose their top position. As such, it has been noted that the characteristics of this feedback loop or network effect can force enterprises with the current market power to develop strong incentives to conduct anticompetitive market practices[127]. Examples of behavior that is of concern include enterprises with current market power taking action that prevents rivals from acquiring a sufficient number of users required for continuously and incrementally improving data collection[128], or taking over rivals that are likely to acquire a

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124 Satoshi Ogawa, “Algorithms, AI and Competitive Advantage” (February 8, 2021, the JFTC "The Study Group on Competition Policy in Digital Markets" (7th Meeting), Material 1) p. 12. The Final Report Regarding Digital Advertising (February 17, 2021), for example, points out that in addition to harnessing vast amounts of data based on search queries and search history, Google uses a wide range of data collection methods, including its browser, Android operating system installed smartphones and Google maps, to control important data related to search advertising, which gives Google a competitive advantage when it comes to search advertising business (Chapter 3, Section 1, 1).

125 There are also cases where enterprises gain possession of data related to other parties as a result of business mergers. “The JFTC Reviewed the Proposed Acquisition of Fitbit, Inc. by Google LLC” (January 14, 2021)” pointed out that if Google Group were to use its own health-related data as well as health-related data supplied from Fitbit Group for its digital advertising-related business, the superior position that Google Group currently has with its digital advertising business would grow even stronger due to improved targeting accuracy when delivering digital advertising, and may result in problems related to foreclosure and exclusionary behavior.

Note that while Article 23 of Japan’s Act on the Protection of Personal Information states that an enterprise handling personal information shall not provide personal data to a third party without obtaining the prior consent of the person, Item 5-2 of the same article states that this third party does not apply when data is provided as a result of the succession of business in a merger or otherwise. As such, according to Japan’s Act on the Protection of Personal Information, personal data can be provided without the consent of the person in the case of a merger or otherwise. This section of Japan’s Act on the Protection of Personal Information is unique in comparison with other countries, and it has been pointed out that in Japan, there is the possibility that data can become concentrated at a business as a result of business mergers without the knowledge of the persons involved.

126 Refer to Chapter 4, 1 (1) below

127 European Commission report in footnote 123 above, pp. 36-37

128 In a lawsuit filed by the United States Department of Justice and others against Google (United States v. Google LLC (Oct. 20, 2020)), it was noted that scale is of critical importance to competition among general

sufficient number of users and adopting those users as its own in order to limit competition[129].

The importance of data in competition has long been noted, and even in competition using algorithms/AI, possession and collection of data important for competition leads to competitive advantage. As data can improve the performance of algorithms/AI especially, enterprises that have a certain user base can go on to acquire even more users—leading to ongoing cycle. There is a need to focus on practices restricting competition arising from these characteristics[130].

2. AI technology stack

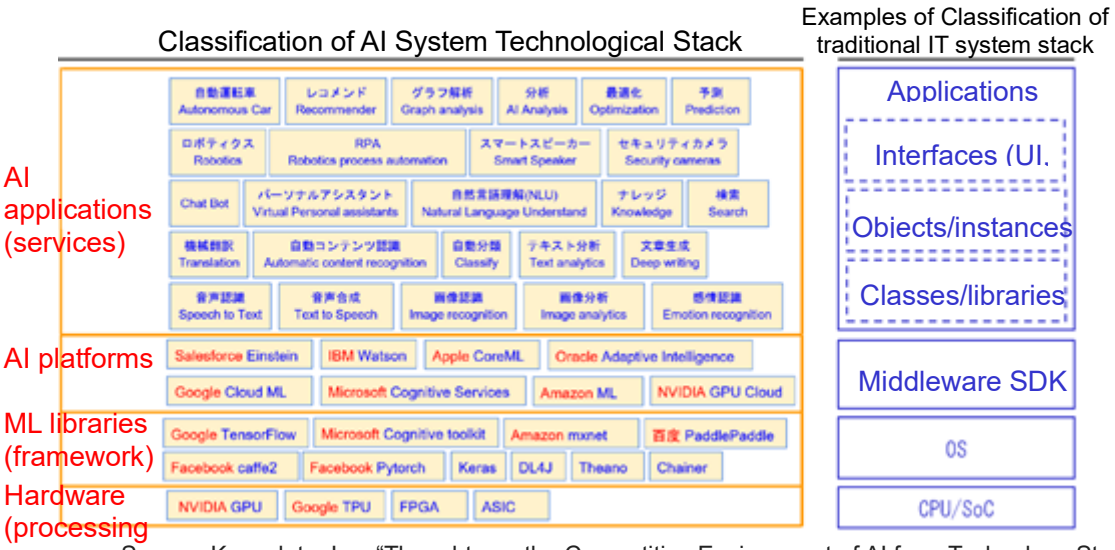
In recent years, a multitude of machine learning AI applications has been developed and is in use, including image recognition, voice recognition, machine translation, recommendations, searches, and more. AI is actually a type of computing machine and is made up of a layered structure similar to traditional IT system stack, where the AI application development framework consists of layers called AI chips, AI framework (called ML libraries), and AI platforms.

search engines; that Google recognized that rivals could not compete without adequate scale; that greater scale improves the quality of a general search engine's algorithms, expands the audience reach of a search advertising business, and generates greater revenue and profits; and that the additional data from scale allows improved automated learning for algorithms to be able to deliver more relevant results (p. 13). The lawsuit claims that Google's behavior denies rivals the opportunity to achieve the necessary scale to compete in those markets.

129 An example of this can be seen with Facebook's acquisition of Instagram and WhatsApp as a way of unduly maintaining its personal social networking monopoly, as alleged in a lawsuit filed by the Federal Trade Commission (Federal Trade Commission v. Facebook, Inc. (Dec. 9, 2020). The lawsuit alleges that Facebook purchased Instagram to eliminate the threat it posed, and made it difficult for other social networking competitors to gain scale; and that Facebook bought WhatsApp to prevent it from becoming an emerging threat to its social networking monopoly, and to ensure that rivals that may pose a future threat would have a more difficult time gaining scale in mobile messaging.

130 The 10th amendment to the German Competition Act includes a new provision to control "companies with a paramount significance for competition across markets," which addresses growing issues where certain enterprises might not only have a dominant market position with a specific platform, but utilize their resources or strategic positions to give them an important influence in other markets or sectors. One criteria for being designated as a "company with a paramount significance for competition across markets" is its access to data relevant for competition. In this way, the competitive advantage gained from data can be considered as a way to gain a competitive advantage across multiple markets.

