

Report on Fact-Finding Survey on Trade Practices by Digital Platform Operators

Report on Trade Practices in Cloud Services Sector



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Chapter 1 Purpose of the survey, etc.

1. Purpose of the survey

As the digitalization of economy and of business activities has advanced in recent years, new forms of services and business models have been created taking full advantage of data and digital technologies in various sections. The businesses that make efforts to maintain and enhance competitiveness are required to promote digital transformation “that establishes advantages in competition along with reforming businesses themselves, organizations, processes, corporate cultures/corporate climates based on the needs of clients and society by corresponding to rapid change in business environments and utilizing data and digital technologies.”^[1]

In these competitive environments, information systems themselves, which form the foundation of business activities, must provide prompt and flexible support to meet the need of the frontline workforce which changes rapidly. The use of cloud services has become widespread as one of the solutions to such need of businesses. According to “Communication Usage Trend Survey 2021” published by Ministry of Internal Affairs and Communications, the percentage of business providers that utilize whatever bit of cloud service is 70.4%, which has been increasing continuously at least for four years since 2017.^[2] Additionally, from the viewpoint of market size, the performance-based scale of the cloud service market became nearly three trillion yen in FY2020 results and it is also expected to continue to expand for the future.^[3] By utilizing cloud service, the business providers who use cloud service will be able to offer various kinds of services for end users (for example, contents delivery and e-commerce transactions, etc.) as well as to have greater productivity and efficiency of their own business.

In cloud service section, although its market itself has shown the situation of expanding as mentioned above, some service providers that have established a solid presence have appeared in such market. These CSPs are now becoming important players who provide the foundation of business activities for a number of enterprises, by conducting digital platform business that provides “opportunities” of services to third parties by utilizing information and communication technologies and data within their own companies or their group companies and providing a wide range of services, ranging from infrastructures as the foundation of information system established by the CSPs to applications to data analysis service or platform of IoT/AI in cloud service business.

In foreign countries, a cloud service is also one of the sections that draw attention from the viewpoint of competitive policy. For example, in the report related to competitive policy in digital market “Unlocking digital competition, Report of the Digital Competition Expert Panel” that the British Government asked the panel of five external experts to create, it is shown that analysis has been

^[1] Ministry of Economy, Trade and Industry, “Guideline for Promotion of Digital Transformation (DX Promotion Guideline) Ver. 1.0”, December of 2018, p2

^[2] Ministry of Internal Affairs and Communications “2021 Results of Communications Usage Trend Survey (Summary)”, May of 2022, p18

^[3] MM Research Institute, Ltd., “Trend in Demand for Cloud Service in Japan (2021 Edition)”, September of 2021

conducted focusing on the digital platform market and business operators that accumulate a large quantity of data and cloud service is seen as one of digital technologies that change economy and create new market and shown as an example of one of the markets where these CSPs compete.^[4] Besides, in the United States, “INVESTIGATION OF COMPETITION IN DIGITAL MARKETS -MAJORITY STAFF REPORT AND RECOMMENDATIONS-,” which the subcommittee on United States House Judiciary Committee antitrust laws, commercial law and administrative law of House Judiciary Committee compiled in October of 2020, stated cloud service is a vital component for various services of digital market such as online retrieval and e-commerce transactions and pointed out that early market entrants have a great advantage and can enclose customers by network effects and high switching costs.^[5] Moreover, cloud service is included as the target section in the Digital Markets Act announced at the end of 2020 by the European Commission.^[6]

Based on the above-mentioned situations, the Japan Fair Trade Commission (JFTC) commenced the survey on actual status of the cloud service section (hereinafter referred to as “the Survey”). In the Survey, it is expected that the efforts are promoted for preventing acts that violate the Antimonopoly Act (AMA) in the said section and ensuring fair, free competition environments implemented by concerned parties by clarifying the actual status of transactions and the state of competition surrounding digital platform operators in the said section and also indicating the views from the AMA and competition policy. In addition, it is supposed that organization of competitive environment of the section of cloud service will contribute to supporting digital transformation.

Besides, regarding business activities of such digital platform business operators, in accordance with the “Fundamental Principles for Improvement of Rules Corresponding to the Rise of Digital Platform Business” (the JFTC, the Ministry of Economy, Trade and Industry (METI), and the Ministry of Internal Affairs and Communications (MIC)) published on December 18 of 2018, which states “as the starting point to achieve transparency and fairness, understanding the actual state of trade practices will be advanced through large-scale, comprehensive and thorough survey”, the JFTC has been continuously conducting the fact-finding survey on the transactions. With respect to online retail platforms and app stores in October of 2019, and digital advertising section in February of 2021, the JFTC compiled the survey reports respectively. This survey of the cloud service section shall be conducted as the fact-finding survey of the trade practices by digital platform operators following these surveys.

2. Cloud services subject to the survey

The Survey mainly targets “IaaS” as the service that only provides infrastructure^[7] and “PaaS” that

^[4] See “Unlocking digital competition, Report of the Digital Competition Expert Panel” , March 2019, 1.4、 1.26、 1.62 paragraph by HM Treasury.

^[5] See “ INVESTIGATION OF COMPETITION IN DIGITAL MARKETS -MAJORITY STAFF REPORT AND RECOMMENDATIONS-“, October 2020 p109 to 120.

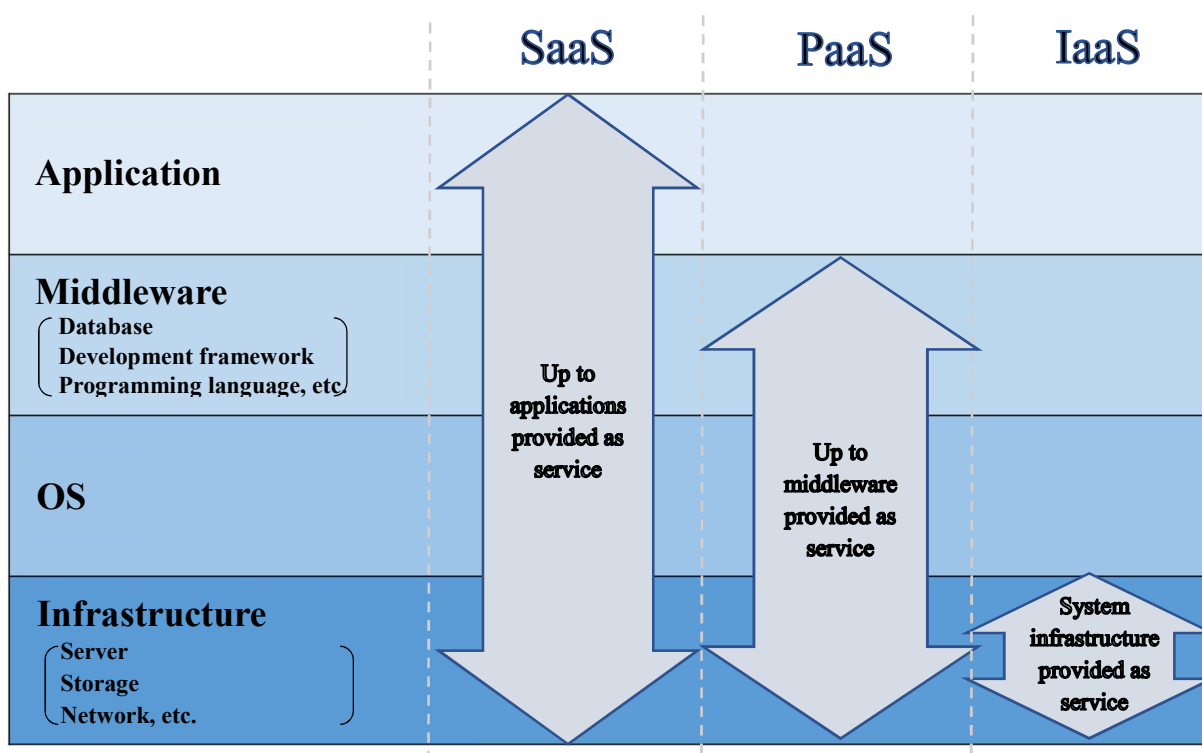
^[6] Additionally, after commencement of the Survey by the JFTC, Netherland in May 2021, France in January 2022 and South Korea in February 2022 commenced the fact-finding survey on cloud services, respectively.

^[7] In the context of information system, upon referring to “infrastructure (infra)”, it usually indicates hardware including server and storage, and network device, etc. and the equipment that installs these including datacenter, etc.

provides from operation systems (hereinafter referred to as “OS”) up to various functions (middleware) (for example, database) required to operate application software (hereinafter referred to as “Applications”) via a network in addition to infrastructure resources, among the classifications of cloud services by service model (see Figure 1-1. For details, see Chapter 2-1(4) mentioned below), with focus on their roles of the cloud services as the foundation/a component in the digital market (hereinafter, “cloud services” and “CSPs” primarily refers to IaaS and PaaS and their service providers, unless otherwise stated.).

Additionally, the Survey also refers to the group of services called “SaaS” that provides up to applications via network as one of the types of cloud services as required.

Figure 1-1. Service model concerning cloud services



Source : Data produced by JFTC, based on documents such as “NIST Special Publication 800-145: The NIT Definition of Cloud Computing”, by Peter Mell, Timothy Grance (September of 2011).

※ In some cases, SaaS providers may own the infrastructure and middleware as the foundation of their own services or otherwise they use other company’s (CSPs of IaaS or PaaS). Similarly, PaaS providers may also use the service of other IaaS providers for their infrastructure parts.

3. Survey method

Other than the Survey as below, the JFTC held “Opinion Exchange Meeting on Cloud Services” (chairperson: Professor Yosuke Okada, Hitotsubashi University, Graduate School of Economics. For details, see Attachment 1.) on March 30 of 2022, where opinions are exchanged regarding the issues and views from the AMA and the competition policy, in order to compile the report with reference to the opinions of academic experts and experts who have knowledge of cloud services.

Besides, in the course of the Survey, report orders under Article 40 of AMA were issued.

(1) Interview-based survey

An interview was conducted to AWS, Microsoft and Google^[8] (hereinafter referred to as “the Three CSPs”), which are expanding their market share every year in the IaaS and PaaS markets among business providers that develop/provide cloud service (hereinafter referred to as “Cloud Service Providers (CSPs)”^[9]; a total of other 22 CSPs; a total of 33 introduction support providers that provide solutions and services for cloud service customers (hereinafter referred to as “CSCs”) by utilizing services by CSPs; a total of six third-party software vendors; a total of 18 business providers that utilize cloud service as CSCs (regarding the explanation for market participants, see Chapter 2-3(1) mentioned below)^[10]. Besides, the interview was conducted to 20 entities including experts, trade associations and research firms, etc. that have expert knowledge related to cloud service section.

(2) Questionnaire-based survey

The JFTC conducted the questionnaire-based survey targeting CSCs of IaaS, PaaS and SaaS out of cloud services (limited to the services that provide the functions of groupware and the ones of CRM^[11]). Its summary is as follows (for details of the results of the questionnaire-based survey, see Attachment 2 and 3.).

Survey target : The JFTC selected 10,000 companies randomly from about 30,000 enterprises that have sales amount of 5 billion yen or more in the latest business year and sent them a request to answer the questionnaire. The JFTC asked the companies that utilize

^[8] When CSPs provide services to CSCs, for example, some of them conduct provision of cloud service and sales of cloud service by using different companies within the same group.

For example, regarding “Amazon Web Services (AWS)”, Amazon Web Services, Inc. whose ultimate parent company is Amazon.com, Inc. is the primary global service provider. Additionally, in the contracts, from February 1 of 2022, on behalf of Amazon Web Services, Inc. Amazon Web Service Japan K.K. whose ultimate parent company is also Amazon.com, Inc. is the contracting party (sales entity) for accounts in Japan.

Regarding Microsoft, for users in Japan, Microsoft Ireland Operations Limited that is 100%-owned subsidiary of Microsoft Corporation is the provision entity of cloud services and Microsoft Japan Co., Ltd. that is 100%-owned subsidiary of Microsoft Corporation is the sales entity of cloud services.

Regarding Google, Google Asia Pacific Pte. Ltd whose investor is Google APAC Technology Pte. Ltd. is the service provider for Google Cloud Platform (GCP) (mainly for IaaS and PaaS) in East Asia/Asia Pacific regions. Google Cloud Japan, GK whose investor is also Google APAC Technology Pte. Ltd. performs sales of GCP.

This report shall view “CSPs” as one group corporation no matter what the entity is the provision one or sales one for cloud service. This report shall describe their names of CSPs for convenience, as “AWS”, “Microsoft” and “Google” respectively.

^[9] Refer to Chapter 2-2 mentioned below.

^[10] Regarding the number of CSPs, introduction support providers, third-party software vendors and businesses using cloud services, in some cases, as one business may take on multiple roles (for example, the entity may provide introduction support of cloud services offered by the Three CSPs while providing its own cloud services.), the interview-based survey may be performed from multiple standpoints for the same business.

^[11] As there are wide variety of service sections for SaaS, the JFTC performed the questionnaire-based survey by taking into account of the market scale and the degree of market concentration and targeting the services that provide groupware functions and the functions of CRM (Customer Relationship Management)

Additionally, groupware refers to the communication system for the purpose of information share within the group providers by using network and the application, whose main functions are e-mail, electric bulletin board, document sharing library, business chat, scheduler, workflow and which provides such functions in complex manner (excluding the ones that are specialized in individual functions such as workflow, document management tool, business chat, etc.).

CRM refers to management of customer information that the businesses have such as performance of service sales to customers and maintenance service provision and status of complaint handling, which utilizes marketing, operation and customer support (targeting the products specialized in customer information management and marketing support functions only and excluding spread sheet software and database software and the ones using their add-on products, or the ones that is a part of/module of the function of ERP products (enterprise resource planning system).).

IaaS or PaaS to answer “questionnaire for CSCs of IaaS” or “questionnaire for CSCs of PaaS” of IaaS to answer (in the case they use both IaaS and PaaS, the JFTC asked them to answer the one of higher using ratio.). Additionally, the JFTC separately sent a request to the companies that use SaaS (limited to the services that provide the functions of groupware and the ones of CRM) to answer “questionnaire for CSCs of SaaS”.

Survey method : Web survey

Implementation period : July 19 to August 20, 2021

Number of respondents : 419 companies for IaaS CSCs

129 companies for PaaS CSCs

1,055 companies for SaaS CSCs

The industries of questionnaire respondents are shown in Figure 1-2 and 1-3. Furthermore, CSPs that the questionnaire respondents utilize are shown in Figure1-4 and 1-5.

Figure 1-2. Industries of questionnaire respondents (IaaS and PaaS)

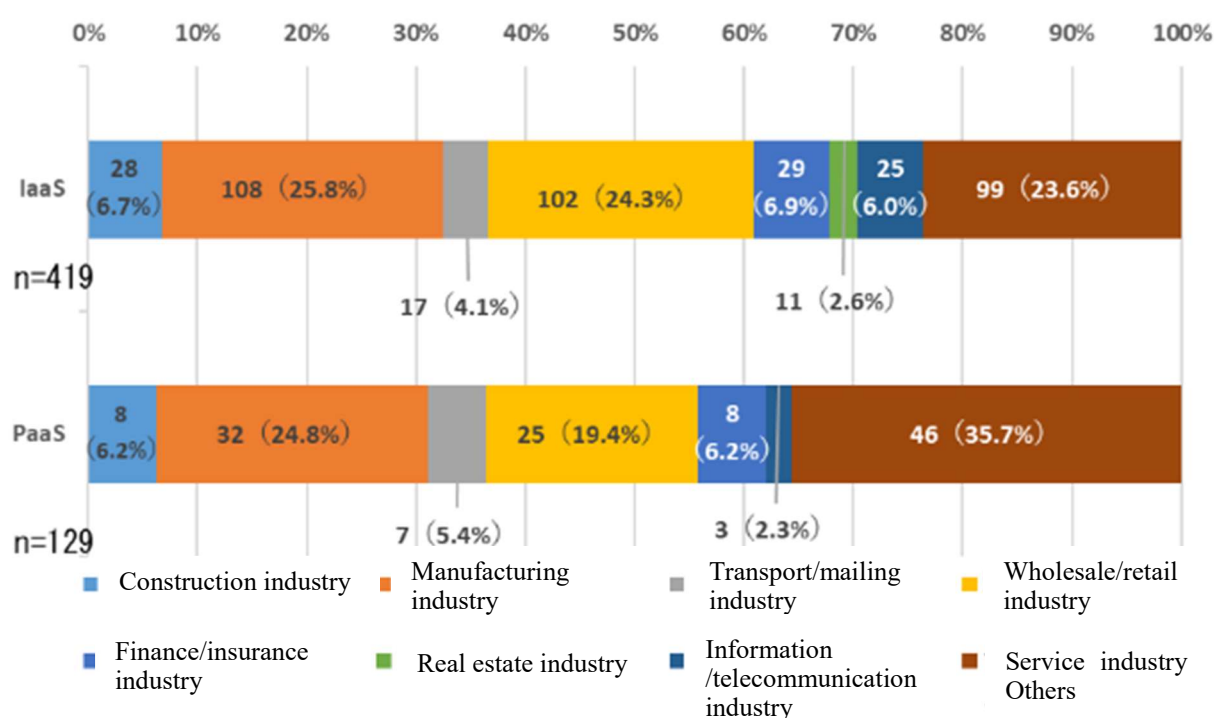


Figure 1-3. Industries of questionnaire respondents (SaaS (groupware and CRM))