[Figure18] Classification of AI system technology stack and examples of classification traditional IT system stack



Source: Kuwadate, Inc. “Thoughts on the Competitive Environment of AI from Technology Stack Perspective”(February 8, 2021, The Study Group on Competition Policy in Digital Markets (7th Meeting), Material 2)

* Source of “Classification of AI system technology stack” on left: Hiroyuki Umeda, “AI Overview and 5-year Footstep”[131]

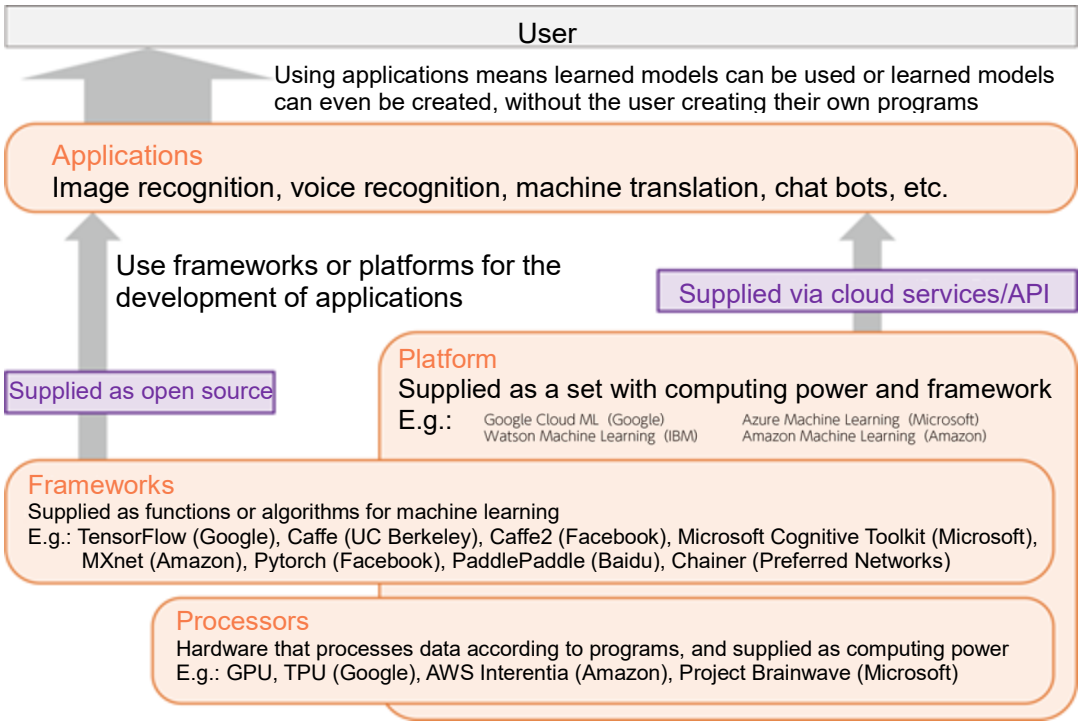
AI chips (processors) are items of hardware that perform calculations and other commands as instructed by programs[132] [133]. AI frameworks supply the functions and algorithms required for machine learning. By employing a combination of these to create a program, machine learning applications can be developed. AI frameworks are supplied as open source from various companies, and can be used free of charge[134].

AI platforms provide an environment for developing applications, and consists of AI chips for computational power, AI frameworks and others[135]. AI platforms are typically supplied via cloud services, however in a practical sense they can be considered as combined sale including the AI framework

131 “Think IT,” October 6, 2017, https://thinkit.co.jp/article/12744
132 Refer to “Information and Communications in Japan 2019” Part 1, Chapter 1, Section 3, 2. Directions for AI” published by the Ministry of Internal Affairs and Communications for a detailed explanation of AI chips, AI frameworks and AI platforms.
133 AI chips include GPUs (Graphics Processing Unit), FPGAs (Field-Programmable Gate Array) and ASICs (Application Specific Integrated Circuit). Development within the AI chip market used to be led predominantly by semiconductor manufacturers, however more recently digital platform enterprises have started developing AI chips (Takuji Imai, “Will GAFA Also Dominate the Core of AI?,” Nikkei xTECH, March 8, 2019).
134 Typical examples include TensorFlow (Google), Caffe (UC Berkeley), Caffe2 (Facebook), Microsoft Cognitive Toolkit (CNTK), MXnet (Amazon), and Pytorch (Facebook), sorted by technical features for each type of AI framework (name of developer is shown within brackets).
135 Typical examples include Google Cloud M (Google), Azure Machine Learning (Microsoft), Watson Machine Learning (IBM), and Amazon Machine Learning (Amazon) (name of developer is shown within brackets).

and cloud service as computing resources (as such, it has been noted that competition among AI platforms should be viewed as competition among cloud services). Given that AI applications in particular have a low difficulty level for development, AI platforms tend to be used more than AI frameworks from perspectives like performance, cost and developer convenience, and as AI applications become increasingly commonplace, some believe that the use of AI platforms is likely to grow[136]. Development of AI systems also has a high affinity with cloud services, as both cloud service providers (CP) and users can receive the benefits of economies of scale, particularly when using machine learning as the cloud environment makes it even easier for users to achieve a greater scale.

[Figure19] Layered structure of machine learning



Source: footnote 132 above

As the use and application of AI becomes an important aspect of competition, there is a greater need to focus more on market trends related to technological stack that can have a considerable impact on the

136 At a meeting of the Study Group, it was noted that the majority of AI platform operators were the same as large-scale cloud service providers. These enterprises not only possess the knowledge of requirements for hardware like AI chips and AI applications, but are also actually suppliers of AI applications and thus have the operational capacity to support such activities. Given this background, it was noted that as AI applications become more commonplace and advanced, large-scale cloud service providers also provide the functions for AI applications as part of AI platforms, and there is the possibility of greater vertical integration.

competitiveness of AI. When examining the trends of such markets, it is important to maintain a focus from a viewpoint that spans all technology layers, such as whether an enterprise influential in one layer market is using its influence to sway competition in markets of other layers, or whether there are problems related to the Antimonopoly Act such as foreclosing markets and exclusionary behavior from the characteristics of AI technology stack by vertical integration across multiple technology layers and others. Additionally, there are many types of AI technology including image recognition and voice recognition technologies, so it will be vital to focus on the characteristics of those technologies, including their applications and whether there are alternative substitutes available. Taking a closer look at the AI technology stack in this way highlights the need to study market trends from a multitude of viewpoints.