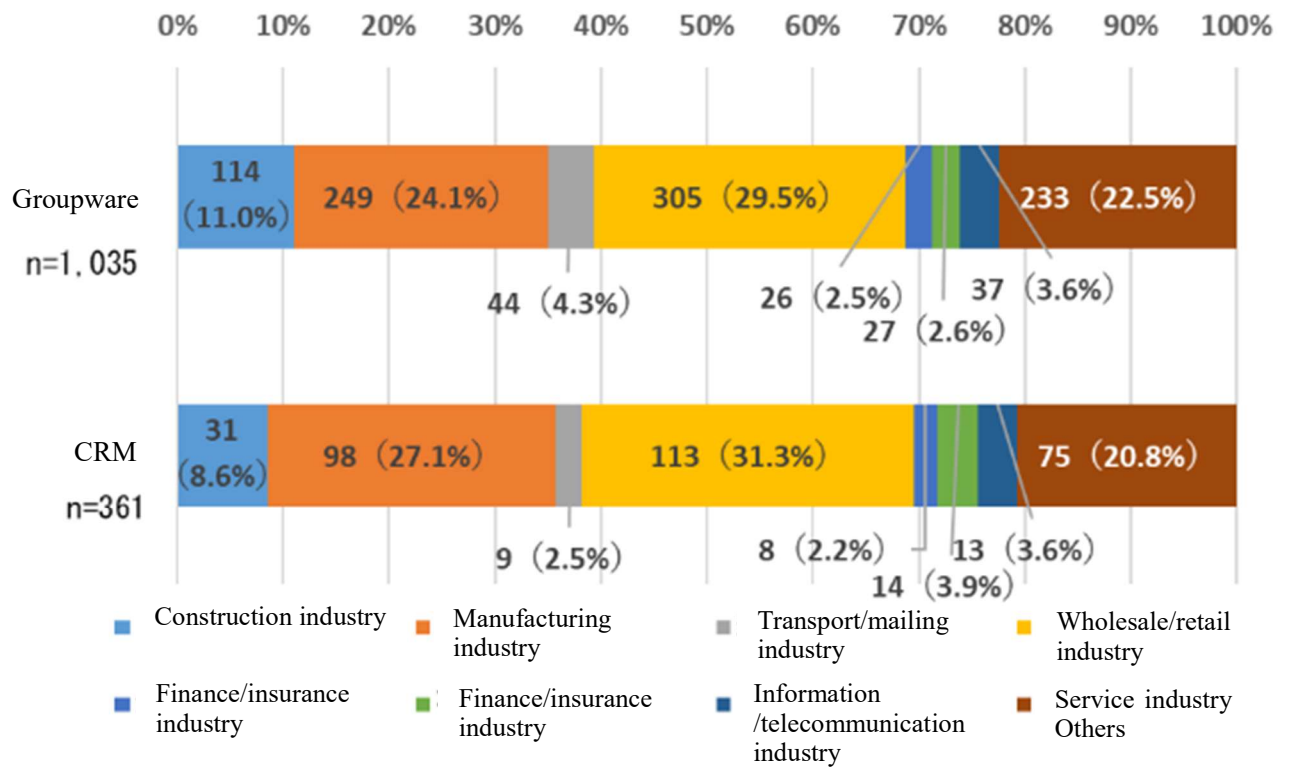
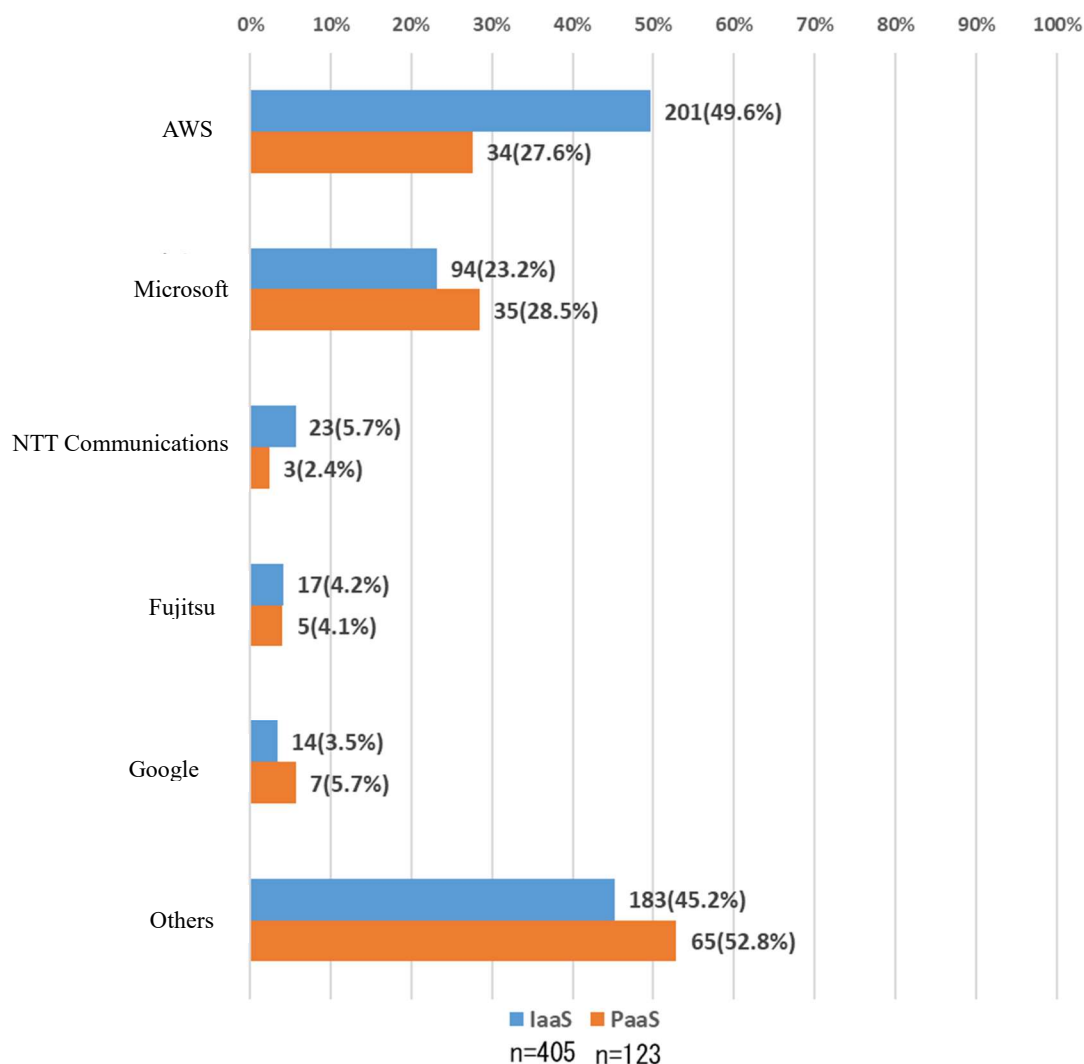


Figure 1-4. CSPs concerning IaaS • PaaS that the questionnaire respondents utilize^[12] ^[13]

【Multiple responses allowed】



^[12] In the Figure, “NTT Communications” shall refer to NTT Communications Corporation (hereinafter refers to as “NTT Communications”.) and “Fujitsu” refers to Fujitsu Limited (hereinafter referred to as “Fujitsu”).

^[13] The breakdown of “Others” are as follows:

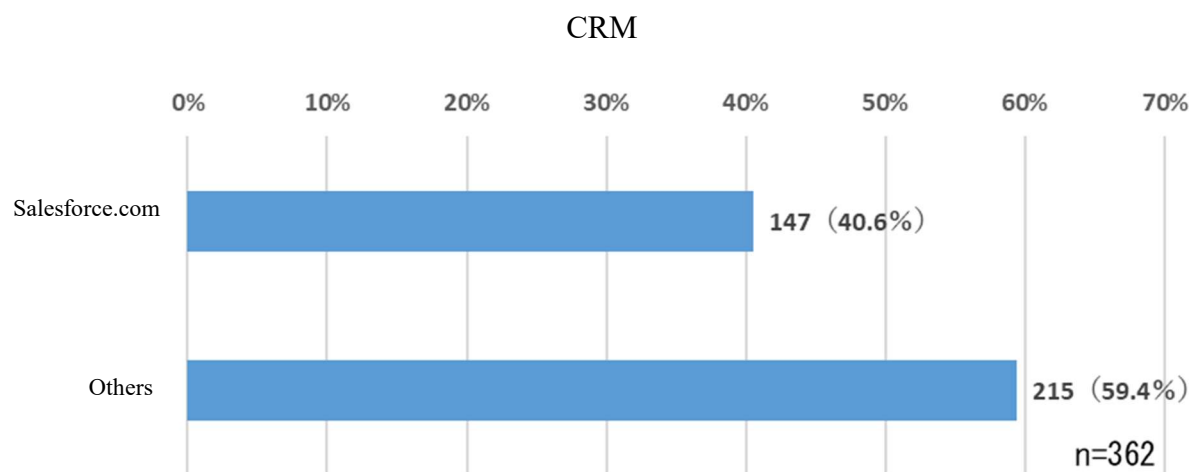
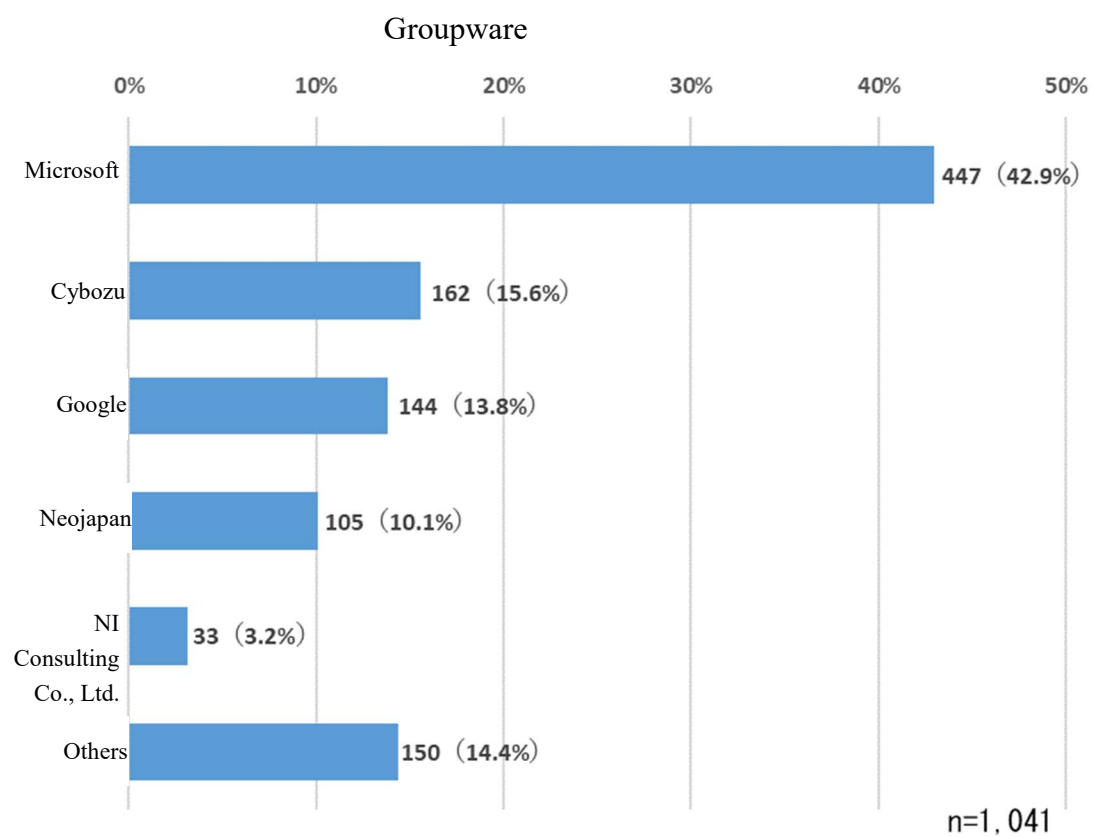
IaaS : Fujitsu Cloud Technologies Limited 15, Internet Initiative Japan Inc. (hereinafter referred to as “IIJ”.) 12, NEC Corporation (hereinafter referred to as “NEC”.) 10, IBM Japan, Ltd. (hereinafter referred to as “IBM”.) 10, etc.

PaaS : Salesforce.com, Inc. (hereinafter referred to as “Salesforce. com”.) 4, IBM 3, NEC 3, IIJ 3, Sakura Internet Inc. 3, etc.

Additionally, while Salesforce. com changed its company name to Salesforce Japan Ltd. (hereinafter referred to as “Salesforce Japan”, when indicating the explanation related to the period before the change of its company name and the survey results shown before such change, this report shall describe its name as “Salesforce. com”.

Figure 1-5. CSPs concerning SaaS (groupware and CRM) that the questionnaire respondents utilize

¹⁴ ¹⁵



¹⁴ In the Figure, “Cybozu” refers to “Cybozu, Inc.”, “Neojapan” to “Neojapan Inc.”, and “NI Consulting” to “NI Consulting Co. Ltd. (hereinafter refers to as “NI Consulting”).

¹⁵ The breakdown of “Others” of CRM are Softbrain Co., Ltd. 19 and NI Consulting 17, etc.

(3) International Cooperation

In the cloud service section, overseas competition authorities are also conducting market studies^[16]. The JFTC has exchanged views and expertise with Authority for Consumers & Markets of the Netherland and L'Autorité de la concurrence of France, which are engaged in cloud service section's survey as the JFTC, in the process of drafting this report. Additionally, the JFTC has also exchanged views and expertise with Directorate-General for Communications Networks, Content and Technology that has taken relevant measures for cloud services in Europe.

^[16] See Note 6 mentioned above.

Chapter 2. Overview of Cloud Service Market

1. Outline of Cloud Service Market

(1) Definition of cloud services

“Cloud” is also called as “cloud computing,” which is used as the term to express the services that provide resources established on the Internet^[17].

While there is no uniform wording used in Japan as the definition of cloud services, for example, the definition of National Institute of Standards and Technology (hereinafter referred to as “NIST”), which is often quoted by the official institutions and private business operators in Japan, states that “cloud computing is a model for enabling via network access to a shared pool of configurable computing resources (networks, servers, storage, applications, and services), which can be rapidly provisioned and released with minimal management effort or service provider interaction” and is supposed to have the following five basic characteristics^[18].

<Five characteristics of cloud model by NIST>

- (i) On-demand self-service
- (ii) Broad network service
- (iii) Resource^[19] sharing
- (iv) Rapid elasticity
- (v) Scalability of services

(2) History of appearance of cloud service

A. Era of on-premise system^[20]

Taking a general view of information processing system by businesses before the appearance of cloud service, while mainframes were used for information processing system from 1960s to 1970s, the client-server information processing became mainstream from 1980s to 1990s, thanks to the lowered prices and performance upgrade of personal computers (terminals). While the former has the configuration where both information processing and data storage are totally centralized to mainframes the latter has the decentralized one where the processing capability is installed in client terminals as well (see Figure 2-1). In either case, from the standpoint of businesses, with regard to such mainframes and client-server information system, in principle, it was supposed that the required facilities should be held as IT assets by their own companies (or their subsidiary companies and the like in charge of information system) and the system should be constructed/operated by their own companies. The information system with such configuration shall be called “on-premise

^[17] MIC, “White Paper on Telecommunications, 2021 Edition”, July 2021, p34

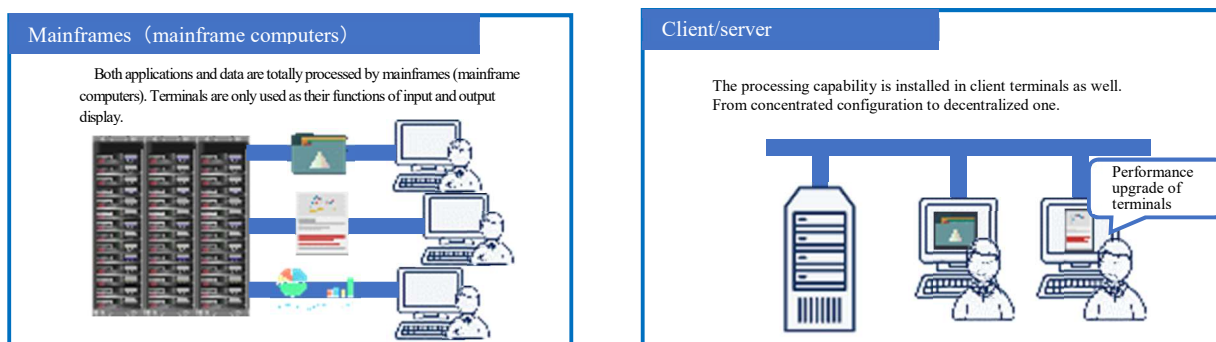
^[18] Peter Mell, Timothy Grance “NIST Special Publication 800-145 Definition of Cloud Computing by NIST”, September, 2011. It was translated in Japanese by Information-technology Promotion Agency, Japan (<https://www.ipa.go.jp/files/000025366.pdf>).

^[19] In the explanation of the same paragraph, examples of resources would be “storage, processing capability, memory and network bandwidth”.

^[20] See MIC, “White Paper on Telecommunications, 2019 Edition”, Part I, Section 1 (4).

system” (hereinafter referred to “on-premise.”).

Figure 2-1 Overview of on-premise system



Source: created by the JFTC based on by p15 of “Basis of Cloud-this explains everything, 2nd edition”, Masayuki Hayashi

B. Expansion of datacenter services²¹

From 1990s to 2000s, with the growth of the Internet, more and more businesses have introduced business system. Accordingly, as the number of servers that the businesses held increased, it has become more difficult to secure sufficient personnel for their operation/maintenance and the labor costs rose. Then the needs to outsource the system has grown, instead of holding all the required facilities, etc. In response to these growing needs, the datacenter service has expanded.

The datacenter service shall be divided into housing-type and hosting-type depending on the functions provided. “Housing” shall refer to the services to manage air-conditioning and security within the building of the datacenter and then lend the rack and space, and the power source, etc. in the said datacenter. The server set in the datacenter shall be brought by the customers themselves and also managed and operated by them. On the other hand, “hosting” shall refer to the service to lend all or part of the domain of the server that providers hold in addition to the rack and space, and the power source, etc. in the datacenter and also to provide operations such as system monitoring, which is also called “rental server.”

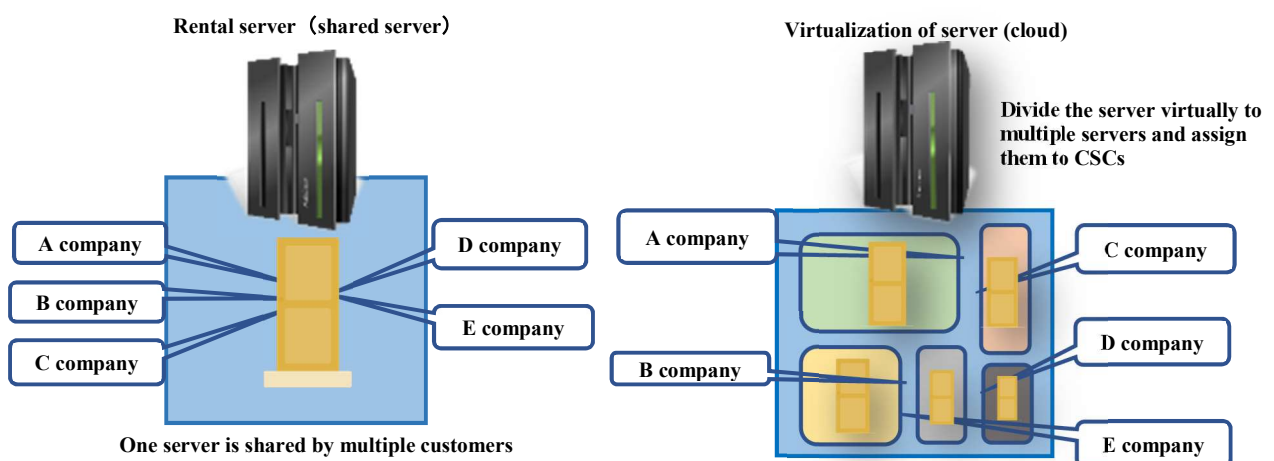
C. Appearance of cloud services

In the late 2000s, other than speeding up CPU processing, the development of technologies such as virtualization and decentralized processing, etc. led to the appearance of cloud services. Virtualization refers to the mechanism to logically divide the resource of hardware including server, etc. For example, the virtualization of server enables multiple server environments to be constructed from one physical server or resources of multiple physical servers to be integrated into one server environment. The server environment assigned through visualization shall assign performance and memory capacities of CPU respectively like the physical server and each enables OS and applications to operate.

²¹ See “Report on Datacenter Industry-Trend of Datacenter Industry and Datacenter Industry as New Asset” January 2020, p5-9 by Development Bank of Japan Inc.

In Cloud services, CSPs totally hold the building and facilities of datacenter, computing resources and hardware and operate the provided resources/hardware, as the hosting service does. While the hosting service is the one of new form in which one physical server is shared by multiple customers, as the new development of cloud service, it provides independent virtual environment for each CSC through virtualization of physical server (see Figure 2-2). Accordingly, with regard to hosting service, while the predicted purpose and service for each contract plan is basically packaged and customers cannot install applications freely to the rental server, in cloud services, CSCs can construct the server freely within visual environment including installation of applications, etc. Furthermore, in hosting services, while the specification is fixed according to the plan selected when making a contract, the cloud service enables them to increase and decrease the necessary amount of resources easily as required. Thus, the cloud service has the characteristics of high flexibility of customization and for increase and decrease in the amount of resources for CSCs (with regard to the advantages of cloud services in general, see (3) mentioned below.).

Figure 2-2 Differences between rental servers and cloud services



Source : Created by the JFTC based on the website of GMO GlobalSign Holdings K.K.
(<https://altus.gmocloud.com/suggest/shared/>)

It is considered that cloud services began to draw attention in Japan as well around 2009, triggered by commencement of providing such services by foreign affiliated businesses. Time-series overview of the movement of main CSPs that engaged in commencement of providing cloud services are as follows:

It is generally recognized that AWS has led commencement of the cloud services excluding SaaS. AWS commenced to provide the services (mainly in IaaS section) including computing and storage in 2006. Next, from the late 2000s to 2010, Google and Microsoft commenced to provide the services, etc. (mainly in PaaS section) that provide application development and execution environment. Although Japanese businesses could also use these services that the foreign affiliated companies commenced, as their datacenter only located overseas (in North America), CSCs had no

choice but to set their own data in the overseas datacenter.

Following global commencement of the services by such foreign affiliated companies, IT vendors in Japan successively announced the intention to enter into IaaS/PaaS section around 2010. In addition, foreign affiliated businesses also started to be engaged in business development in Japan, such as establishment of Japanese corporation of both AWS and Google specialized in cloud service businesses in 2015, as well as establishment of datacenter in Tokyo by AWS, that of Microsoft in the eastern Japan (Tokyo) and the western Japan (Osaka) in 2014 and that of Google in Tokyo in 2016^[22]. Since commencement of service provision, such companies have been engaged in enhancement of service contents: for example, AWS has started to provide the services of PaaS as well as those of IaaS, while Microsoft and Google started to provide not only those of PaaS but also those of IaaS.

D. Expansion of Cloud Service Area

As mentioned above in C, cloud services initially provided basic functions such as computing, application development and operation environment, as the services have become increasingly complicated and highly functional at present, the number of services has dramatically increased accordingly. In this respect, according to the explanations by CSPs, in accordance with development of technologies related to cloud computing, it appears that CSPs have created more specialized services, including data analysis, IoT, machine learning, AI, block chain and quantum computing^[23]. Moreover, in the Opinion Exchange Meeting on Cloud Services, there was a comment that the range of services provided as cloud services will continue to expanding for the future, pointing out that as softwarization has been advanced in many areas so far, the softwarized areas can be converted into cloud and CSPs may continue to play an important role in various areas including social infrastructure, and also pointing out that as softwarization of core technologies has been advanced, various items have come to be actually created on the cloud; for example, some foreign countries have already experienced establishment of infrastructure related to 5G on the cloud of the leading CSPs.

Based on such expansion of cloud service areas, in the Opinion Exchange Meeting on Cloud Services, it was also a comment that in some cases, due to enhancement of services and functions provided by CSPs as cloud services, the existing businesses and CSPs might compete against each

^[22] As of May 2022, AWS opened the datacenter in Tokyo and Osaka, Microsoft did in the eastern Japan (Tokyo/Saitama) and the western Japan (Osaka) and Google in Tokyo and Osaka, respectively. Additionally, as their respective locations are described based on the names of “regions” that show the geographic places of the datacenters (for details, see 3(3) mentioned below), actually, they are not always located in the said prefectures.

^[23] In response to the question from the JFTC that asks about the trend of the contents of services added so far when it is viewed on a time-series basis, for example, AWS answered, “in 2006, when AWS commenced to provide the services, AWS provided computing, storage and data porting service with customers. AWS added database service in 2007, provided the services such as analytics, networking and contents distribution services, etc. in 2009. In 2011, AWS added the services of security, authentication and compliance. In recent years, AWS continues to enhancing service provision and commenced to provide the services including IOT (internet of things) in 2015, machine learning in 2016, block chain in 2019, and quantum computing in 2020.” In addition, Microsoft answered, “the initial service for cloud was the basic infrastructure services including computing and storage. The more complicated the cloud computing becomes, the more complicated needs CSPs correspond to including software development, data analysis, machine learning, AI, etc. and the more specialized PaaS services they started to create.”

other in the targeted sections of such enhancement.

(3) Advantage of cloud service

The advantages of using cloud services are generally described as follows:

A. Flexibility/swiftness of construction

In the case of on-premise and datacenter services, (hereinafter collectively referred to as “On-Premise, etc.”), customers would perform the design by themselves corresponding to individual requirements of the systems of their own companies and individually procure and arrange and construct required facilities, hardware and software from the respective vendors. Thus, upon constructing the system, as it is necessary to decide the scale by predicting the peak of system use and procure the resources accordingly, the initial costs upon construction may become higher and it may result in a waste of resources during off-peak hours. Meanwhile, in the case of cloud services, as it is not necessary for CSCs to procure hardware, etc. by themselves, they can select the amount of functions they want to use at any time and they can easily expand and reduce such amount, it is advantageous for CSCs because they can reduce not only the initial costs but also the waste of resources even if their amount of use may fluctuate. Because of this advantage, for example, it is possible for start-up companies to start new services while cutting the initial costs and use the cloud services to flexibly expand the resources accordingly in the case of expansion of their use.

Furthermore, it is pointed out that there is an advantage that the cloud services can construct systems swiftly. While it takes a long time for the companies in the case of On-Premise, etc. and they need to procure and arrange the resources by themselves, it is possible for them to swiftly get to work on system construction as they only need to start the use of previously prepared computing resources by CSPs. Moreover, in the case of the design for cloud services (especially IaaS), it is said that the system can be constructed swiftly by developing a specific pattern of the design related to infrastructure on the assumption that the necessary functions would be selected out of the previously prepared ones and then combined them.

This means that development, construction and modification can be performed swiftly and flexibly to meet on-site needs and would give an advantage for the rapidly changing digital society surrounding the business.

B. Effective use of internal IT human resource by outsourcing maintenance/operation

In addition to A mentioned above, with regard to cloud services, since maintenance and operation provided as the cloud services are performed by CSPs, it becomes possible for them to assign the human resource of their own companies who were previously assigned to such maintenance and operation to significant efforts closer to their own business issues.

C. Availability/reliability

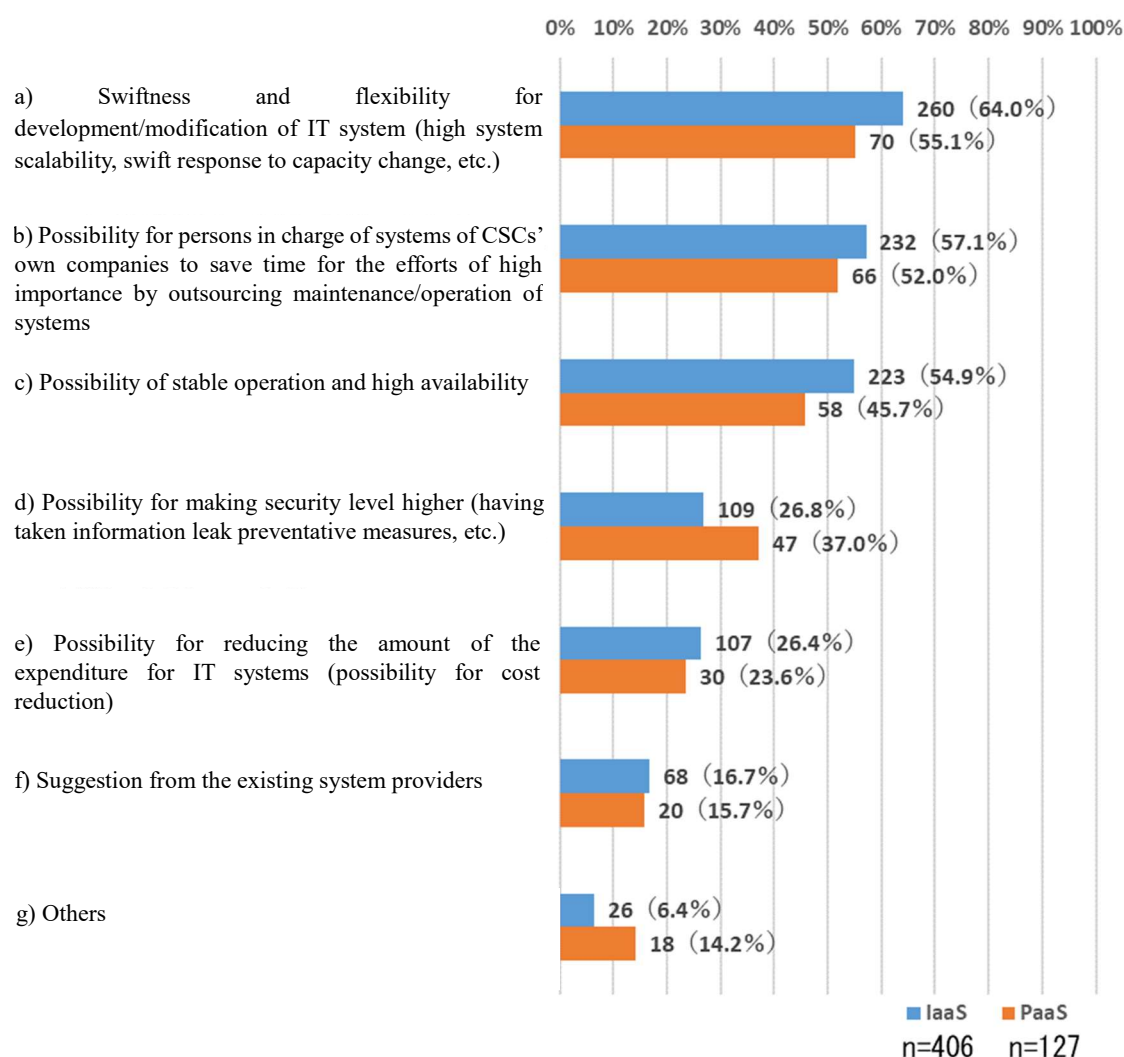
With regard to On-Premise, etc., when taking actions including duplication and backup of system as the countermeasures against failure and disasters, CSCs must do those by themselves. On the

other hand, CSPs have promoted efforts to adopt the configuration to provide against failure by utilizing disaster resilient datacenter and making use of specialty as the providers. In some cases, cloud services may be assessed superior to On-Premise, etc. in regard to availability and reliability depending on the providers that CSCs use.

As shown in Figure 2-3, according to the questionnaire-based survey, many of the respondents stated their swiftness and flexibility for development/modification of IT system (high system scalability, swift response to capacity change, etc.) (Option a), possibility for persons in charge of systems of CSCs' own companies to save time for the efforts of high importance by outsourcing maintenance/operation of systems (Option b), and possibility of stable operation and high availability (Option c), as the reasons why CSCs had introduced IaaS and PaaS. It can be said that the questionnaire results show the Options a to c mentioned above are broadly recognized by the businesses as the advantages of cloud services.

Figure 2-3. Reasons why CSCs had introduced IaaS/PaaS

(Advantages supposed to be gained by introduction of IaaS/PaaS) 【Multiple responses allowed】



(4) Classifications of cloud services

A. Classifications of cloud services by service model

As shown in Figure 1-1, cloud services are classified into 3 layers of IaaS, PaaS or SaaS, when roughly classified from the viewpoint of the scope of IT resources provided by CSPs (the scope of responsibilities of CSPs and CSCs).

(i) IaaS

“IaaS” is the abbreviation of “Infrastructure as a Service,” which refers to the services to provide infrastructure resources including servers, storage and networks, etc. via network (to enable the construction of infrastructure in a virtualized environment). The most representative service as IaaS is the virtual server and, in some cases, for which various functions may be

prepared, including storage and network functions, load balance^[24] and auto scale as the option to be added to this^[25]. As it is the services that provide only infrastructure, CSCs need to introduce and manage higher-layer software including middleware, applications and other software by themselves.

(ii) PaaS

“PaaS” is the abbreviation of “Platform as a Service.” While IaaS refers to the services to only provide infrastructure resources, PaaS refers to the services to provide middleware via network, including platforms, etc. to operate OS and applications in addition to infrastructure resources. For example, in the case where application development and operation environment of businesses as the PaaS services is provided, such services enable CSCs to swiftly develop applications on them, without constructing development environment by themselves. It seems that the services and functions provided by PaaS have been spreading and, for example in recent years, the functions as the basis of IoT and AI have been provided by PaaS as well.

Additionally, in some cases, PaaS providers may utilize another provider's IaaS to infrastructure resources.

(iii) SaaS

“SaaS” is the abbreviation of “Software as a Service,” which refers to the services to provide applications that operate on cloud base. The conventional similar service is the packaged software. While the packaged software needs to be installed to the terminal and server, SaaS provides the use of applications operated and managed by CSPs to CSCs via a network. There are a wide variety of the applications provided as SaaS including communication tools such as e-mail, electric bulletin board, document sharing library, business chat, scheduler, workflow, groupware that are offered in a complex manner, and CRM to manage information related to customers for businesses (customer information, performance of purchase and sales and products to customers and maintenance service provision, response status of inquiries and complaints from customers, etc.) .

As the applications of SaaS are automatically upgraded even in the middle of use, SaaS has the advantage for CSCs in that they can always use the latest capabilities and do not need to control bugs, etc. and they can use the applications seamlessly regardless of the locations such as workplaces, their own houses, and terminals such as personal computers, mobile phones and

^[24] The load balancer is the device to provide the system to distribute external communication (traffic) to multiple servers for the purpose of redundancy (see Note 32 mentioned below) and load distribution. For example, in the case of operating the website by one server, the server may be in danger of being down due to access concentration exceeding processing capacity. As the countermeasure against such case, by preparing multiple servers, the load balancer may play the role to distribute the access to each server in order to prevent concentrating access to any of such servers (See NTT communications website (<https://www.ntt.com/bizon/glossary/j-r/load-balancer.html>)).

^[25] Auto scale refers to the function to automatically increase/decrease the number of virtual servers in accordance with the load of server including access concentration, etc. by increasing the number of servers automatically in the case of access concentration, and by reducing their number in the case of less access, it always enables the system to operate stably by the minimum required number of servers (see IDC Frontier website (<https://www.idcf.jp/words/auto-scale.html>)).

tablets, etc. as long as there is a network environment.

Additionally, some of SaaS providers use the services of other companies (CSPs of IaaS and PaaS) including infrastructure resources and middleware, etc. as the infrastructure of their own companies.

B. Classification by usage forms

(i) Public cloud

“Public Cloud” refers to the cloud services that CSPs provide via a network, etc. such as the Internet with the unspecified number of CSCs including businesses and individuals.

(ii) Private cloud

In contrast with public cloud, “private cloud” refers to the cloud services provided by CSPs through network such as the Internet, etc. only for specified CSCs including businesses and individuals. The private cloud shall be classified into two types: “hosted type (use type)” that uses the resources of CSPs via network and “on-premise type (possession type)” that constructs and operates the cloud environment dedicated to CSCs themselves. The former may be selected by CSCs that feel uncomfortable with sharing resources with multiple other CSCs by the public cloud, as the resources dedicated to them are prepared. The latter is generally considered to be no substantially different from on-premise in that IT assets must be procured and operated by themselves, although the cloud environment is constructed by the visualization of resources of their own²⁶.

(iii) Hybrid cloud

“Hybrid cloud” refers to the systems and services that make use by linking cloud service and on-premise, etc. including public cloud and private cloud in accordance with CSCs’ requirements.

(iv) Community cloud

“Community cloud” refers to the form in which multiple businesses and groups construct and commonly operate cloud systems for specific purposes.

(5) Current status and trend of introducing cloud service for businesses

A. Introduction status of cloud services

After going through the progress of information processing systems by businesses mentioned above in (2), at present, there are the options with regard to the infrastructure of information processing systems, such as on-premise, datacenter services or cloud services. As mentioned in Chapter 1-1, the percentage of business providers that utilize whatever bit of cloud service and the

²⁶ Because of that, as on-premise type private cloud does not fall under “cloud services”, the Survey shall sort out that it is included in “On-Premise”.

market scale of cloud services have been growing in recent years. While the whole market relating to information processing system including on-premise and cloud services has been expanding, in the form of switching from on-premise, use of cloud services by businesses is on a rise^[27].

With regard to introduction of cloud services (including SaaS), for example, it rarely takes the form of switching from the systems that were conventionally on-premise into the cloud all at once; in general, the businesses gradually start the introduction of the systems from the ones that have been judged suitable for using cloud computing. The followings are the patterns as the forms of introduction of cloud services for businesses.

(i) Introduction of SaaS to the areas where the independent workflow is required including general work that are not directly connected to the competition of the business within companies.

(ii) The existing systems constructed by making use of on-premise, etc. (they are often called “legacy systems”) are ported on cloud services (mainly IaaS). As the existing systems constructed based on the on-premise, etc. has not been designed and developed on assumption of cloud environments and it is often difficult to construct totally new cloud native^[28] systems from scratch from the viewpoint of compatibility with the existing systems and business continuity, in the case of porting the existing system onto the cloud services, “lift and shift” method for porting have been adopted in many cases, in which once the existing systems have been ported on cloud services with no change and then are gradually changed to the environments suitable for the cloud.

(iii) In the case of construction of new systems that make use of innovative technologies, such as IoT, AI and data analysis, as it is possible for the businesses to design and develop suitably for cloud environments from scratch, they can design/develop cloud native systems.

According to the questionnaire-based survey, the starting year of the use of IaaS or PaaS by the questionnaire respondents is as shown in Figure 2-4: it is found that the number of the businesses that started utilizing IaaS or PaaS increased from 2010 to 2015^[29].

^[27] Comparing the scale of the information system market relating to public cloud (public cloud-related SI market) and the one relating to on-premise (conventional SI market), the public cloud-related SI market was 2.9839 trillion yen and the conventional SI market is 9.1814 trillion yen in 2020 FY and the proportion of the public cloud-related SI market and the conventional SI market were 24.5% and 75.5 % respectively among their total amount as the whole market. Whereas, in 2024 FY, it is expected that the public cloud-related SI market will be 5.2017 trillion yen and the conventional SI market is 8.7899 trillion yen and the proportion of the public cloud-related SI market and the conventional SI market will be 37.2% and 62.8% respectively among their total amount as the whole market (“Present Situation and Future Outlook for Cloud Computing 2021” (Market) issued by Fuji Chimera research Institute, Inc.

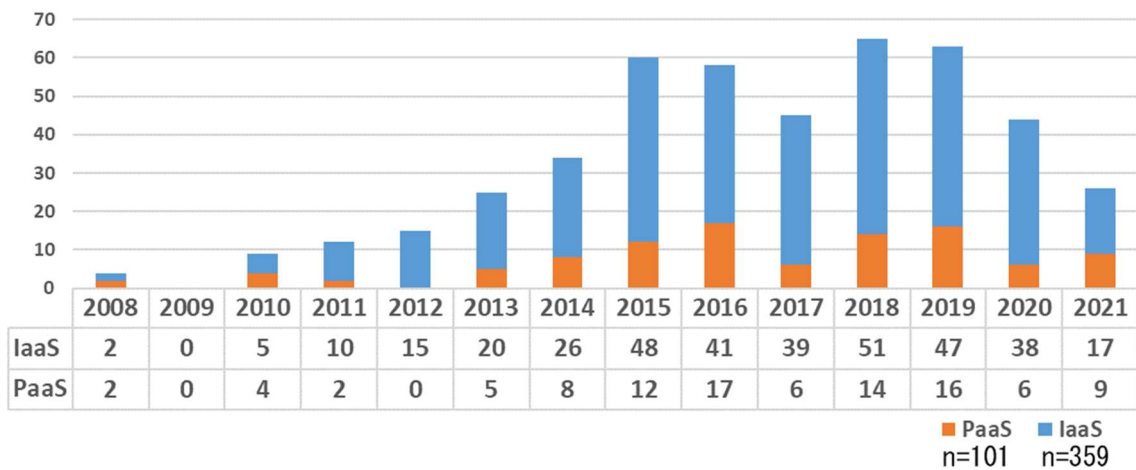
Additionally, according to the private questionnaire-base survey subject to the businesses in Japan, the pattern of portion by IaaS CSCs shows that the proportion of the porting from the servers of their own companies that are yet to be virtualized within their own companies is 29.1% and the one of the porting from the servers that are virtualized within them is over 19.2% while the one of new CSCs is 31.1% as the poring pattern by the CSCs of IaaS, from which the porting from on-premise environment can be found in many cases. The same trend can also be found in PaaS (MM Research Institute, Ltd., “Trend in Demand for Cloud Service in Japan (2021 Edition)”.

As a result, while the whole market relating to information processing system continues to expand for the future, it is expected cloud services markets will keep expanding through acceleration of the porting from on-premise.

^[28] The overall efforts including systems and applications on the assumption of cloud environments or design and development on the assumption of cloud environments from scratch refer to “cloud native”.

^[29] IaaS and PaaS have the common use purpose including the use of “infrastructure of in-company systems/applications” as the main purpose of use as shown below in Figure 2-6. For CSCs, as it is considered that IaaS and PaaS are mutually substitutable, the trend of the sum of IaaS of PaaS have been analyzed in this report.