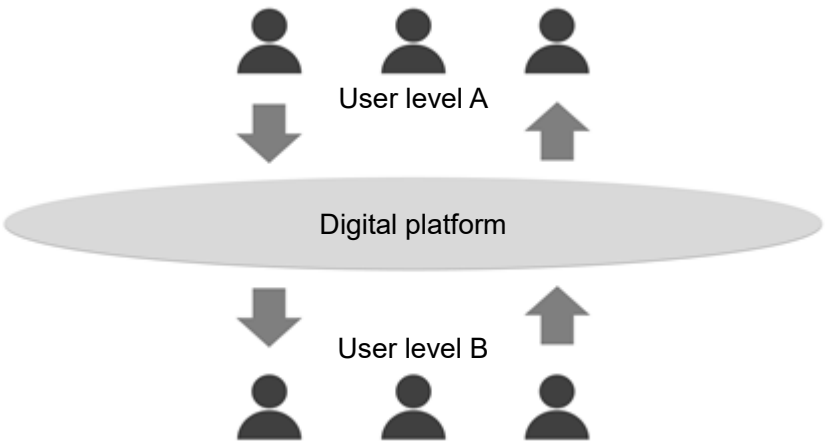
IV. Digital Platform and Algorithms/AI Problems

1. Characteristics and other aspects of digital platforms

Digital platforms provide a “place” for third parties utilizing information communications technology and data, and are continually serving as the impetus for creating groundbreaking business opportunities and innovation. Digital platforms provide ordinary people with significant benefits like making our social and economic lives more efficient (by being able acquire any type of required information in an instant) and safer (by helping us avoid dealing with some vicious businesses). As a result, digital platforms have a strong influence on our social and economic life, and the influence continues expanding driven by characteristics of digital platforms stated as follows.

Services referred to as digital platforms cover a broad scope, including online retail s, search services, webcasts, booking services, social networking services (SNS), electronic payment services, and many more. Digital platforms can be broadly classified into two types: “matching platforms” that facilitate and optimize exchanges directly between users, and others that are called “non-matching platforms.” Both types have a matching intention with many different users.

[Figure20] Structure of digital platforms



Source: Created by the JFTC

These digital platforms are commonly defined by the following features[137].

137 Refer to section 1-2 of footnote 61 above.

○ Multi-sided market and network effects

These digital platforms are generally multi-sided markets with many different users, and benefit from network effects. There can be “direct network effects” where a user’s utility increases as the number of users on the same platform increases, and “indirect network effects” which arise when the utility of other user groups grows as the number of users of a specific user group increases.

○ Low marginal costs and economies of scale

Since a digital platform is a place for transactions using information and communication technology as well as data, a marginal cost for providing services can be low. As a result, a scale of the network can be efficiently expanded, and a better service can be provided at a lower cost.

These features mean that digital platforms are often have dominant providers of services, which can lead to a monopolization and oligopolization. This also means that users tend to flock to those specific digital platforms, and in turn data related to that digital platform becomes highly concentrated.

From the perspective of competition policy, there are concerns over anti-competitive behavior employed by digital platforms, which have harnessed these network effects and economics of scale to gain the influential position amongst customers or that have formed a monopolistic or oligopolistic position by dominating their respective market. A number of guidelines and amendments have been published in the past, and surveys conducted to study these conditions (Attachment 5).

2. Digital platforms and Algorithms/AI

Today’s digital platform operators design and operate their platforms by incorporating algorithms and AI as a key aspect of their rules and systems, and using these to analyze the platform they have designed or operate[138]. The specific way that algorithms and AI are actually used varies depending on the services or business models provided by each digital platform, but are thought to be extensive and wide-ranging. Examples of these include using algorithms to generate rankings of products or services that are most popular with users, or using algorithms to analyze data on users attributes and purchase history to personalize the prices, trade terms, products or services shown (such as recommendations) for each user. In June 2017, the

138 Refer to footnote 1 above

European Commission fined Google for violating competition law by using search algorithms to predominately display its own Google Shopping results on the search results page, and push the shopping search results of competitors down so they are displayed lower[139]—this is an example that highlights just how closely related digital platforms are with algorithms/AI.

Discussions on competition policies related to algorithms/AI like this are closely related to digital platforms, so the key issues to address in relation to digital platforms in particular have been outlined below, based on characteristics and other aspects of digital platforms and applying them to points related to algorithms/AI examined by the Study Group.

(1) Ranking manipulation

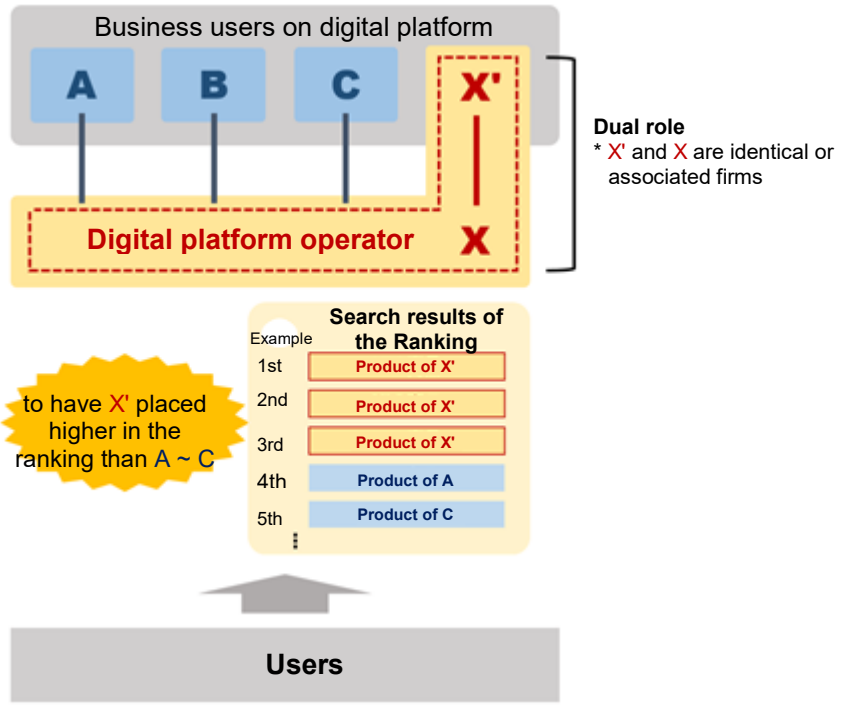
Online retail, search engine, and other digital platforms use algorithmic ranking for their services. As described in Section 4-1 above, a digital platform operator catering services in a multi-sided market may achieve a monopolistic or oligopolistic status due to network effect, economies of scale, or other factors when its scale reaches a certain level (critical mass). This digital platform becomes an important sales channel (gateway) for the business users selling goods and services to consumers, and the ranking on this digital platform may have a significant impact on the sales of and competition among these sellers.