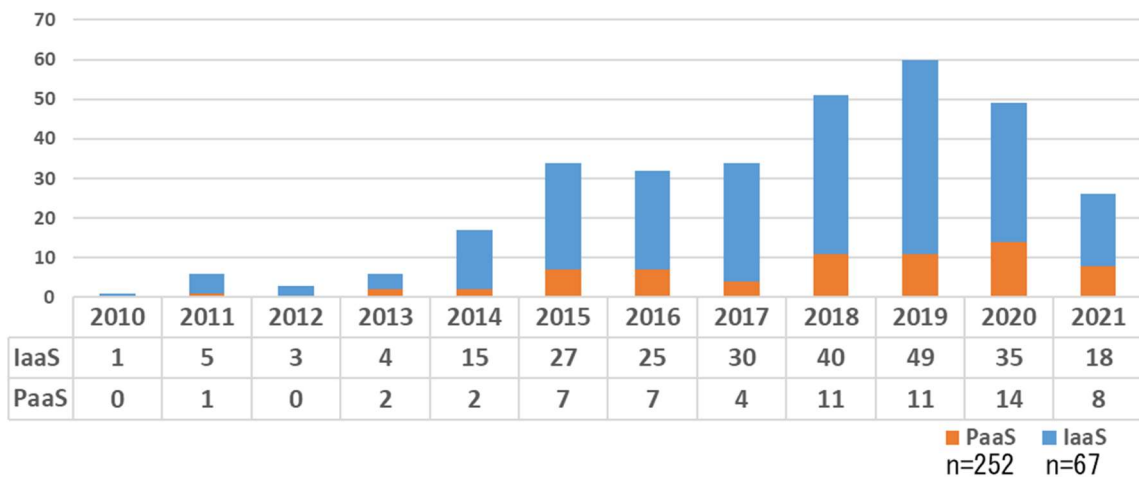
Figure 2-4. Starting year of the use of IaaS or PaaS by businesses



(Note: with regard to 2021, up to the time of conducting the questionnaire)

Moreover, when asked about the experience of switching from on-premise to IaaS or PaaS in the past decade, the businesses that experienced switching from on-premise to IaaS or PaaS are 58.2% of the respondents (319 companies out of 548 ones), as shown in Figure 2-5, in which it is found that the number of the businesses that switched from on-premise to IaaS or PaaS goes on increasing year after year from around 2011.

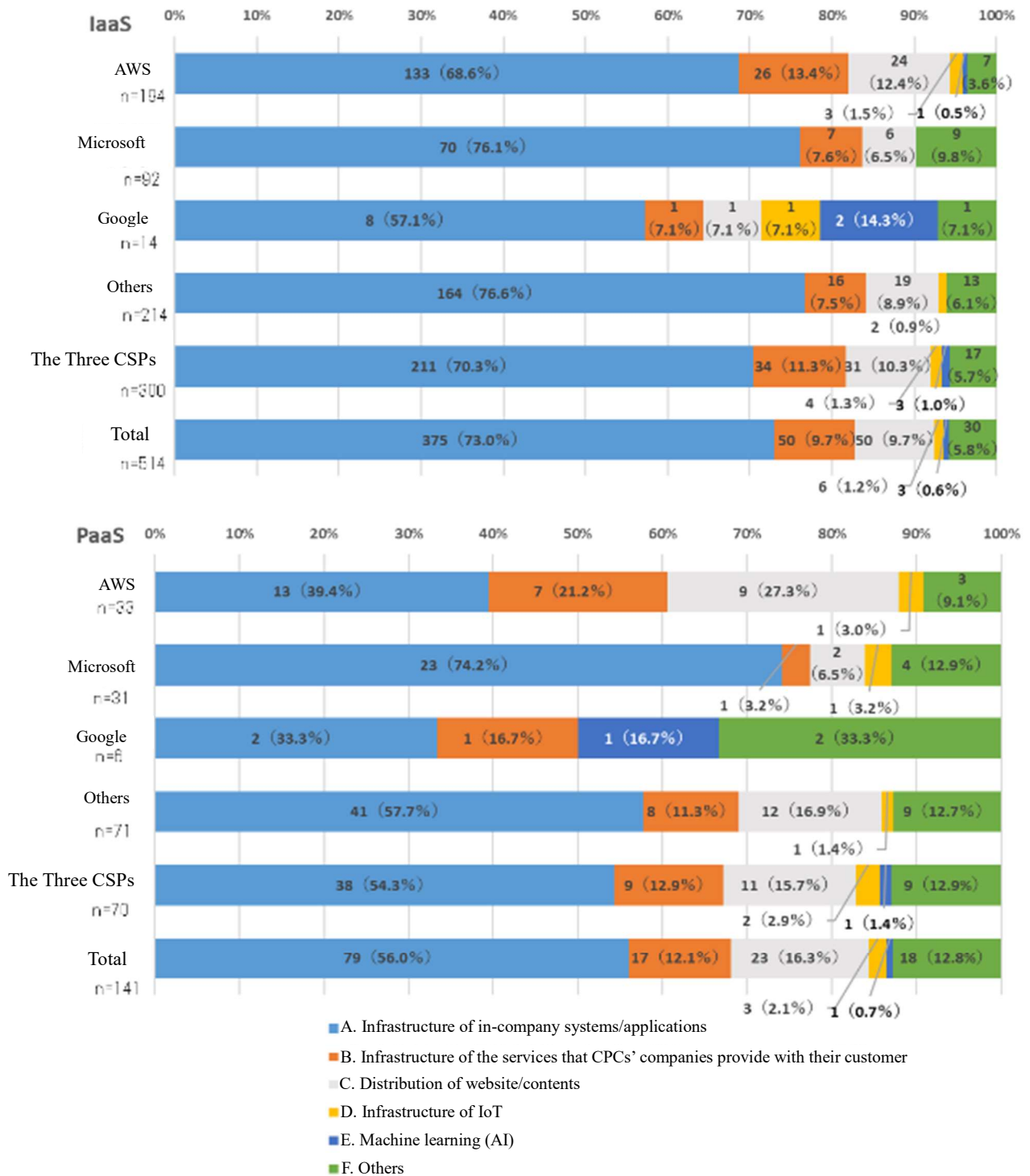
Figure 2-5. Switching timing when businesses have the experience of switching from on-premise to IaaS or PaaS in the past decade



(Note: with regard to 2021, up to the time of conducting the questionnaire)

As shown in Figure 2-6, “infrastructure of in-company business systems/applications”(Option a) showed the largest number of the responses as the main purpose of use of IaaS/PaaS by the said businesses.

Figure 2-6. Main purpose of use of IaaS/PaaS³⁰



As shown in Figure 2-7, as the reasons why the services of CSPs are selected, the results show that the largest number of the proportion of the responses was 50% to 60% as prices (Option a) and quality (option b) respectively, followed by location of the data (Option c), abundant software, etc.

³⁰ In the Figure, “Others” do the ones of the CSPs other than the Three CSPs. Hereinafter the same shall apply to the figures.

provided by the said CSPs (i.e. of first party) (Option d), a large number of introduction support providers and engineers, etc. (Option f) and recommendation by introduction support providers (Option h), whose proportion was around 20% to 40%.

In addition, with regard to the Three CSPs, the results showed the higher proportion of the responses by CSCs who selected the reasons of abundant software, etc. provided by the said CSPs (i.e. of first party) (Option d), abundant software, etc. provided by third-party (Option e) and easiness of information collection regarding operation (Option g) compared to the other CSPs^[31]. In addition, with regard to the two CSPs of AWS and Microsoft, the proportion of the responses of CSCs who selected a large number of introduction support providers and engineers, etc. (Option f) is significantly higher compared to the other CSPs.

^[31] Furthermore, hereinafter in this report, it means that, when comparing the proportion of responses of CPCs of the Three CSPs with those of all the other CSPs in total, the former exceeds the latter, and additionally that, with regard to the CPCs of the top five CSPs of IaaS/PaaS as AWS, Microsoft, NTT communications, Fujitsu and Google, when comparing the proportion of responses of CPCs of the Three CSPs with those of NTT communications and Fujitsu, all of the former exceeds all of the latter.

Figures 2-7. Reasons why CSCs selected the services by the CSPs used 【multiple responses allowed】

※Red: 50% or more, Yellow: 30% or more to less than 50%

IaaS	AWS (n=195)	Microsoft (n=91)	Google (n=14)	Others (n=211)	The Three CSPs (n=300)	Total (n=511)
a) Timing of introduction or the prices and charge system in the future	61.0% (119)	48.4% (44)	42.9% (6)	53.1% (112)	56.3% (169)	55.0% (281)
b) Quality as the services including availability, stability, security and interface etc.	65.6% (128)	60.4% (55)	50.0% (7)	55.0% (116)	63.3% (190)	59.9% (306)
c) Location of the CPCs' own data stored in the said services (country, region)	31.3% (61)	37.4% (34)	21.4% (3)	39.8% (84)	32.7% (98)	35.6% (182)
d) Abundance of related services operated on the said cloud services including software and applications provided by the said CSPs (of first party)	32.8% (64)	31.9% (29)	71.4% (10)	6.6% (14)	34.3% (103)	22.9% (117)
e) A large number of operated on the said cloud services including software and applications provided by third parties (of third party)	13.8% (27)	16.5% (15)	35.7% (5)	4.7% (10)	15.7% (47)	11.2% (57)
f) A large number of introduction support businesses and engineers including Sler and consultants etc. who can manage the said cloud services	32.3% (63)	26.4% (24)	7.1% (1)	14.2% (30)	29.3% (88)	23.1% (118)
g) Easiness of information collection related to operation because of substantiality of introduction results, training and user community etc. related to the said cloud services	28.2% (55)	17.6% (16)	7.1% (1)	5.7% (12)	24.0% (72)	16.4% (84)
h) Recommendation for the use of the said services by introduction support businesses including Sler and consultants etc. (introduction support businesses recommended the said services as the suitable ones for the CSCs' requirements)	29.2% (57)	25.3% (23)	7.1% (1)	28.4% (60)	27.0% (81)	27.6% (141)
i) Convenience or advantage of the use together with other kinds of IT services provided by the said development/CSPs	6.7% (13)	18.7% (17)	14.3% (2)	18.0% (38)	10.7% (32)	13.7% (70)
J) Others	6.7% (13)	8.8% (8)	14.3% (2)	6.2% (13)	7.7% (23)	7.0% (36)

PaaS	AWS (n=33)	Microsoft (n=34)	Google (n=6)	Others (n=73)	The Three CSPs (n=73)	Total (n=146)
a) Timing of introduction or the prices and charge system in the future	51.5% (17)	47.1% (16)	50.0% (3)	41.1% (30)	49.3% (36)	45.2% (66)
b) Quality as the services including availability, stability, security and interface etc.	63.6% (21)	61.8% (21)	66.7% (4)	50.7% (37)	63.0% (46)	56.8% (83)
c) Location of the CPCs' own data stored in the said services (country, region)	21.2% (7)	23.5% (8)	0.0% (0)	20.5% (15)	20.5% (15)	20.5% (30)
d) Abundance of related services operated on the said cloud services including software and applications provided by the said CSPs (of first party)	33.3% (11)	47.1% (16)	66.7% (4)	19.2% (14)	42.5% (31)	30.8% (45)
e) A large number of operated on the said cloud services including software and applications provided by third parties (of third party)	18.2% (6)	26.5% (9)	0.0% (0)	6.8% (5)	20.5% (15)	13.7% (20)
f) A large number of introduction support businesses and engineers including Sler and consultants etc. who can manage the said cloud services	39.4% (13)	29.4% (10)	33.3% (2)	6.8% (5)	34.2% (25)	20.5% (30)
g) Easiness of information collection related to operation because of substantiality of introduction results, training and user community etc. related to the said cloud services	21.2% (7)	29.4% (10)	50.0% (3)	12.3% (9)	27.4% (20)	19.9% (29)
h) Recommendation for the use of the said services by introduction support businesses including Sler and consultants etc. (introduction support businesses recommended the said services as the suitable ones for the CSCs' requirements)	30.3% (10)	35.3% (12)	0.0% (0)	17.8% (13)	30.1% (22)	24.0% (35)
i) Convenience or advantage of the use together with other kinds of IT services provided by the said development/CSPs	6.1% (2)	20.6% (7)	0.0% (0)	4.1% (3)	12.3% (9)	8.2% (12)
j) Others	3.0% (1)	2.9% (1)	0.0% (0)	16.4% (12)	2.7% (2)	9.6% (14)

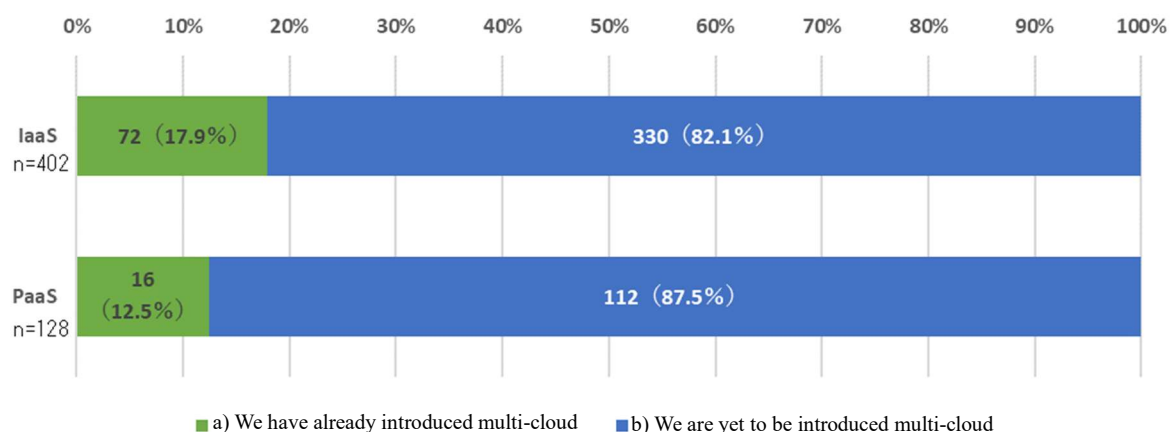
B. Introduction status of multi-cloud

Some CSCs use a combination of cloud services provided by different providers, which refers to “multi-cloud.” For example, with regard to SaaS, it is not uncommon to use the service by B

company for accounting system while using the one by A company for CRM. Moreover, in particular, some of large companies and the businesses that have the advantage of IT use a combination of different providers with regard to IaaS and PaaS as well as SaaS. For example, in some cases, they differently use the services of CSPs that have their respective processing areas of specialization, in accordance with the needs of CSCs: for example, while using the services of specific providers for servers and storage in-company operation, the ones of other providers are combined for use as the base for data analysis in the EC site.

According to what the questionnaire asked about if the CSCs introduce IaaS and PaaS services of different providers, use their combination by selecting the best IaaS and PaaS for each operation, or assign the same function to IaaS and PaaS provided by different providers to achieve redundancy^[32], the results are shown as Figure 2-8: only 10 to 20% of the respondents of the questionnaire among the businesses have introduced multi-cloud for both IaaS and PaaS. Additionally, as shown in Figure 2-9, with regard to the reasons of introduction by the businesses that have introduced multi-cloud, 70% to 80% of such businesses answered that they aimed at introducing the cloud services that are excellent at processing concerning the said operation in the functional aspects. Furthermore, it is found that 20% to 30% of the respondents who introduced multi-cloud answered “avoidance of vendor lock-in”^[33] and “redundancy and risk diversification” respectively.

Figure 2-8. Status of multi-cloud introduction

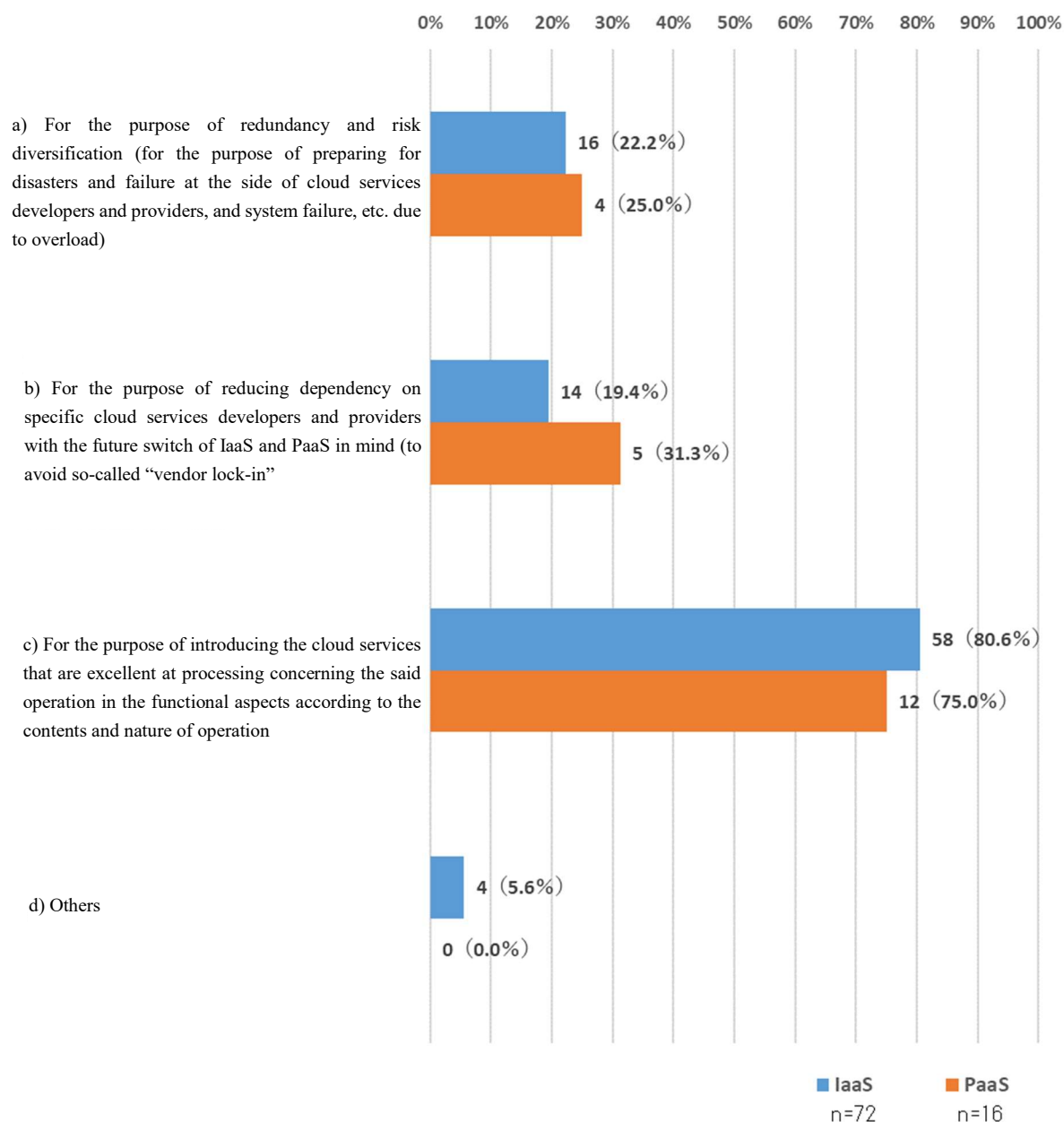


^[32] Redundancy means that countermeasures have been taken for the systems to continue operating in the case of occurrence of problems to systems or servers: it is general to make back-ups or operate in multiple devices (See “Illustrated for quick learning. Only one textbook to thoroughly understand the mechanism and technology of AWS”, p51), by Shigetaka Ogasawara.

^[33] Vendor lock-in refers to the situation where it is difficult for CSCs to switch to the same kind of services provided by the other providers due to use of technologies specific to a provider or complicated systems that have already been built on cloud services, etc.

Figure 2-9. (in the case of the answer of “a) Multi-cloud has been already introduced” in Figure 2-8)

Reasons why multi-cloud has been introduced 【Multiple responses allowed】



According to what is confirmed about the factors that make the multi-cloud introduction difficult for the businesses that have already introduced multi-cloud and the ones that have yet to introduce multi-cloud, the results are shown as Figure 2-10 and 2-11, respectively.

Among the responses by the businesses that have already introduced multi-cloud, “We can't think of anything in particular” (Option e) held the largest number, among the responses by the ones that have yet to introduce multi-cloud, “there is no need to use a combination of services” (Option e) held the largest number. However, for both businesses, as the factors that make them difficult to introduce the multi-cloud, it is found that the responses of “cost for enhancement of human resource

system who can deal with the services provided by multiple CSPs” (Option c) and “increase in financial burden due to a combination of services” (Option b) held a certain proportion; the responses “it is technically difficult to link services between different businesses” (Option a) were also found.

Figure 2-10. (in the case of the answer of “a) Multi-cloud has been already introduced” in Figure 2-8)
The factors that make the multi-cloud introduction difficult 【Multiple responses allowed】

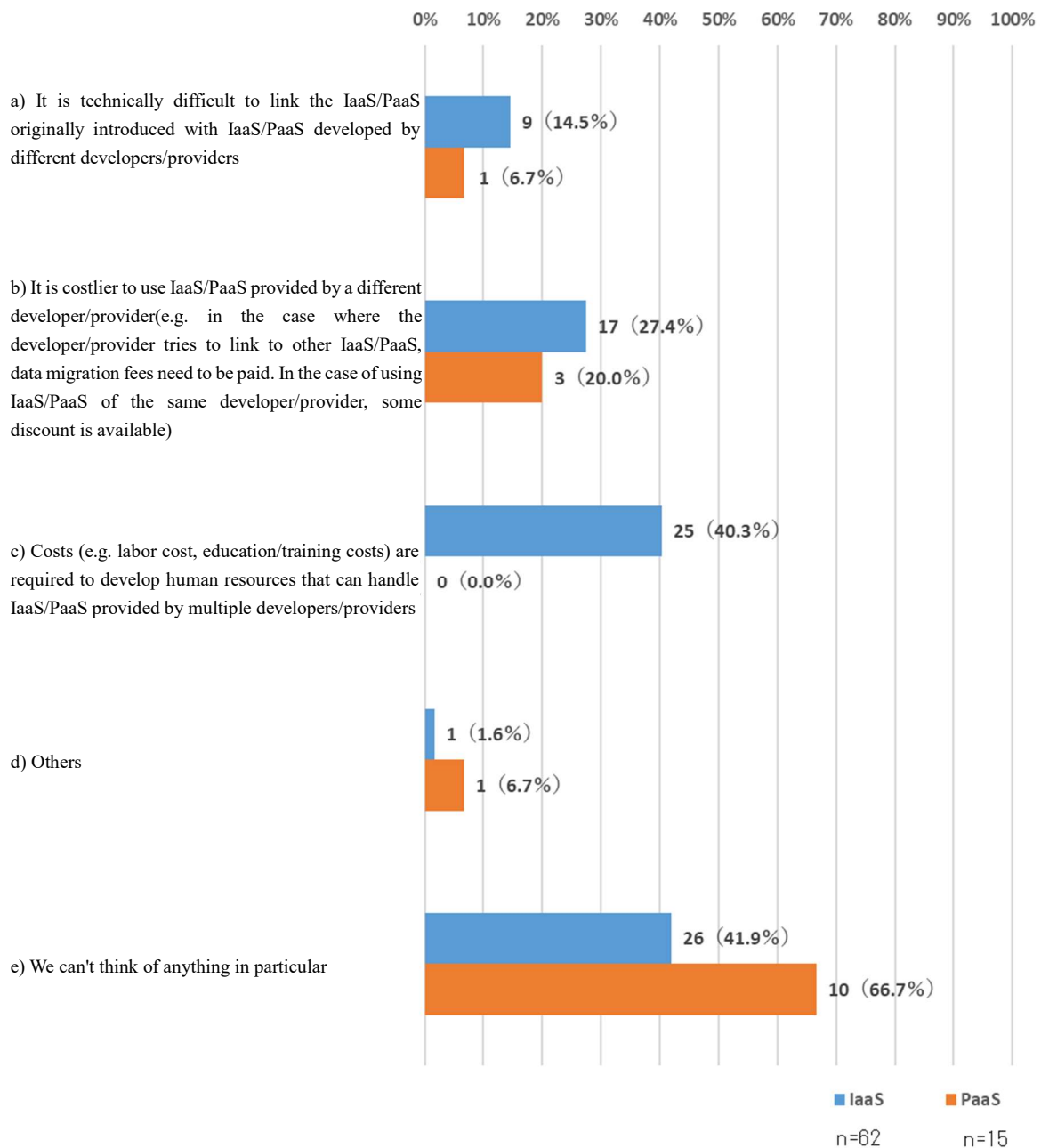
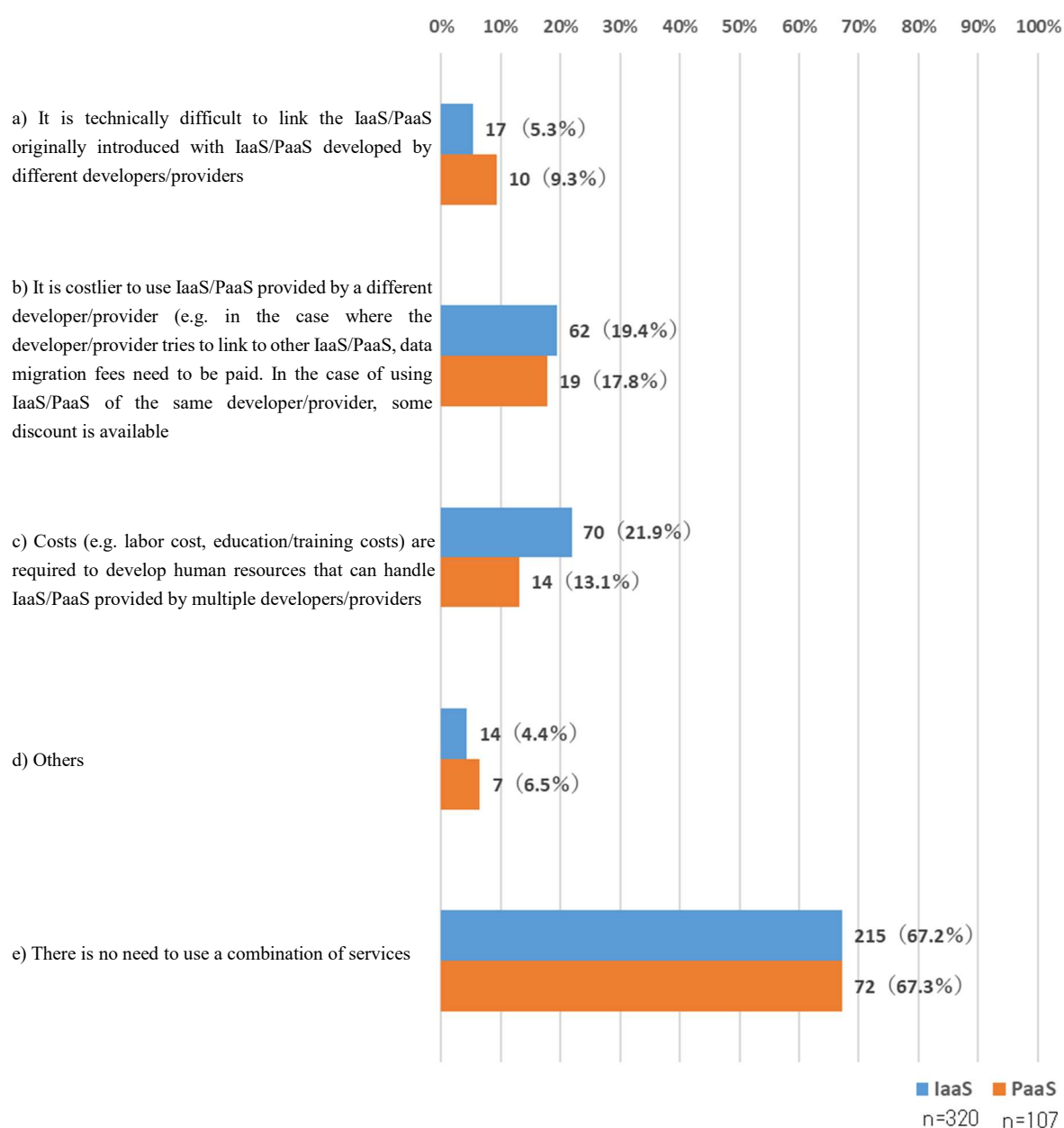


Figure 2-11. (in the case of the answer of “b) Multi-cloud is yet to be introduced” in Figure 2-8)

Reasons why multi-cloud is yet to be introduced 【Multiple responses allowed】



2. Market scale of cloud service market, etc.

The market scale of IaaS and PaaS and the market share of the top five sales in Japan^[34] is shown in Figure 2-12. Furthermore, changes in the market share of the top providers in the said market are shown in Figure 2-13.

In Japan, the total market share of the top three CSPs is increasing every year and thus the degree of

^[34] The JFTC calculated the market share, in order to calculate the market shares concerning IaaS and PaaS, by asking CSPs to submit the information of FY 2011, FY 2014, FY 2017 and FY 2020 and based on the results of the market research company. Upon collecting information, report orders under Article 40 of AMA were issued against some CSPs. In the case of submission by dollar-basis figures, such figures are converted into Japanese yen based on the annual average TTS for each year (FY 2011: 80.84 yen/\$, FY 2014: 106.85 yen/\$, FY 2017: 113.19 yen/\$, FY 2020: 107.82 yen/\$).

concentration to them is also ongoing. When viewing the total market share of the Three CSPs, it has been rapidly expanding since 2011. So, it can be said that the concentration of the market share in the cloud service market of Japan may be based on expansion of the market shares of the Three CSPs.

Figure 2-12. Market scale of IaaS and PaaS and the market share of the top five sales in Japan³⁵

FY 2011

Ranking	Name of business	Share (%)
1	NTT Communications	20–30
2	Salesforce. com	10–20
3	IIJ	5–10
4	NS Solutions	5–10
5	AWS	5–10
	Others	40–50

Market scale : 44,173 (million yen)

FY 2014

Ranking	Name of business	Share (%)
1	AWS	20–30
2	NTT Communications	10–20
3	IIJ	5–10
4	Salesforce. com	5–10
5	Microsoft	5–10
	Others	30–40

Market scale : 115,239 (million yen)

FY 2017

Ranking	Name of business	Share (%)
1	AWS	30–40
2	NTT Communications	5–10
3	Salesforce. com	5–10
4	IIJ	5–10
5	Microsoft	5–10
	Others	30–40

Market scale : 265,064 (million yen)

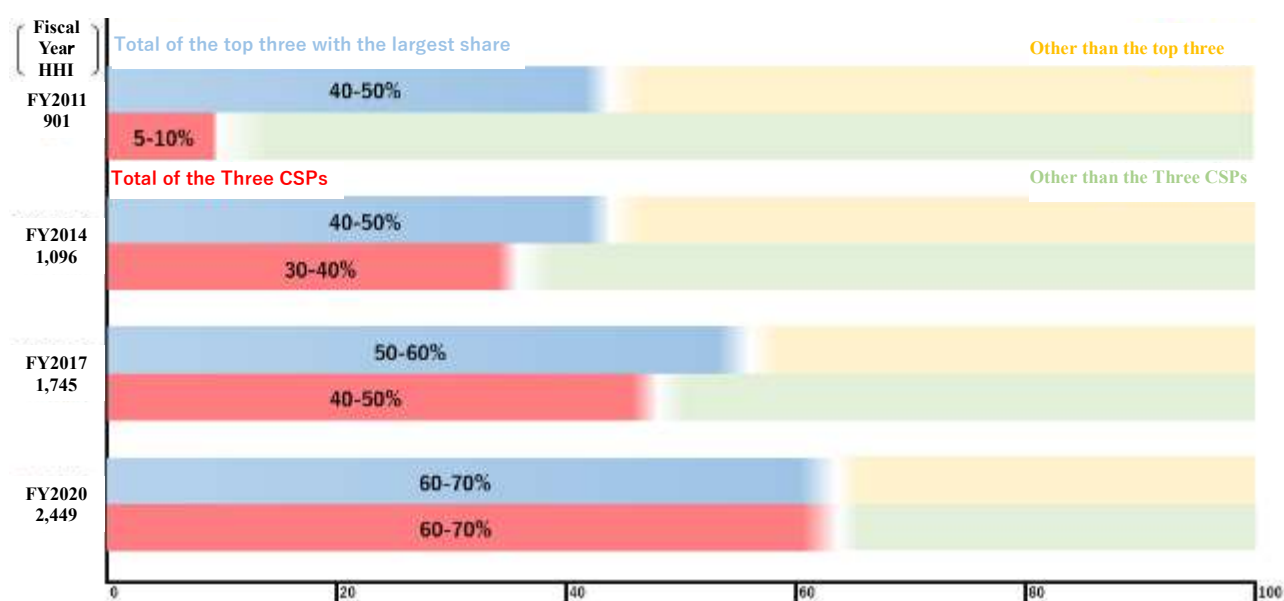
FY 2020

Ranking	Name of business	Share (%)
1	AWS	40–50
2	Microsoft	10–20
3	NTT Communications	5–10
4	Google	0–5
5	Salesforce. com	0–5
	Others	20–30

Market scale : 542,583 (million yen)

³⁵ In the Figure, “NS Solutions” refers to NS Solutions Corporation.

Figure 2-13. Changes in the total market share of the top three companies with the largest market share in Japan, the total market share of the Three CSPs and HHI^[36] (Total of IaaS and PaaS)



3. Overview of transactions on cloud services

The following outlines the business operators, commercial channels, transactions detail, and fee structures regarding cloud services.

(1) Major business operators engaged in transactions on cloud services transactions

A. CSPs

CSPs refer to the businesses that provide the cloud services resources possessed by themselves to users.

The types of CSPs include the ones that mainly provide the cloud services resources, and the ones that provide the cloud services resources in conjunction with system integration services (see B below for more details of system integration). The Three CSPs are engaged in the cloud service business mainly by providing resources^[37].

Some of the major CSPs including the Three CSPs also operate marketplaces, which are sale platforms for third-party software compatible with their cloud services. These CSPs may list their own (first-party) software services on their marketplaces, not only accept and screen listings from third-party software vendors.

B. Introduction support providers

In Japan, “system integration”, which means a type of business mainly contracting from other

^[36] HHI (Herfindahl-Hirschman Index) is calculated by the sum of the squares of the market shares of each business operator in the market.

^[37] See “2021 Cloud Computing Status and Future Outlook (Vendors Section)” (Fuji Chimera Research Institute, Inc.), etc.

businesses to build and operate information systems used by other businesses, has been developing under contract from the businesses, has been developed. The business operator that performs this system integration is called the system integrator (hereinafter referred to as “SIer.”)^[38].

In Japan, it is regarded that IT human resources have been concentrated in IT enterprises, and few businesses other than IT enterprises have sufficient IT human resources^[39]. Therefore, upon using the cloud services, users with sufficient IT human resources may build and operate information systems by themselves; however, users without such resources may outsource the construction and operation of their information systems to other companies^[40]. In addition, there are some business operators providing advice (consulting) on the construction and operation of information systems, though they do not build by themselves information systems. In this report, the business operators that provide system integration or consulting services using the cloud services of other companies are referred to as “introduction support providers”^[41].

The business operators providing system integration with using cloud services include business operators that have provided system integration services for on-premise information systems since before the popularization of the cloud services, telecommunication carriers/internet service providers, business operators providing exclusively introduction support of cloud services (cloud integrators), and consulting firms^[42].

C. Partners

The major CSPs including the Three CSPs have established a partner system that allows introduction support providers to resell the CSP's services, etc., and assigns to them classifications or rankings according to the acquisition status of the qualifications set by the CSP, sales performance, and other factors.

CSPs offer benefits such as discounts on cloud service offer prices, referrals of projects, and technical training opportunities to their partners, depending on their ranking. For CSPs, partners are responsible for the sales promotion of their cloud services, and CSPs with partner systems are working to improve the quality and quantity of their partners.

Some CSPs offer different discount rates and other benefits according to each partner's sales performance (sales volume) and other factors in their partner systems, so partners may have the incentive to increase their sales performance by specializing in a particular CSP rather than handling the services of multiple CSPs.

In general, partners that are large SIers with having traditionally provided system integration

^[38] See MIC, “White Paper on Information and Communications, 2019 Edition”, Part I, Section 1, 2(2).

^[39] Comparing the proportion of the human resources engaged in information processing/telecommunication that belong to IT enterprises or to other businesses on a country-by-country basis, the proportion of the human resources that belong to IT enterprises is 34.6% in the United States and 38.6% in Germany, while the one in Japan is remarkably high at 72% (“2017 White Paper on IT Human resources” p13, by Information-technology Promotion Agency.)

^[40] See “2021 Cloud Computing Status and Future Outlook (Market Section)” (Fuji Chimera Research Institute, Inc.), etc.

^[41] Some introduction support providers not only provide introduction support services for other companies' cloud services but also provide their own cloud services, i.e., they also fall under the CSPs mentioned in above clause A.

^[42] See “2021 Cloud Computing Status and Future Outlook (Market Section)” pp.58-85 (Fuji Chimera Research Institute, Inc.), etc.

services often have a large number of in-house engineers and can handle services from multiple CSPs to meet the broad-ranging needs of their customers including existing customers. On the other hand, some small- or med-sized partners that provide cloud integrations or consulting services might make a business decision to become a partner specializing in one CSP, partly due to the aforementioned incentives.

D. Third-party software vendors

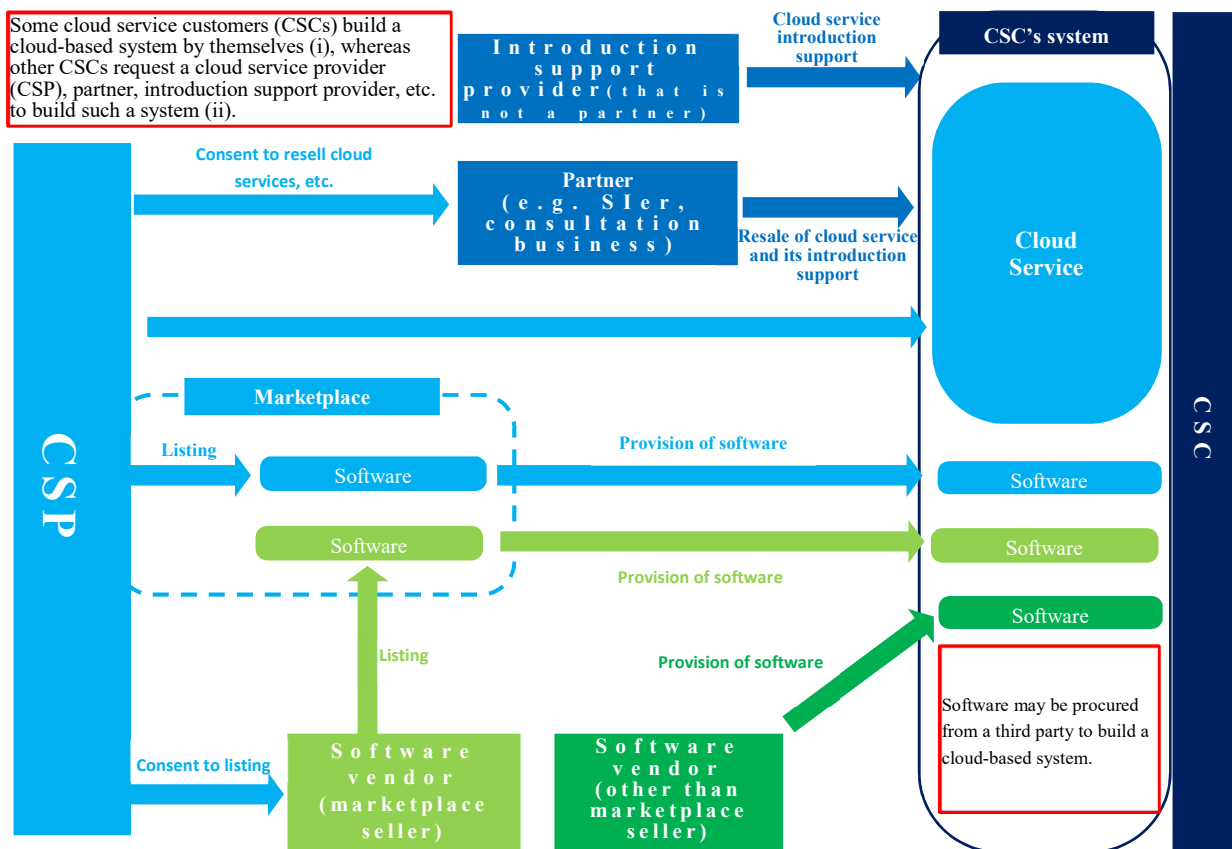
When users build systems on IaaS or PaaS, they may use not only various peripheral services (first-party services) provided by the CSPs of IaaS or PaaS the users use, but also a combination of IT services provided by multiple providers, including software provided by third-party software vendors. Such third-party software is not available for every IaaS or PaaS, and the user selects software that can run on or be linked or connected to the specific IaaS or PaaS.