As explained in Section 1, Part 2, if a digital platform operator also sells products and services on its digital platform, this operator will hold a "dual role" in that it competes with other business users while being in a position to administer the ranking on the digital platform. In this case, a digital platform operator with an influential position in the digital platform market may unfairly exclude competing business users and restrict competition in the market that supplies applicable products and services by, for example, displaying its own products and services at the top and treating them favorably, or allowing them to take advantage when the ranking algorithm is changed (self-preferencing)[140].

139 Refer to footnote 6 above about Google shopping charges

140 In Europe, in December 2020, the European Commission published a proposal for the "Digital Markets Act" that defined providers of "core platform services" such as online intermediation services, online search engines, and social networking services as "gatekeepers" that meet certain criteria, and imposed certain obligations on these gatekeepers. One of the obligations of gatekeepers in this proposal is to refrain from self-preferencing its own products (or giving favorable treatment to any third party belonging to the gatekeeper) in the ranking (Article 6-1 (d)).

[Figure 21] Dual role of digital platform



Source: Created by the JFTC

A digital platform operator that has an influential position in the digital platform market may also use the ranking position on the digital platform—an important sales channel for its sellers—as a penalty to ensure the effectiveness of contractual terms and conditions that restrict competition, or force sellers to accept changing the terms and conditions to their disadvantage.

With regard to ranking, consumers' choices may be manipulated when the ranking differs from their expectations, as described in Section 2-1. If the consumers' product selection is manipulated because of the ranking controlled by digital platform operators who have an influential position in the digital platform market, fair competition among sellers will not be ensured, which can be considered a huge problem in terms of competition policy.

- COLUMN -

Eliminating competitors using the position as a digital platform operator

As described above, if a digital platform operator that caters services in a multi-sided market achieves a monopolistic or oligopolistic status due to network effect, economies of scale, or other factors, that digital platform may become an important sales channel

(gateway) for a business user that sells goods and services to consumers.

Digital platform operators can, in principle, set not only the ranking but also the conditions of use of their digital platforms. Therefore, if a digital platform operator also provides goods and services on its digital platform, it will have a "dual role" of setting the conditions of use of its digital platform and competing with other sellers in the market that supplies similar goods and services.

The JFTC's survey[141] of the situation to date has also found that digital platform operators may use their position to exclude competing business users in the market that supplies similar goods and services, for example, by giving favorable treatment to themselves or their affiliates through rankings and fees. This is due to these digital platform operators having "dual roles." Such digital platform operators having a monopolistic or oligopolistic status and providing important sales channels to sellers can raise concerns that self-preferencing by these digital platform operators may have adverse effects on competition in the market that supplies goods and services.

For a digital platform operator with a monopolistic or oligopolistic status holding such a "dual role" to ensure a fair competitive environment in the market that supplies similar goods and services, it is desirable, in general, that the digital platform operator and its affiliates treat the sellers fairly in the terms and conditions for using its platform[142].

(2) Personalization

As described in Section 2-2, it has become possible in digital markets to collect a huge amount of data on users and analyze it using algorithms/AI, which can be used to personalize various transactions, such as prices and transaction terms, product/service recommendations, search results, and distribution of advertisements, for each user. Such personalization may be convenient for users, but it may also result in discriminatory treatment between different users in terms of transaction terms.

As described above, the use of digital platforms tends to concentrate on specific services. Therefore, user-related attributes and transaction data are also likely to accumulate on specific digital platforms. Thus, in the competition between digital platforms, data tends to concentrate on specific digital platforms. Also, if a digital platform operator also sells goods and services to consumers, the operator is able to obtain transaction data and user information of other sellers transmitted on its digital platform.

In this framework, digital platform operators are in a position to collect a large amount of critical data that is important to compete and conduct personalization through more accurate analysis.

141 See footnote 61 in Section 4, Part 2.

142 It is pointed out that, from the perspective of ensuring such fair treatment, the necessary task in the future is to consider appropriate measures in terms of competition policy, such as requiring digital platform operators to place firewalls between relevant business units (i.e., take appropriate information blocking measures).

From a competition policy perspective, price personalization, namely, price discrimination using algorithmic personalization, is of particular concern if it allows digital platform operators to exclude their competitors from the market. For example, it may be theoretically possible for a digital platform operator that also sells its products and services to consumers to use its position of being able to collect a large amount of transaction data and user information and use personalization techniques to analyze more precisely which customers it will likely compete for with other business users. The operator could use algorithms and AI to efficiently identify sellers that cater to the same customers and selectively set predatory prices to exclude other sellers.

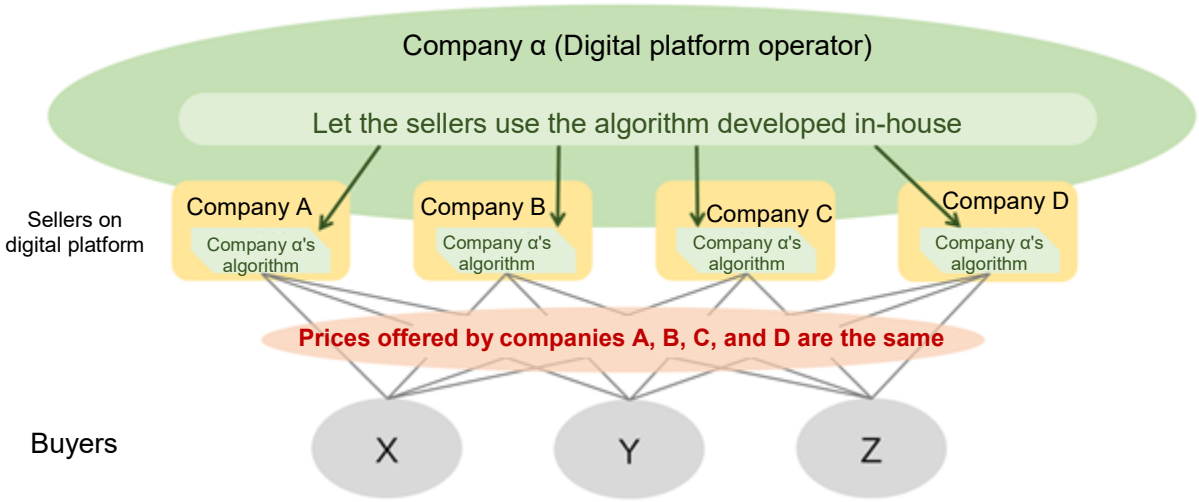
(3) Concerted practices, etc. using algorithms

As described in Section 1 above, there is a concern that algorithmic/AI-based pricing will enable competitors to conduct concerted practices without direct or indirect contact between them. There are four types of discussed scenarios.