Third-party software vendors usually develop software for specific cloud services and provide it to users after independently verifying that their software runs on or can be linked or connected to such specific cloud services. Third-party software vendors may sell their software directly to users (or to introduction support providers who have been contracted by the users to build their systems), and they may also list their software on marketplaces operated by major CSPs and sell it to users on such marketplaces.

Some of the implementation support providers and partners listed in clauses B and C above also develop and provide such third-party software.

As stated above, in the cloud services sector, there are many business providers engaged in various businesses based on the services of CSPs, and an ecosystem centered on the CSPs has been formed. Figure 2-14 illustrates such relationships among the business providers involved in cloud services.

Figure 2-14. Businesses involved in cloud services



(Note) As this diagram only shows related businesses in a broad, general manner, it may not apply to some CSPs.

(2) Commercial channels

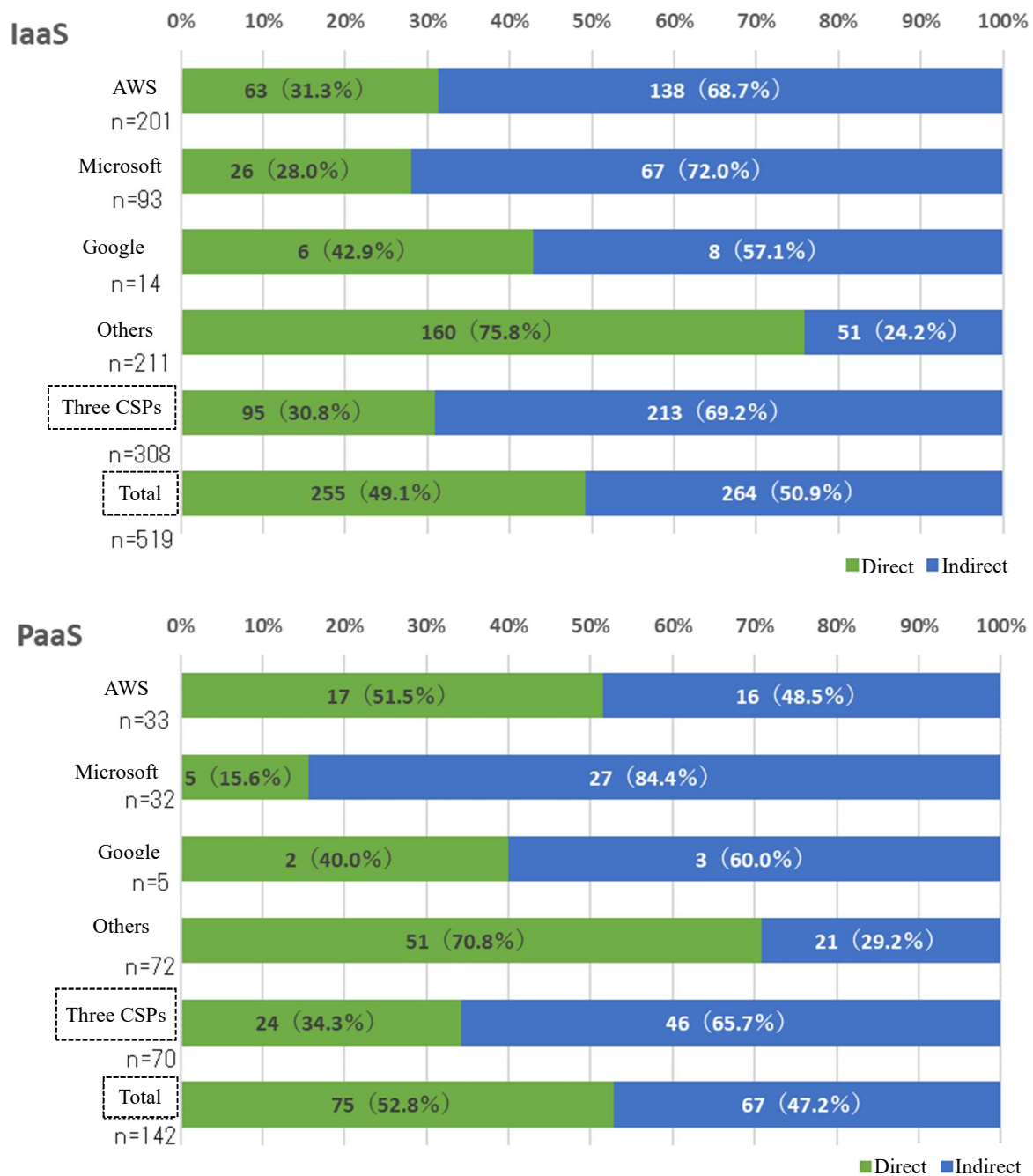
The commercial channels of the cloud services are broadly classified into direct transactions between CSPs and CSCs and indirect transactions through the partners between CSPs and CSCs. In addition, the direct transactions are classified into the ones where CSCs apply for the use of services on the Internet such as CSPs' website (i.e., a contract is concluded without individual negotiations, following general prices and transaction terms that have been set and announced in advance) and the ones where CSCs make contracts upon individual negotiation related to the prices and transaction terms with CSPs. The direct contracts with the Three CSPs are generally made in the former style, while it is said that they sometimes adopt the latter style for the contracts with relatively large CSCs.

In the case of the transaction through a partner between a CSP and a CSC, the partner is provided with the cloud services at a price that is a certain discount applied to the general price in a direct transaction, according to their ranking, as mentioned above in the section (1)C, then the partner provides the cloud services to the CSC at a price that includes its own profit, or at a price that is integrated with the consideration for value added by the partner, such as integration services.

As shown in Figure 2-15, among the survey respondents, the majority of the contracts with the Three CSPs were indirect ones through the partners between CSPs and CSCs, whereas the most common type of contract for other CSPs was direct contracts, in which the CSP deals directly with the CSCs. The reason for this is considered that the Three CSPs have partner networks and make

their partners play a role in sales promotion of their cloud services, while other CSPs (mainly domestic IT vendors), in their cloud services business, have adopted a business model in which they provide their cloud services packaged with integration services or other services according to customers' requirements under direct contracts with them, in the same way as they have conventionally provided integration services for on-premise systems, and they have no partner network.

Figure 2-15. Types of contracts with CSPs



(3) Transactions detail

Transactions for cloud services allow users to use resources possessed by CSPs.

Most CSPs have Service Level Agreement (hereinafter referred to as “SLA”) that describes the terms and conditions on service availability, etc., applied to the transactions with the user. The SLA stipulates the scope of responsibility of the CSP, the standard service availability rate, the upper limit of service downtime, etc. If the service falls below the guaranteed value and meets the specified conditions under the SLA, the usage fee will be reduced or refunded.

When applying for the use of virtual servers, which are the basic function of IaaS and PaaS, many cloud services require users to select a "region" and "zone", which indicate the location of the relevant infrastructure (data center). A region refers to a geographical area, such as East Japan (Tokyo), West Japan (Osaka), or the Western United States (California). A zone refers to an independent operation area within the same region, and there are usually multiple zones within a single region. For example, a backup server may be located in a different region than the main server region to make the system redundant and meet the requirements of a disaster contingency planning (DCP) or business continuity plan (BCP). Another way to use redundant systems is to select multiple zones.

(4) Fee structures

The fee structure for cloud services varies depending on the service. However, in many cases on IaaS and PaaS, the fee amount is calculated by pay-as-you-go billing, based on such as the unit price per hour of usage corresponding to the CPU performance and storage capacity used by the user, the unit price per data volume transferred, or the unit price per information volume for data processing.

The unit price, which is the basis for pay-as-you-go billing, may be set to decrease in steps according to the amount of usage for each specific period. In addition, certain discounts may be offered on the assumption that a specific amount of usage is committed on an annual basis.

Chapter 3. Characteristics of cloud service market and assessment of competitive environment

1. Point of attention for cloud service market

(1) Market related to transaction on cloud services

A cloud service consists of various services that can be individually traded. In the cloud service market various customers are assumed according to the usage purpose^[43]. For example, in the case of assumption of the customers of systems established by using cloud services, the IaaS and PaaS as a whole may be assessed as one market without distinguishing individual cloud services. In addition, in the case of assuming the customers that use only a part of services of IaaS or PaaS for the purpose of using AI and data analysis, etc., the cloud service market may be assessed as a part of IaaS and PaaS service market, including the cloud service market relating to AI and the one for data analytics infrastructure. Besides, in the case of SaaS, for services and functions that are different from each other, such as groupware and CRM, it is supposed that their respective markets and the market for the specific usage purpose among the services may be defined^[44]. Thus, as various customers are assumed in cloud services, the multiple markets of different customers and suppliers can be redundantly defined.

Accordingly, upon assessment from the AMA and the competition policy, in light of the contents to be assessed, the markets that consist of appropriate customers and suppliers shall be defined.

Moreover, the cloud service has a layer structure: the services of SaaS may be provided by constructing the applications on IaaS and PaaS of other CSPs and be provided as the ones that used by third parties on the cloud services of specific CSPs. The markets for services that are used in combination in these ways have a relationship that mutually affect their competition: while demands for services increase on one hand, the ones increase on the other hand, or the interconnectivity of services is reduced on one hand, it may cause adverse effects on service provision on the other hand.

(2) Substitutability to on-premises environment

As mentioned above in Chapter 2-1(5), as an example of the use of cloud services, including reconstruction of the existing system that had already been constructed on-premise environment on the cloud, the cloud services or on-premise environment might be used for the purpose of system. Taking into account these actual states of use, substitutability between cloud services and on-premise environments shall be reviewed.

^[43] The market subject to such review shall be judged from the viewpoint of substitutability basically for the customers. Additionally, as required, the viewpoint of substitutability for the suppliers may be considered as well (GUIDELINES TO APPLICATION OF THE ANTIMONOPOLY ACT CONCERNING REVIEW OF BUSINESS COMBINATION, Part2-1). In this case, when multiple customer bases exist according to the contents/prices of commodities/services, the market may be defined for each customer base.

^[44] For example, in “The JFTC Reviewed the Proposed Acquisition of Slack Technologies, Inc. by salesforce.com, inc.” by the JFTC (July 1, 2021), with regard to CRM software market, the types of CRM software, namely “CRM software for commercial use”, “CRM software for customer services”, “CRM software for marketing” and “CRM software for e-commerce” have been defined and “the whole CRM software” has been redundantly defined as well.

A. Status of switching between cloud services and on-premise

As mentioned above in Chapter 2-1(5), while the whole market on information system including on-premise and cloud services have been expanding, switching from on-premise to cloud services has been proceeded. In this regard, the questionnaire results also show that the proportion of the businesses that experienced switching from on-premise to IaaS or PaaS in the past decade is 58.2% of the respondents (319 companies out of 548 ones), from which it is found that a majority of the businesses that use cloud services have experienced the switching from on-premise^[45].

B. Analysis of substitutability based on hypothetical price raise

As a general method to assess substitutability of the services for customers, there is a method for customers to consider the degree of switching to the other services when the businesses that supply services make a small but significant and non-transitory increase in price: the range of price increases used in this method is supposed to be around 5 to 10 %^[46].

Based on the questionnaire results on the existence/non-existence of switching of services in the case where the price rise of all the cloud services from around 5 to 10%, the substitutability of the cloud services and on-premise was assessed^[47].

The proportion of the businesses who answered that they would switch to on-premise due to 5 to 10% price raise of the cloud services is 4% as shown in Figure 3-1^[48]. That is, approximately 96% of the CSCs answered that they would continue the use of cloud services despite the price rise of 5 to 10%.

Thus, from the viewpoint of substitutability from the customers of cloud services, it is supposed that there is little possibility of switching from the cloud services to on-premise due to small but significant and non-transitory increase in price, namely that the cloud services are highly likely to have different markets from on-premise.

^[45] This questionnaire-based survey may be no more than reference information as this is not subject to the businesses that use only on-premise at present, the proportion of the businesses that have experienced switching from cloud services to on-premise was only 2% (10 out of 548 companies as the respondents).

^[46] “GUIDELINES TO APPLICATION OF THE ANTIMONOPOLY ACT CONCERNING REVIEW OF BUSINESS COMBINATION”, Part2, 1.

^[47] Among the data used in this analysis, in particular with regard to the price raising rate of the cloud services the responses were obtained by asking the respondents subject to the questionnaire about the behavior at the time of hypothetical price raise in the form of the question as “In the case where the prices of all IaaS/PaaS (that is, IaaS/PaaS that your company currently use and the one that you currently do not use) increases by 5 to 10%, how does your company take measures for that?” (by stated preference approaches).

^[48] As the responses of “unknown/unsure” is not considered to be analytically significant, the responses are aggregated by excluding the said ones in this report. It is a broadly adopted method to treat the responses of “unknown” like this: for example, in “Good practice in the design and presentation of customer survey evidence in merger cases” (revised version in May, 2018, ¶4.23 (p45) published by Competition & Markets Authority (CMA) as British competition authority, with regard to analysis of substitutability due to the hypothetical price raise, it is stated that “A response of don’t know to the main (first) diversion question usually means that the respondent is not asked any further questions relating to that hypothetical scenario and the response is not informative for the purpose of the diversion ratio calculation.”

Moreover, in this analysis, even if the responses of “unknown/unsure” are included, the proportion shows the high value as 59.1% based on the number of businesses and 47.4% based on the amount of money used.

Figure 3-1. Correspondence at the time of 5 to 10% price raise of all the cloud services

	a) Continuing use of cloud services	b) Switching to on-premise	c) Unknown/unsure	Total	The proportion switching the case excluding b/(a+b) of in c)
Number of businesses	315 (59.1%)	14 (2.6%)	204 (38.3%)	533	4.3%

2. Characteristics of cloud service market

(1) Factors for competitiveness in cloud service market

Having started from provision of computing and storage that makes use of virtualization technologies the cloud services have led to provide various services/functions including data analysis, IoT, machine learning, AI, block chain, and quantum computing as a result of active technological development, and are expected to continue to broaden their range for the future. At present, in all the business sections, while unceasing implementation of technological development and service development is required, in the cloud services as well, for maintenance/improvement of their competitiveness, it is important to timely invest to human resource, technological development, equipment, etc. and to foster corporation culture that enables them.

In addition, as the factors for competitiveness in cloud services, the following characteristics are indicated. As mentioned above in Chapter 2-2, the degree of the cloud service market concentration is increasing gradually and this trend is expected to continue in the future due to the following factors^[49].

A. Competitiveness based on economies of scale

According to the interview with CSPs, they explained that economies of scale works upon providing cloud services. It was pointed out as their factors that competitiveness based on economies of scale includes that, as the scale of a business increases, it can reduce the procurement costs of hardware required to provide cloud services such as data centers and servers, electricity required to operate the hardware, etc., data centers can be efficiently extended once basic design of datacenter is completed and the software is automated for operation of datacenter, demand for computing can be efficiently decentralized^[50]. Additionally, according to the interview with market

^[49] Other than the factors described below, in the Opinion Exchange Meeting on Cloud Services, the followings were pointed out: as the characteristics of information system whose layer structure of functions is multi-layered, if the market or technologies reach maturity the functions that have been provided in the upper layer so far tend to be incorporated into be the lower layer. Because of that, the CSCs of lower layer become able to use the incorporated functions and there are characteristics to proceed market concentration in order to enhance the use of services of the existing vendors.

^[50] To the question by the JFTC, “What kind of factors are supposed to contribute to economies of scale in cloud service business?” by the JFTC, AWS, Microsoft, Salesforce Japan and NTT Communications answered respectively: “for example, we have been engaged in reducing required costs for our own business including reduction in hardware costs, improvement of operation efficiency and power consumption reduction.” (AWS), “public cloud can achieve scale merits by some methods by constructing and operating a large-scale datacenter. First of all, they can distribute demands more easily and efficiently over larger resource pool. Secondly, public cloud can obtain synergistic effects by procuring input goods including server rack, server component and power component.

participants, it was pointed out that the cost for development of software relating to various kinds of services provided by CSPs does not grow proportionally to the scale of business. Through such working of economies of scale, as the businesses that have gained relatively large customer base (the number of customers, sales volume) become possible to provide services at lower prices compared to the ones that have not gained, it is considered that the competitiveness in prices were improved and the share of the said businesses can be easily increased. Additionally, as the businesses that have entered into the market at an earlier stage have an advantage in acquisition of customer base, it can be said that early entrants have advantages in cloud services.

The assessment that economies of scale can work through cloud services may also be suggested by the following facts^[51]:

(A) The operating expenses per revenue relating to the cloud services by major CSPs tend to decrease with the increase of revenue. Figure 3-2 summarizes the revenue, operating expenses and the operating expenses per revenue^[52] of AWS and Google Cloud^[53] whose data has been obtained from the published data. From these, it is recognized that, while the revenue of both AWS and Google Cloud is increasing year by year, at the same time, their operating expenses per revenue tend to decrease^[54].

Moreover, both firms explained that the prices of cloud services are declining^[55] so increase in revenue reflects the increase the scale of supply.

As a result, it is supposed that the average costs required for supply of both companies have been decreasing in accordance with expansion of business scale.

Additionally, in general, public cloud achieve a lower cost by purchasing bulk power and then carry such power over customers, through structuralized and organized power contract or long-term contract (omitted). Once the operator of public cloud designs the architecture of basic datacenter efficiently, by reusing the said architecture in the datacenter constructed subsequently, which enables us to save the time and costs that might have been required if we design if from the start. Additionally, by software automation, we can emulate the behavior of datacenter without increasing the number of personnel to operate cloud services.” (Microsoft), “although we are not the provider of IaaS solution of public cloud, we understand that IaaS is a more common and circulated service and as its price is affected by the one of physical assets as the basis used for provision, economies of scale and its effect can be applied to IaaS in general.” (Salesforce Japan), “generally speaking, we think that enhancement in buying power for apparatus in use and optimization of operation management, etc. are the factors to contribute to prices through scale expansion.” (NTT communications).

^[51] In general, economies of scale refer to reduction in average costs (costs required to supply one unit of service) in accordance with expansion of scale; however, as it is difficult to measure economies of scale directly, the fact to suggest economies of scale is indicated here.

^[52] Amazon.com, Inc. has publicly announced the revenue and operating costs relating to the segment of “AWS” in Form 10-k since 2015. Alphabet Inc. has announced the revenue and operating profit relating to the segment of “Google cloud” since 2018. As Alphabet Inc. has not publicly announced operating costs, they have been calculated as the amount obtained by deducting operating profit from the revenue in Figure 3-2.

^[53] Among the services by the top five share companies, regarding the cloud services by other than AWS and Google Cloud, no information on revenue from Form 10, etc. could be obtained. Besides, “AWS and Google Cloud” here refers not to corporate names but the information used in Form 10-k of Amazon. com. Inc. and Alphabet Inc.

^[54] The fixed expenses such as depreciation expenses shall be included in operation expenses.

^[55] To the question by the JFTC, “please explain an overall trend regarding the prices of your company’s cloud services so far.”, AWS answered that “AWS have been decreasing the prices for a large number of services frequently. (partially omitted) According to the research by third-party published in 2018, it is reported that cost of use for AWS has been decreasing year by year and concluded that ‘AWS has been experiencing 73% decrease of the workload operating cost at maximum in 2017 compared to the operation in 2014.’” Google answered that “the cloud service fees have been varying with time in accordance with the state of competition in this section that has grown rapidly. Within the normal operation scope, Google Cloud has not recorded the price index that indicates such price trends in particular but recognizes that such prices have been generally decreasing.”.

Figure 3-2. Relationship between revenue and operation costs on cloud service provision

	Business year	2015	2016	2017	2018	2019	2020
AWS	Revenues (million \$)	7,880	12,219	17,459	25,655	35,026	45,370
	Operating cost (million \$)	6,373	9,111	13,128	18,359	25,825	31,839
	Operating cost per revenue	0.809	0.746	0.752	0.716	0.737	0.702
Google Cloud	Revenues (million \$)	-	-	-	5,838	8,918	13,059
	Operating cost (million \$)	-	-	-	10,186	13,563	18,666
	Operating cost per revenue	-	-	-	1.745	1.521	1.429

(B) According to the questionnaire-based survey, among the respondents of the questionnaire, regarding the reason why CSCs chose particular cloud services they are using, 55.0% of IaaS customers and 45.2% of PaaS customers answered “the prices and charge system at the timing of introduction or in the future” (Option a), which shows the high rate together with “quality as the services including availability, stability, security and interface, etc.” (Option b) that showed the highest rate in the responses. From these, it is found that the price has become an important element to be considered in choosing the cloud services for customers (for details of the questionnaire results, see Chapter 2-1(5) A. Figure 2-7.).

These facts are consistent with the assessment that functioning of economies of scale enables cloud services to be provided the ones at lower price and that accelerate concentration of market share.

B. Competitiveness based on economies of scope

According to the interview with market participants, it was pointed out that CSPs may have an advantage from a cost perspective by using their equipment and technologies used in their existing businesses other than cloud services in their cloud services business, which can generate synergistic effects, that is, economies of scope may function. For example, in the case CSPs develop and accumulate technologies and know-hows relating to the cloud used by the existing business of their group and they conduct business where they use the equipment combined with the cloud services, it is expected that they can invest the cloud service businesses efficiently. In this regard, it is supposed that the digital platform businesses that deploy various services by using information communication technologies and data can demonstrate the superiority resulting from economies of scope by diverting the technologies that have been used in the existing business.

With regard to the Three CSPs, the examples are as shown below, where the cloud service business the technologies and equipment seem to have been shared between cloud service business and other existing business.

As it is supposed that Amazon.com, Inc. as a parent company of AWS has in-depth knowledge relating to operation of datacenter, IT infrastructure in e-commerce business since before

commencing the cloud service business and has commenced the cloud service business by utilizing such in-depth knowledge relating to operation of large-scale IT infrastructure, it can be said that the cloud service business of AWS has synergetic effects with e-commerce business. Furthermore, AWS still develops and provides new service by utilizing technologies and in-depth knowledge that it has within Amazon group (e.g. in-depth knowledge relating to deep learning technologies and machine learning technologies, and fraud detection, etc.)^[56].

Microsoft explains that it provides software solutions for on-premise and cloud-based services, and that efficiency may be improved as the expertise of engineers are available for both of them. Therefore, it can be said that software solutions for on-premise and cloud-based services have synergetic effects with each other^[57]. In addition, it is supposed that as the said company (or the partner of the said company) has experienced provision of on-premise software that can also be applied to the cloud, the customer base of on-premise software can be utilized upon converting the on-premise software into cloud. Therefore, it is considered that software solutions for on-premise and cloud-based services have synergetic effects with each other^[58].

Google explains that it makes use of the latest technologies including datacenter, storage, computing, AI/machine learning, container, data analysis, cyber security, etc. and the existing technologies and services that Google has been using such as connection to submarine network in the cloud service business^[59].

^[56] To the question by the JFTC, “Please enumerate the matters that you and your group can demonstrate your collective strengths, and the services that are available for providing a good price and quality for CSCs (individual services provided as cloud service) by utilizing (diverting, applying, etc.) of cloud service business of equipment, technologies, and data, etc. that we have developed and used in the business other than cloud services. Also, please explain the details of utilization (diverting, applying, etc.) of cloud service business of equipment and technologies, and data, etc. that we have developed and used in the business other than cloud services for each of such services”, AWS answered that “as Amazon have constructed and operated online-retail business for more than a decade, it has had in-depth knowledge on operation of a large-scale datacenter and IT infrastructure. At that time, there was no concept regarding cloud service. It was general for businesses to purchase at their own expense and organize their own IT equipment by employing IT human resource. Because of that, they were forced to bear a huge amount of prior investment and high operation costs. In order to support purchase, operation and management of IT equipment that businesses and other organizations conduct by using the Internet, Amazon has found an innovative idea to make use of their own in-depth knowledge on operation of a large-scale IT infrastructure.” “At present, AWS continues to develop and provide new ideas by making use of in-depth knowledge on operation of a large-scale IT infrastructure that it has within Amazon group. As a concrete example, Amazon Lex is the service to construct interactive interface by using in-depth learning technology identical to the one adopted in Amazon Alex. Amazon Fraud Detector is the full managed service that can easily detect fraud by making use of the in-depth knowledge on fraud detection of AWS and Amazon.com. Additionally, Amazon Forecast is the full managed service that uses the identical technology to the one of machine learning used to provide extremely precise prediction. Amazon Personalize is the machine learning service that enables the developer to easily create individual recommendations suitable for the users of applications.”

^[57] To the question described in Footnote 56, Microsoft answered “Microsoft provides both on-premise software solution (Office and Exchange Server, etc.) and cloud base service (Azure and Exchange Online, etc.). By providing both of them, it may lead to improve efficiency to be provided with customers. For example, the same Microsoft engineering teams can work by Windows Server Solutions and Azure Offer, the said teams can apply to both of them. Also, the sales team and partners of Microsoft have experience of having provided the services with our customers for years by making use of on-premise software that is also applied to cloud services.”

^[58] Besides, while demonstration of synergy in sales itself is not a problem under the AMA, there are some cases that may be a problem that violate the AMA depending on the means for sales, for example, a tie-in sale of the services concerning other business where the company is influential with the cloud service of the said company (for details that can give rise to problems under the AMA, see Chapter 5-1.(2) and (3)).

^[59] To the question described in Footnote 56, Google answered that “The cloud service is a highly competitive section. As Google Cloud is a relatively new entrant and has always been seeking for the method to provide higher quality/lower prices with customers/market in order to survive in sever competition with a large number of CSP of cloud services. As with other CSPs, Google Cloud have been committed to provide better services with customers by making use of and applying the latest technologies and functions including datacenter, storage, computing, AI and machine learning, container, data analysis and cyber security, etc. and the

C. Competitiveness based on a wide range of provided services

According to the interview with CSPs, for cloud services, it is pointed out that it is important to have an ability to develop technologies that can provide a wide range of services and functions to meet diverse needs of CSCs in addition to differentiating each individual service. In particular, recently it is supposed that as digital transformation that create a new value has been promoted by making use of data and IT technologies, there are a large number of CSCs that choose the services where a wide range of tools for digital transformation is prepared. In this regard, from the market participants as well, it was pointed out that digital platform providers that deploy large-scale cloud services have excellent human resource and overwhelmingly quick development speed of services, and launch new cloud services one after another⁶⁰.

In addition, according to the questionnaire-based survey as well, regarding the reason each CSC chose its current CSP, 22.9% of IaaS customers and 30.8% of PaaS customers answered that, “there are abundant related services that operate on the cloud service, including software and applications (of first-party) provided by such CSP.” (Option d). From this, it is found that CSCs appreciate the possibility of a wide range of services and functions upon choosing cloud services (for details of the questionnaire results, see Chapter 2-1(5) A. Figure 2-7.).

D. Indirect network effects due to an increase in related businesses

As mentioned above in Chapter 2-3(1), in the transactions on cloud services, the ecosystem has been formed mainly focusing on CSPs and there are a large number of businesses that conduct business based on the services on the premise of the existing CSPs including introduction support businesses that provide system integration services by making use of the services of the said CSPs and third-party software vendors that provide software used on the services of the said CSPs. While it is important for CSPs to enhance ecosystem that consists of such third parties in order to secure competitiveness in cloud service market, it is assumed that the following indirect network effects function mentioned below upon enhancement of such ecosystem:

(A) Indirect network effects on introduction support businesses

In the ecosystem formed focusing on the existing CSPs, it is supposed that indirect network effect can be produced between CSC and introduction support businesses and engineers that deal with the services of the said CSPs. Also, according to the overseas survey mentioned in Chapter 1-1 mentioned above, there are some descriptions about the network effects related to ecosystem in cloud services.

In this respect, as mentioned above in Chapter 2-3(1)B, as IT human resource have been conventionally concentrated in IT enterprises in Japan and many of CSCs may not have ample IT human resource, system integration and consulting by introduction support providers have

existing infrastructure and services (that are used and deployed by Google), including connection with submarine cable network that secure/improve global connectivity, etc., for cloud business.”

⁶⁰ To the question asking the number of provided services by the JFTC, as the number of services provided in 2020, while AWS answered 211 services, Microsoft as 200 or more, Google as 179 and NTT Communications as 84.

been widely utilized. Due to such circumstances, for the CSPs that provide cloud services in Japan, it is essential to expand the introduction support providers that deal with their own companies for the purpose of boost and maintenance of competitiveness in sales.

Such introduction support providers may add their own services, such as providing closed network connection service which does not use the Internet for the connection with cloud services of CSPs and providing operation automation services of virtual servers of CSPs. As mentioned above in C, it is suggested that the CSCs appraise availability of a wide range of services and functions upon choosing cloud services. Therefore, when there are a larger number of introduction support providers and engineers experienced in technologies related to a particular cloud service, CSCs have more opportunities to receive services optimized to their own needs. As a result, the benefits for CSCs increase, and the number of CSCs using such service increases as a result, which contributes to increase benefits for introduction support providers and engineers of the said service, and the number of introduction support providers and engineers dealing with such cloud service also increases as an indirect network effect. As mentioned above, in Japan, it is supposed that, as it is important to expand the introduction support providers that deal with in-company services for improvement and maintenance of competitiveness in sales, especially the indirect network effect relating to introduction support provider can be easily produced.

According to the questionnaire-base survey, regarding the reason each CSC chose the service that the CSC has been using, 23.1% of IaaS users and 20.5% of PaaS users answered, “there are a large number of introduction support providers and engineers, including SIer and consultants, who can deal with the said cloud service.” (Option f). From this, it is found that emphasize may be placed by CSCs on abundance of introduction support providers and engineers who can deal with the cloud service of the said CSP and provide consultation upon choosing CSPs (for details of the results of the questionnaire-based survey, see Chapter 2-1(5), Figure 2-7.).

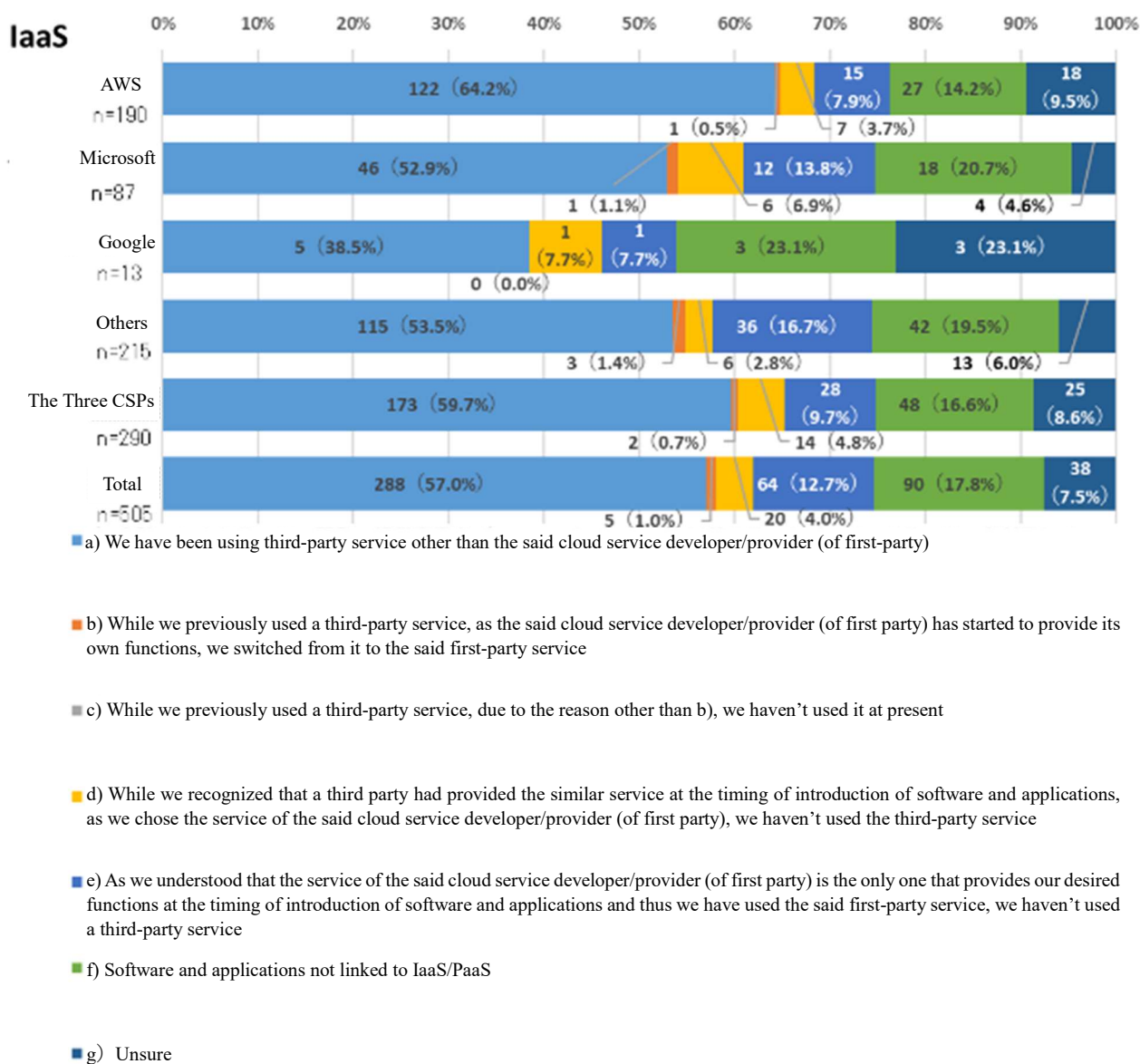
(B) Indirect network effects on third party software vendors

As mentioned above in Chapter 2.3(1)D, CSCs may use software provided by third party software vendors, when using cloud services.

While, as mentioned above in C, it is suggested that the CSCs appraise availability of a wide range of services and functions upon choosing cloud services, third party software vendors also contribute to enhancement of functions utilized in cloud services. Therefore, when there are a larger number of third-party vendors that supply software available in a particular cloud service, CSCs have more opportunities to receive services optimized to their own needs. As a result, the benefits for CSCs increase, and the number of CSCs using such service increases as a result, which contributes to increase benefits for the third-party software vendors that deal with the said cloud service, and the number of the third-party software vendors dealing with such cloud service also increases as an indirect network effect.

According to the questionnaire-based survey, regarding the reason each CSC chose the service that the CSC has been using, 11.2% of IaaS users and 13.7% of PaaS users answered, showing the limited proportion, “there are a large number of related services that operate on the said cloud service, including software and applications (of third party) provided by third parties.” (Option e) (for details of the results of the questionnaire-based survey, see Chapter 2-1(5), Figure 2-7.), as shown in Figure 3-3. However, in the actual state of use, 57% of IaaS CSCs and 47.2% of PaaS CSCs answered, “we have been using third-party service other than the said cloud service developer/provider (of first-party)” (Option a). From this, it is found that CSCs raise added value of cloud services by making use of software and applications of third parties.

Figure 3-3. Use status of software and applications of businesses (third parties) other than the said CSP in the system where cloud services are used



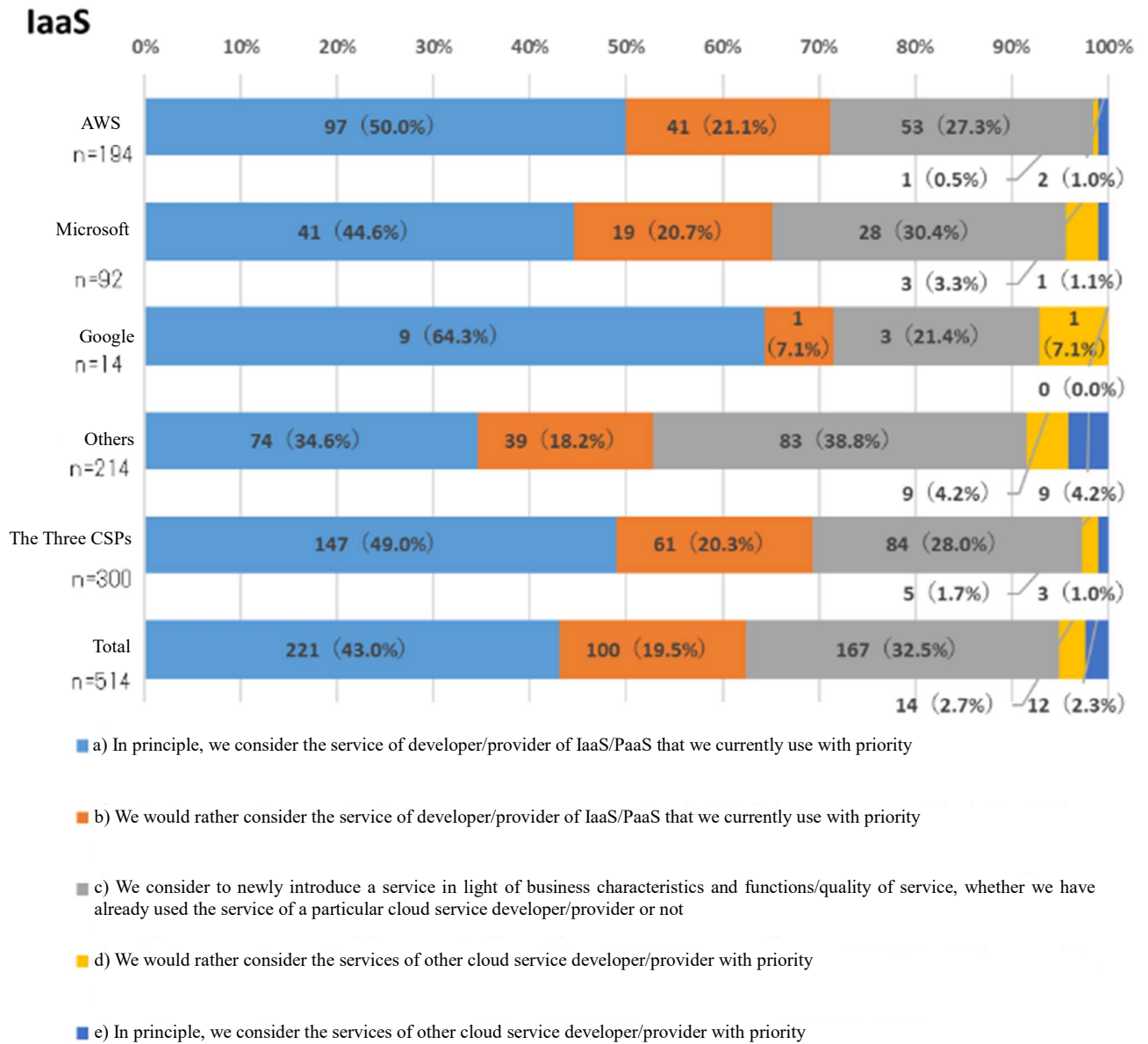
E. Tendency among CSCs toward preferential use of services provided by current providers