The type that needs to be kept in mind concerning digital platforms is the hub-and-spoke type[143] of coordinated pricing among sellers. Digital platforms such as online retail may provide price-setting tools to their sellers. There is a particular concern for digital platform markets that are likely to become oligopolistic due to network effects and economies of scale, in that digital platform operators may force business users to adopt their price-setting algorithms and restrict competition in the market through coordinated price setting based on these algorithms[144].

143 For details of the hub-and-spoke type, see Section 1-2-(2)-b- (b) of this Report.
144 As described in footnote 33, if an online retail platform operator's commission is based on the sales of its sellers, it will benefit such online retail platform operator when its sellers sell their products at higher prices. Therefore, it is pointed out that if an online retail market is oligopolistic, online retail platform operators with high market shares may become incentivized to force their sellers to adopt their price-setting algorithms and coordinate with higher prices by using these algorithms.

[Figure22] Hub-and-spoke digital platform



Source: Created by the JFTC

From the perspective of not hindering competition between sellers on digital platforms, digital platform operators with a particularly influential position in the digital platform market need to be careful not to impose restrictions on their sellers' free price setting capability. For example, such digital platform operators should provide a selection of price-setting tools and allow sellers to use them by providing pricing data using APIs and others that can connect with price-setting tools offered by other operators.

(4) Gaining competitive advantage, etc. through data accumulation

As described in Section 3-1 above, if an algorithm/AI could significantly impact the quality/performance of products and services, the availability of access to competitively important data can affect the quality/performance of products and services. Also, if data-driven network effects work, data collection may improve in a sustained and amplified manner after a provider's scale reaches a certain level (critical mass).

Digital platforms are also characterized by network effects, economies of scale, and other factors that make it easier for the platform usage to concentrate on specific services, with related data accumulating on specific digital platforms.

Therefore, if data-driven network effects[145] work in addition to network effects, data and users in particular will likely concentrate on digital platform operators with a certain scale and user base, creating a very high barrier to

145 For details of data-driven network effects, see Section 3-1 of this Report.

entry and expansion for competitors ("tipping"). Because having a certain scale and user base is critical when competing in this type of market, it is especially necessary for digital platform operators to pay close attention to whether any action is being taken to unfairly prevent competing providers from achieving the necessary scale.

If a digital platform operator possesses—in addition to the competitive advantage of having accumulated data—technology for collecting large amounts of data or advanced/complex technology for analyzing large amounts of collected data, and if it would require significant investment and a long period of development for a competitor to acquire the same level of technology to compete, such a technological competitive advantage may become a barrier to entry and expansion[146].

If users continue to use services on particular digital platforms and data is accumulated, these users may become locked in to these digital platforms after, for example, receiving services tailored to their preferences. To facilitate competition and ensure users are provided with multiple options on digital platforms, digital platform operators should allow users to manage their own data stored on digital platforms. From this perspective, it is important that digital platform operators allow transferring/releasing of data at users' requests, for example, by allowing data transfer (data portability)[147] and providing APIs. This will spawn a variety of services using such data, stimulate competition, and provide a wide range of options to users, which will trigger more competition over the quality of services, including the protection of privacy and security. In doing so, care must be taken not to hinder the incentive to utilize the data accumulated on the digital platform and provide new types of services[148].

(5) Summary

The above is a theoretical summary of the discussions in this Study Group, particularly those considered to be related to digital platforms.

Digital platform operators are also innovators who create innovative businesses and markets and provide many benefits to users and consumers. However, network effects and other factors could cause a

146 See footnote 116 and 128.
147 The method of transferring data may include direct data transfer (copying of data held by provider A to provider B based on the user's instructions) and data disclosure (downloading of data held by provider A based on the user's instructions and the user who downloaded the data can upload it to provider B). (See Attachment 2-1 "Options for data transfer and release" – 4. (1) Method of data transfer and release in "Options for Rulemaking to Address the Rise of Platform Businesses" published by the JFTC, METI, and MIC.)
148 See footnote 61 (Part 1, Section 4-2 in the Report)

concentration of customers and data on specific operators, which may, in some cases, lead to monopoly or oligopoly. Because of these characteristics, there may be a structural problem where some issues discussed in the Study Group are likely to manifest.

The JFTC needs to pay close attention to trade practices taken on digital platforms based on this theoretical summary compiled by the Study Group.

Part 3 CONCLUSION

For players in digital markets, the important factor in competition is the design and operation of algorithm/AI, and the impact of algorithms/AI on competition is expected to continue to grow further in the future.

Algorithms and AI are essential tools for innovation, bringing tremendous benefits to society, such as improving the efficiency of providers' business activities and convenience for consumers. Yet, there is a concern that competition may be restricted depending on how algorithms and AI are utilized. Therefore, the Study Group discussed, under the theme of "Algorithms/AI and Competition Policy," the conducts that algorithms/AI will enable or facilitate, and provided a theoretical summary of the competition policy issues surrounding algorithms/AI, focusing on the cases in which algorithms/AI may restrict competition.

For example, regarding concerted practices, the Study Group organized, based on discussions held in other countries, how concerted practices can be facilitated by using algorithms/AI, the applicability of the current Antimonopoly Act, issues related to Antimonopoly Act and others. Regarding unilateral conducts, the Study Group discussed "rankings," which are becoming increasingly important in competition in digital markets, and organized the cases in which the use of rankings may restrict competition and the issues related to the method of verifying algorithms by competition authorities. With digital markets, "personalization" conducted by analyzing consumer data is expected to make it easier to differentiate consumers. For example, the Study Group organized the issues regarding "personalized pricing," which involves setting different prices for each consumer. From the perspective of algorithms/AI and competitiveness, the Study Group also organized the issues related to data and AI technology stack.

This report is the first of its kind in Japan to discuss a wide range of issues regarding algorithms/AI and competition policy, but this report is only a summary of the Study Group's current discussions. In the future, it is quite possible that other new issues related to competition policy will arise as the technology of algorithms/AI progresses and their utilization expands. The Study Group expects that this report will serve as a starting point for further discussions among relevant authorities and experts in the digital field, both in Japan and abroad.

Based on this report, the Study Group’s expectation is for the JFTC to actively address problems associated with algorithms/AI regarding the Antimonopoly Act and competition policy. To that end, the JFTC needs to actively co-operate with external experts and train its own employees to develop and accumulate expertise in algorithms/AI so that the JFTC can also properly address problems involving advanced algorithms/AI. Given that business activities in the digital field

are conducted globally and that international organizations, etc. and competition authorities in other countries also discuss algorithms/AI and competition policy, it is desirable that the JFTC will use this report as an opportunity to continue to participate in international discussions in this field, and actively co-operate with competition authorities in other countries in addressing issues related to algorithms/AI.

The Study Group expects that this report will contribute to the development of a fair and free competitive environment in the digital field that uses algorithms/AI and help Japan's sound economic development.

Attachment 1

Main discussions and study on algorithms/AI and competition policies overseas

Name of competition authority/international organization, etc.	Name of report, etc. (Published date)	Summary
Organisation for Economic Co-operation and Development (OECD) Competition Committee	Roundtable on "Algorithms and collusion" (June 2017)	Discussions among member countries on concerns about the use of algorithms to achieve collusion and issues in competition laws.
United Kingdom Competition & Market Authority	"Pricing algorithms" report (October 2018)	An examination from an economic perspective on the use of algorithms and personalized pricing that facilitate collusion.
Portuguese Competition Authority	"Digital ecosystem, Big Data and Algorithms" report (July 2019)	An examination of cases where algorithms for pricing and price surveys are used for collusion, and the impact of algorithms for ranking and recommending products on consumer behavior and competition.
German Federal Cartel Office and French Competition Authority(Joint study)	Working Paper - "Algorithms and Competition" (November 2019)	An examination of collusion using algorithms and practical challenges when investigating algorithms.
International Competition Network (ICN)	"Big data and Cartels: The impact of digitalization in cartel enforcement" – Scoping paper (April 2020)	An examination of issues related to big data when used as a vehicle for collusion, issues related to collusion, history of digital cartels, and issues of investigating digital cartels.
Netherlands Authority for Consumers and Markets	Study into the functioning of algorithms in practice (December 2020)	Launching of a trial to find out how the authority can monitor in practice the functioning of algorithms that businesses use.
United Kingdom Competition & Market Authority	"Algorithms: How they can reduce competition and harm consumers" –Research and analysis (January 2021)	An examination of potential harms to competition and consumers from the use of algorithms, techniques for analyzing these harms, and role of regulators.

Name of competition authority/international organization, etc.	Name of report, etc. (Published date)	Summary
Finnish Competition and Consumer Authority	"Collusion situations caused by algorithms" report (February 2021)	An examination of the situations where algorithms are used as a means of implementing collusion and the applicability of competition laws.
Finnish Competition and Consumer Authority	"Personalised pricing in light of consumer and competition policy" report (February 2021)	An examination of the implementation status and effects of personalized pricing and its relationship with laws and regulations.

Attachment 2

Overseas Algorithms/AI-Related Collusion Cases

Name of competition authority, etc.	Case name, date, etc.	Summary
U.S. Department of Justice	Case involving ATP (Agreed to settle in March 1994)	■ The U.S. Department of Justice reached a settlement agreement with eight major airline companies after identifying over 50 separate price fixing agreements covering hundreds of routes using ATP's system to exchange ticket price information. ■ Information regarding airline tickets (e.g., fare, boarding date, flight segment, terms and conditions applicable to the ticket, and start and end dates of sales) was transmitted daily from these airlines to the ATP's system and shared not only among travel agents, computer reservation systems, and consumers, but also among the airlines. **On the reservation system, the airlines floated price increases long before the ticket sales start, and by watching the reactions of competing airlines to the price increases and adjusting the price increase amount, the airlines were able to identify a mutually acceptable range of price increases.**
U.S. Department of Justice	Poster cartel case (Agreed to plead guilty in April 2015)	■ An e-commerce seller of posters and other products, of which Mr. A is an executive, and another e-commerce seller used commercially available algorithm-based pricing software to set prices for posters sold on the Amazon Marketplace (hereinafter, "Marketplace"). This software had the functionality to collect price information from competing businesses for specific products sold on the Marketplace and sell the products at prices set by the sellers. ■ Mr. A and the other seller agreed on the prices of certain posters to be sold on the Marketplace, and in order to implement the agreement, **they agreed to use a specific pricing algorithm to coordinate the price changes**. To comply with the agreement and monitor the effectiveness of the pricing algorithm, these sellers collected and exchanged poster price and sales information. By following the agreement, these sellers sold posters at anti-competitive prices.

Name of competition authority, etc.	Case name, date, etc.	Summary
Court of Justice of the European Union	Eturas case (Preliminary ruling requested in January 2016)	■ Eturas, a company that provides an online reservation system for travel agencies, **sent a message to each travel agent that it will modify its system to limit the discount rate for online travel reservations to a maximum of 3%. As a result, the same maximum discount rate was applied to each travel agency**. ■ Based on this fact, the Competition Council of the Republic of Lithuania found the actions of Eturas and the travel agencies a violation of competition law, as these travel agencies did not express any objection to the introduction of this cap on the discount rate and they could have known that other travel agencies using the same reservation system would introduce the same discount rate. The Supreme Administrative Court of Lithuania received the complaint and asked the Court of Justice of the European Union for a preliminary ruling on the legal liability of these travel agencies. ■ With regard to the legal liability of travel agencies, or participation in a concerted practice, the Court of Justice of the European Union decided that if the travel agencies were aware of the message from Eturas regarding the introduction of discounts cap, it could be presumed to have participated in a concerted practice unless they had publicly distanced themselves from the practice, reported it to the administrative authorities, or adduced other evidence of the systematic application of a discount exceeding the cap in question.

Name of competition authority, etc.	Case name, date, etc.	Summary
U.K. Gas and Electricity Markets Authority	Cartel case of allocating customers by gas and electric power companies (Infringement decided in July 2019)	■ Three companies, Economy and EGEL, gas and electricity suppliers, and Dyball, a company that sells software and other services in the electricity and gas market, entered into an agreement and/or concerted practice to allocate customers in relation to the supply of gas and electricity to domestic customers in UK. In this infringement, Economy and EGEL (including their sales agents), agreed not to actively target customers already supplied with gas and/or electricity by the other in their sales activities. However, each other's existing customers would be allowed to switch between the two businesses if they proactively sought to do so. **The agreement and/or concerted practice was implemented by sharing commercially sensitive and strategic information, in the form of details of their current customers, on a software systems provided by Dyball.** ■ Dyball was party to the infringement and contributed to the common objectives pursued by Economy and EGEL. Dyball did this by facilitating the allocation of customers between Economy and EGEL, through its own conduct in **developing and introducing software systems that allowed the acquisition of certain customers to be blocked and customer lists to be shared**.

Source: Created based on the competition authority websites, etc.

Attachment 3

Overseas Cases Related to Ranking Algorithms

Name of Competition authority	Case name, date, etc.	Summary
French Competition Authority, etc.	Booking.com case (Commitment decision in April 2015)	■ French Competition Authority made a commitment decision to address concerns about competition related to the parity clauses an online travel agency Booking.com imposed on hotels. The commitment decision ordered Booking.com not to impose such parity clauses because the parity clauses imposed by Booking.com for room rates and the number of vacant rooms restrained free business decisions by hotels, especially the freedom for hotels to determine room rates and the number of vacancy rooms. ■ While it was stipulated that Booking.com can cancel the contract when the hotel does not comply with the parity clauses, **online travel agencies including Booking.com, having crawling and scraping technologies as powerful technologies to monitor hotel websites to recognize the changes in offered prices, automatically explored the Internet for data collection. The commitment decision ordered the ranking algorithm used by Booking.com not to directly consider whether or not hotels are complying with the parity clauses.**
European Commission	Google Shopping case (Fine decision in June 2017)	■ The European Commission made a decision to impose a fine of 2.42 billion Euro on Google for a violation of the EU Competition Law. The European Commission concluded that Google abused its market dominance through its search engine by giving an illegal advantage to another Google product, its comparison shopping service. ■ Google uses a system that layouts the results of its comparison shopping service at conspicuous locations. To be more specific, when a consumer typed in a search query (search word) for search engine, which corresponded to a search result of its comparison shopping service, the result is shown at or close to the top of the search results of the general search service. ■ Also, in its search results, Google lowers the display order of the search results of competitive comparison shopping services. To be more specific, **the results of competitive comparison shopping services are shown among Google's search results based on its search engine algorithm. Google has integrated a number of criteria into the algorithm, which results in low-rank display of the search results of competitive services.** Evidences show that even the highest-rank search results of competitive services were showed on the fourth page of Google search results on average, and others were shown at even lower ranks. This algorithm is not

Name of Competition authority	Case name, date, etc.	Summary
		applied on Google comparison shopping service, and therefore the display orders will not be lowered. As a result, the search results of Google comparison shopping service more easily attract the consumers' eyes thanks to the way to display Google search results, whereas those of competitive services less easily.
Korea Fair Trade Commission	Self-preferencing case using NAVER search service (Fine decision in October 2020)	■ The Korea Fair Trade Commission made a decision to issue a correction order and impose a surcharge of 27.7 billion won in total on NAVER, which operates a search service on shopping and video fields, for a violation of the fair-trade law. The Korea Fair Trade Commission concluded that the act of NAVER to adjust and modify its search algorithm to control the display order of search results unjustly came under abuse of dominant market position, discriminatory treatment in unfair trade practices, and unjust customer inducement for its shopping comparison service, as well as unjust customer inducement for its video search service. <Shopping comparison service> ■ NAVER is a service provider of a shopping comparison service that allows users to search to compare the information of products sold in various online shopping malls and is leading this service market with a more than 70% share. Also, NAVER has been offering an online marketing service by itself. ■ When determining the display orders of product search results, NAVER adjusted and modified the search algorithm in various ways so that products from its online market could receive priority. To be more specific, **by specifying weights to the ranking and adjusting the values upward or downward, NAVER lowered the display orders of products from competitive online markets and maintained or increased the ratio of products from its online market displayed on a page.** For information, one of the triggers for such acts of adjustment and modification was a request from its internal payment department (NAVER Pay) in anticipation of increase in the number of users resulting from the increased display results of products from its online markets. ■ As a result of these acts, the display ratios of products from NAVER online market increased in the search results of NAVER Shopping, whereas those of products from competitive online markets decreased. These acts had been conducted continuously from the initial stage of the business in accordance with the process of growth, resulting in rapid increase of NAVER's share in the online market.

Name of Competition authority	Case name, date, etc.	Summary
		<Video search service> ■ NAVER has provided its own videos from NAVER TV and competitor videos to consumers through its video search service. In the search results, videos are arranged from the top to the bottom in the order of "relevance" that is calculated based on the search algorithm. ■ **In the entire change of the video search algorithm in 2017, NAVER** has selected "keywords" in contents as the core element of displaying search results. **While NAVER provided a demonstration version for testing to its video department for the preparation to this algorithm change, it informed the competitors of nothing, including the facts about the change and the importance of keywords for being displayed at a high rank.** As a result, while the number of NAVER TV videos shown at the top of search results increased by 22% during a week after the algorithm change, the number of competitor videos displayed decreased in unison.

Source: Created based on the competition authority websites

Attachment 4

Algorithm-Related Acts Pointed out in the JFTC Fact-Finding Survey Reports

Report regarding trade practices on digital platforms (Business-to-Business transactions on online retail platform and app store) (Released in October 2019)	■ There are cases where digital platform operators themselves or their related companies sell products on their digital platforms. In such cases, when digital platform operators unjustly interfere a transaction between sellers who compete the digital platform operators and consumers by giving sellers unfair treatment compared to the digital platform operators itself or their related companies on commission rate or display method regarding search results, managing arbitrarily search algorithm to give the goods which they or their related companies sell on the digital platform preferential treatment, they could violate the AMA (e.g. Interference with a Competitor's Transactions). (pp. 61-62)
Report regarding trading on restaurant portal sites (Released in March 2020)	■ When a restaurant portal site at an influential position in the market treats specific restaurants differently from other restaurants in the same contract plan, such as by arbitrarily establishing and applying a rule (algorithms) for determining display orders without any rational reason in order to lower their display orders, and the act concerned forces the specific restaurants into significantly unfavorable positions in competition, exerts an direct and significant influence on the competition function of those restaurants, and adversely affects the fair competitive order between restaurants, the portal site operator could violate the AMA (Discriminatory Treatment). (p. 49)
	■ When a restaurant portal site at a superior bargaining position to restaurants puts specific restaurants at a disadvantage that is unjustifiable in light of normal business practices, such as by arbitrarily establishing and applying a rule (algorithms) applicable only to specific restaurants, beyond ordinary rules (algorithms), without any rational reason in order to lower their display orders and force those restaurants to change the contract plan to a plan advantageous to its own restaurant portal site, the act concerned could violate the AMA (Abuse of Superior Bargaining position). (p. 49)
	■ When a service provider of a general search engine at a dominant position in the market adversely affects the fair competitive order, such as by displaying its own service in an advantageous condition with the large share in the general search engine market or the like as a backdrop when providing a service competitive with restaurant portal sites, resulting in an exclusion of competing restaurant portal sites from the market, the act concerned could violate the AMA (Interference with a Competitor's Transactions). Also, when competition is substantially restrained, the act concerned could violate the AMA (Private Monopolization). (pp. 78-79)

Attachment 5

History of Governmental Study in Relation to Digital Platforms

Future Investment Strategy 2018 (Cabinet decision in June 2018)

Rules in response to the rise of the platform business model

As digital platform continues to dominate the market, the rise in businesses with platform business models has brought a need to sustain a competitive business environment. Data portability on selected platforms and open APIs ensure a transparent and level playing field inclusive of SMEs and venture firms. Fundamental principles regarding this new business model shall be finalized and rolled out during this year to ensure fairness to users and clarify corporate social responsibility of platform businesses. Deregulation aimed to stimulate innovation (relaxation of entry requirements, etc.) will be also considered.

Study Group on Improvement of Trading Environment surrounding Digital Platforms, etc.

July 2018	The JFTC, METI, and MIC launched the "Study Group on Improvement of Trading Environment surrounding Digital Platforms" composed of experienced academics on policies concerning competition, information, and consumers to summarize issues regarding the challenges and actions surrounding digital platforms.
November 5, 2018	Released the Interim Report (Proposal) prepared by the study group → Public comment procedure was taken
December 12, 2018	Released the Interim Discussion Paper
December 18, 2018	Released the Fundamental Principles (JFTC, METI, and MIC)

Fundamental Principles for Improvement of Rules Corresponding to the Rise of Digital Platform Businesses (Released on December 18, 2018)

JFTC/METI/MIC

1. Perspective of Legal Evaluation of Digital Platform Operators

1. They provide an essential basis for socio-economy.
2. They design, operate and manage a field itself participated by many consumers (individuals) and businesses.
3. Such field is essentially highly manipulative and technically non-transparent.

2. Promotion of Sound Development of Platform Businesses

3. Ensuring Transparency to Achieve Fairness with respect to Digital Platform Operators

1. Understanding of the actual state of trade practices through large-scale, comprehensive and thorough surveys
2. Consideration of the establishment of an expert organization with advanced knowledge in a variety of fields including digital technology and businesses for supporting law enforcement and policy making by government departments
3. Consideration toward the introduction of disciplines to ensure transparency and fairness, such as obligations to make available and disclose certain rules or trade conditions

4. Ensuring Fair and Free Competition in Digital Markets

1. Review of business combination that takes into account of data and innovation
2. Application of the rules about abuse of superior bargaining position with respect to the relationship with consumers

5. Considering Rules on Data Transfer and Open Data

6. Establishment of Balanced, Flexible and Effective Rules

7. International Application of Laws and Harmonization

Follow-up on the Growth Strategy

(Cabinet decision on June 21, 2019)

I. Realization of Society 5.0

1. Development of Rules for the Digital Market

(2) New specific measures to be taken

(i) Response to digital platform companies

- The government plans to establish an expert organization on domestic and overseas data and digital markets (Digital Market Competition Headquarters (provisional name)) comprised of experts with diverse and high-level knowledge across ministries and agencies in order to conduct evaluations of market competition in the global and radically changing digital market.

(snip)

- In light of the possibility of data accumulation in the digital market posing a threat of hindering competition, even if a company's sales only hold a small share of the market, the government will review the ideas of business combination assessment related to assessment points, considering data accumulation in the digital market, revise the said assessment criteria within FY2019, and consider the ideal form of notification criteria based on sales within FY 2019 in order to prevent competitive inhibition caused by data accumulation by corporate acquisition.

(snip)

- The government hence needs to prepare legislation and guidelines to ensure transparency and fairness of transaction practices and other unique relationships formed in the digital market, and aims to submit a bill to the National Diet's 2020 Ordinary Session (Act on Improving Transparency of Digital Platformer Transactions (provisional name)).

(snip)

- The government will address the approach for applying the regulation on abusing the dominant bargaining position of the Act on Prohibition of Private Monopolization and Maintenance of Fair Trade (Antimonopoly Act) to business-to-consumer transactions by digital platform companies before the summer of 2019 and develop an enforceable system.

(snip)

JFTC's Major Efforts in Relation to Digital Platforms

Guidelines

- Release of the "Guidelines Concerning Abuse of a Superior Bargaining Position in Transactions between Digital Platform Operators and Consumers that Provide Personal Information, etc." (December 2019)
- Amendments of the "Guidelines to Application of the Antimonopoly Act Concerning Review of Business Combination" and the "Policies Concerning Procedures of Review of Business Combination" for appropriate response to business combinations in the digital area (December 2019)

Fact-Finding Surveys

- Final Report Regarding Digital Advertising (February 2021)
- Report Regarding Trading on Common Point Services (June 2020)
- Report Regarding Household Accounting Services, etc. and Report Regarding on Cashless Payments with QR Code, etc. (April 2020)
- Report Regarding Trading on Restaurant Portal Sites (March 2020)
- Report Regarding Trade Practices on Digital Platforms (Business-to-Business Transactions on Online Retail Platform and App Store) (October 2019)
- Survey Report Regarding Transactions in B2C E-Commerce (January 2019)

Study Groups

- The Study Group on Competition Policy for Data Markets (November 2020 -)
- The Study Group on Business Alliances (Report released in July 2019)
- The Study Group on Data and Competition Policy (Report released in June 2017)