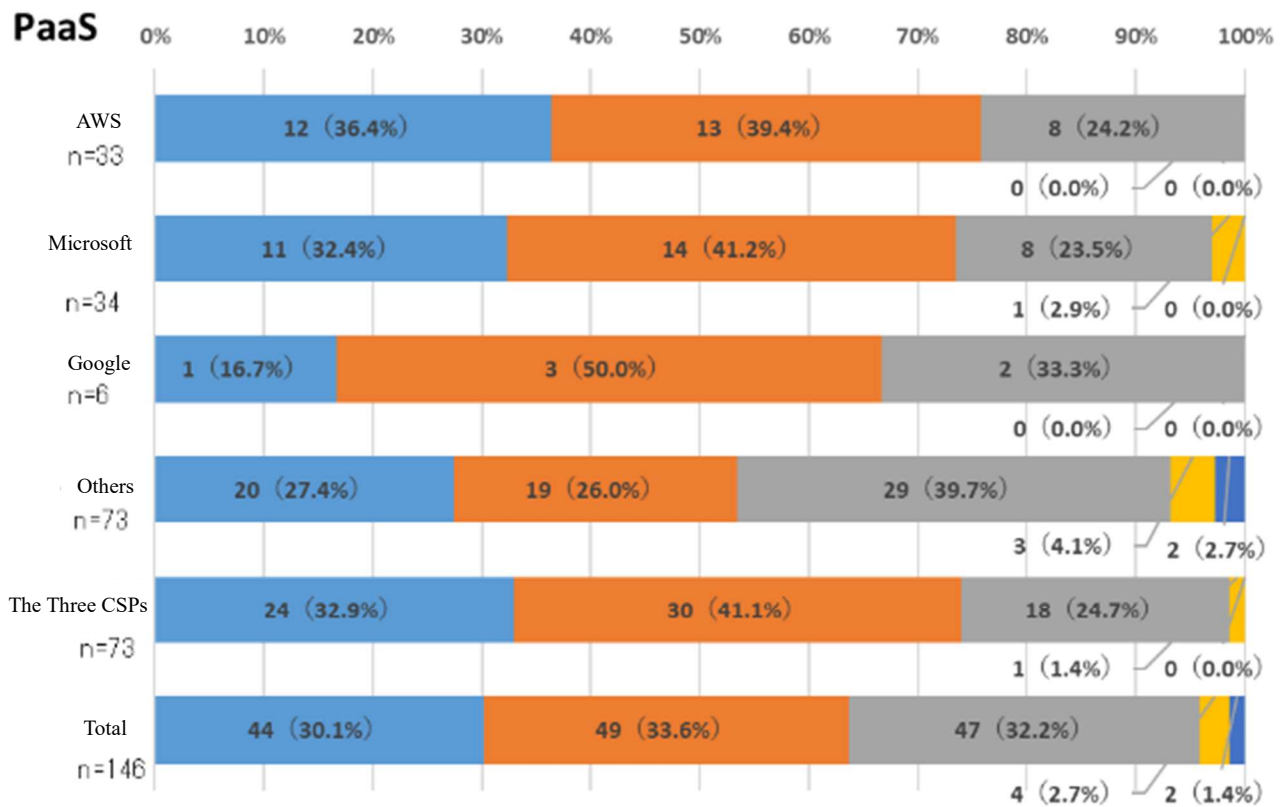
As shown in Figure 3-4, according to the questionnaire-based survey, regarding introduction of the services by the same CSP upon increasing its use, around 60% of CSCs (62.5% for IaaS, 63.7% for PaaS) answered “consider with priority” (Option a) or “would rather consider with priority” (Option b). From this, it is found that CSCs tend to give a priority for consideration to the CSPs that they have already used upon increasing its use.

This tendency is remarkable for the CSCs of the cloud services by the Three CSPs showing high proportion (69.3% for IaaS, and 74.0% for PaaS), which resulted in higher proportion compared to

the CSCs of the services of the CSPs other than the Three CSPs (52.8% for IaaS and 53.4% for PaaS).

Figure 3-4. CSPs that you will give a priority if you consider increase in the use of cloud services





- a) In principle, we consider the service of developer/provider of IaaS/PaaS that we currently use with priority
- b) We would rather consider the service of developer/provider of IaaS/PaaS that we currently use with priority
- c) We consider to newly introduce a service in light of business characteristics and functions/quality of service, whether we have already used the service of a particular cloud service developer/provider or not
- d) We would rather consider the services of other cloud service developer/provider with priority
- e) In principle, we consider the services of other cloud service developer/provider with priority

As shown in Figure 3-5, according to the questionnaire results asked about the reasons of their choice to the CSCs who answered “we consider introduction of the service of the CSPs we have already use with priority upon increasing in use of cloud services” or “we would rather consider introduction of the service of the CSPs we have already use with priority upon increasing in use of cloud services”, a relatively large number of respondents answered “reduction of the costs” (Option a) and “human resource” (Option b).

Additionally, some CSPs may provide volume discounts or discounts based on the commitment of a certain amount of service use. Thus, it is assumed that such charge system could be the incentive to choose the service of a particular business provider as well as other factors. Furthermore, in general, as the terms and usability may differ significantly depending on service providers, in the case where CSCs have already been provided the functions they require by the

business provider, many of them are likely to choose the service of the said business provider.

Figure 3-5. (in case of choosing a or b in Figure 3-4) Reasons why CSCs consider the introduction of the service of developer/provider of IaaS/PaaS that they currently use with priority 【Multiple responses allowed】

※ Red: 50% or more Yellow: 30% or more to less than 50%

IaaS	AWS (n=136)	Microsoft (n=59)	Google (n=10)	Others (n=113)	Three CSPs (n=205)	Total (n=318)
a) The charge system can reduce the costs rather by integrating to the services of IaaS/PaaS developer/provider that they currently use than using a combination with other ones of cloud service developers/providers.	52.9% (72)	61.0% (36)	70.0% (7)	40.7% (46)	56.1% (115)	50.6% (161)
b) It is difficult to introduce IaaS or PaaS of other cloud service developers/providers as usability of IaaS/PaaS that CSCs currently use differ significantly from one of other cloud service developers/providers from the viewpoint of proficiency of persons in charge of IT system and human resource system who can deal with multiple services, etc.	45.6% (62)	42.4% (25)	20.0% (2)	35.4% (40)	43.4% (89)	40.6% (129)
c) It is expected that IaaS or PaaS of other cloud service developers/providers cannot easily link to IaaS or PaaS of other cloud service developers/providers from technical aspects in the case where it is required to link to the system constructed on IaaS/PaaS that CSCs currently use.	19.1% (26)	18.6% (11)	10.0% (1)	26.5% (30)	18.5% (38)	21.4% (68)
d) It is difficult or takes a labor and time to find introduction support providers and engineers who can deal with IaaS/PaaS of other cloud service developers/providers.	14.0% (19)	13.6% (8)	0.0% (0)	21.2% (24)	13.2% (27)	16.0% (51)
e) Others	7.4% (10)	6.8% (4)	10.0% (1)	9.7% (11)	7.3% (15)	8.2% (26)

PaaS	AWS (n=25)	Microsoft (n=23)	Google (n=4)	Others (n=39)	Three CSPs (n=52)	Total (n=91)
a) The charge system can reduce the costs rather by integrating to the services of IaaS/PaaS developer/provider that they currently use than using a combination with other ones of cloud service developers/providers.	60.0% (15)	47.8% (11)	25.0% (1)	56.4% (22)	51.9% (27)	53.8% (49)
b) It is difficult to introduce IaaS or PaaS of other cloud service developers/providers as usability of IaaS/PaaS that CSCs currently use differ significantly from one of other cloud service developers/providers from the viewpoint of proficiency of persons in charge of IT system and human resource system who can deal with multiple services, etc.	20.0% (5)	39.1% (9)	0.0% (0)	33.3% (13)	26.9% (14)	29.7% (27)
c) It is expected that IaaS or PaaS of other cloud service developers/providers cannot easily link to IaaS or PaaS of other cloud service developers/providers from technical aspects in the case where it is required to link to the system constructed on IaaS/PaaS that CSCs currently use.	20.0% (5)	26.1% (6)	50.0% (2)	23.1% (9)	25.0% (13)	24.2% (22)
d) It is difficult or takes a labor and time to find introduction support providers and engineers who can deal with IaaS/PaaS of other cloud service developers/providers.	8.0% (2)	21.7% (5)	25.0% (1)	5.1% (2)	15.4% (8)	11.0% (10)
e) Others	12.0% (3)	4.3% (1)	0.0% (0)	15.4% (6)	7.7% (4)	11.0% (10)

(2) Service switching by CSCs

According to the questionnaire results where the question regarding experience of switching CSPs in the past decade is asked, the proportion of the businesses that have experienced switching of CSPs was only 15.7% (86 companies among 548). Based on the responses to the questionnaire, the factors that make switching difficult are organized as follows along with assessment of probability of service switching.

A. Analysis on service switching

(A) Substitutability based on a hypothetical price increase

In the questionnaire, substitutability of the cloud services the respondents currently use to other cloud services or on-premise was assessed based on the results of responses on existence/non-existence of other cloud services or on-premise in case of increase in the prices

of the cloud services the respondents currently use by around 5 to 10%^[61].

The results were as shown in Figure 3-6: the proportion of the responses that they would switch to other cloud services or on-premise due to increase in the prices of the cloud services by around 5 to 10% that they currently use was around 14.1% in terms of the number of businesses^[62]. That means that around 85.9% of the respondents would continue to use the cloud services they currently use even if the price of currently used cloud services were to increase by 5 to 10%.

Thus, with regard to the CSCs who have already used cloud services, there is little possibility of switching from the cloud services that they currently use to other cloud services or on-premise due to small but significant non-transitory increase in price.

Figure 3-6. Correspondence at the time of price raise of cloud services CSCs currently use by 5 to 10%
(based on the number of businesses)

	Number of responses (proportion)
a) We continue use of the cloud services we currently use.	263 (54.8%)
b) We will switch to the cloud services we currently do not use.	30 (6.3%)
c) We will switch to on-premise.	13 (2.7%)
d) Unknown/unsure	174 (36.3%)
Total	480
$(b+c)/(a+b+c)$	14.1%

(B) Increase rate of price by which the cloud services that CSCs currently use may be switched.

The questionnaire survey was conducted regarding increase rate of price on the cloud services that CSCs currently use which results in (i) switching from the cloud services they currently use to on-premise and (ii) switching from the cloud services they currently use to other cloud services. Based on the said survey results, the cumulative relative frequency^[63] of the increase rate of price which results in switching to other services (on-premise/other cloud services) was summarized based on the number of CSCs. Figure 3-7 shows the results of (i), while Figure 3-8 shows the results of (ii).

(i) With regard to switching from cloud services to on-premise, it is found that a majority of the

^[61] Among the data used in this analysis, in particular with regard to the increase rate of price of the cloud services, the responses are obtained about the behavior at the time of a hypothetical price raise of the respondents subject to the questionnaire by asking in the form of question “In the case where only the price of IaaS/PaaS that you currently use increases by 5 to 10% while the data amount currently used remains unchanged, how does your company take measures for that? ” (by “stated preference approaches”).

^[62] While the responses of “unknown/unsure” is considered not to be analytically significant, the responses are aggregated by excluding the said ones in this report, even if the responses of “unknown/unsure” are included, the proportion shows the high value as 54.8% of the responses to continue to use of the cloud service they currently use.

^[63] It refers to the value which is obtained by dividing the cumulative frequency of a certain class by the sum of frequency of all the classes in frequency distribution.

businesses decide to switch only after the price raise by around 30%.

- (ii) With regard to switching from cloud services to other cloud services, it is found that a majority of the businesses decide to switch only after the price raise by around 20%, which is the degree of the lower price raise compared to (i).

Thus, it is also assumed that switching from the cloud services currently used to other cloud services or on-premise is difficult to occur without a significant price raise.

Figure 3-7. Cumulative relative frequency of the increase rate of price of currently used cloud services when switching from currently used cloud services to on-premises (base on the number of businesses)

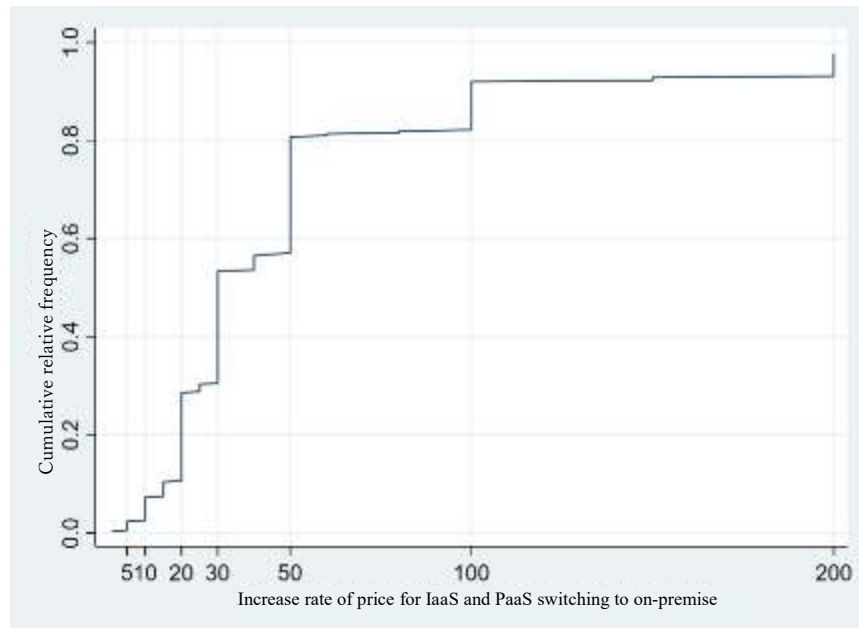
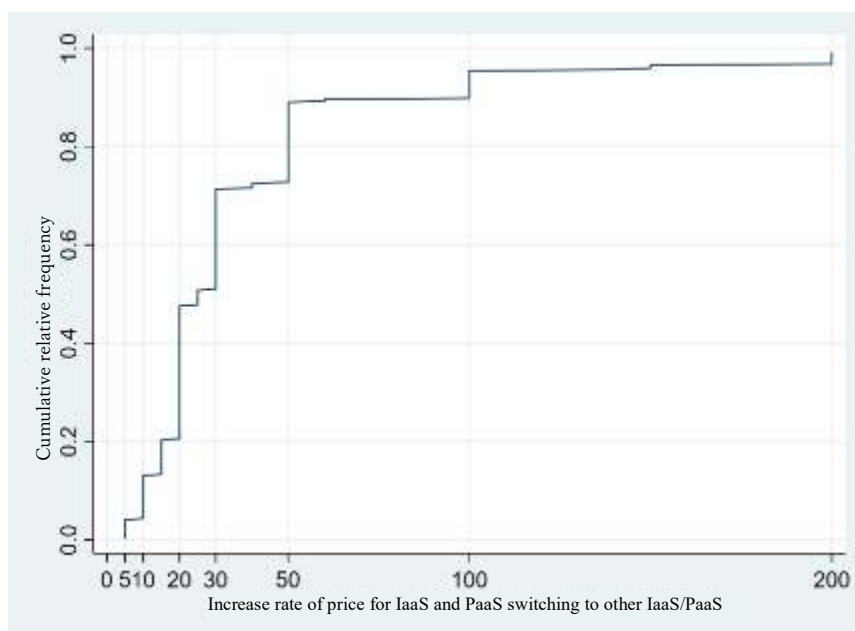


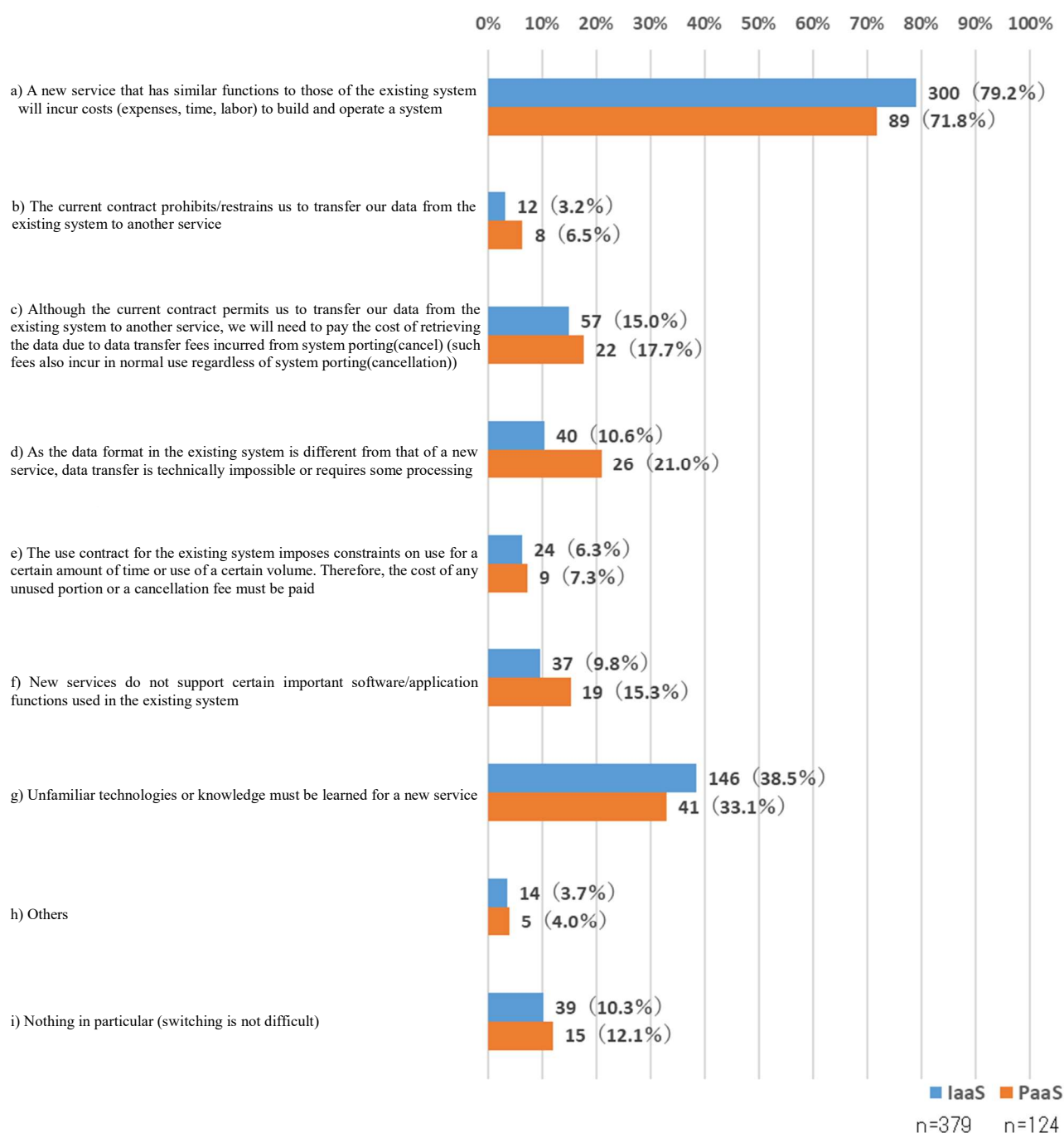
Figure 3-8. Cumulative relative frequency of the increase rate of price of currently used cloud services when switching from currently used cloud services to other cloud services (base on the number of businesses)



B. Factors that make it difficult to switch services

The questionnaire results showed that a large number of the respondents answered “it costs us dearly (costs/time/labor) to construct and operate the similar system with the existing one on the service of a new business provider“ (Option a) and “it is necessary for us to obtain unfamiliar technologies and knowledge on the service of a new business provider (Option g) as the factors that make it difficult for switching of CSPs (switching to the cloud services other than the ones they currently use or switching to on-premise). Moreover, some of the respondents answered, “it costs us dearly to extract data for the purpose of data migration from the existing cloud service.” (Option c), “it requires data processing for data migration due to the difference of data format between the existing cloud service and a new one (Option d), and “the functions of important software that we currently use on the existing cloud are not compatible with a new service” (Option f).

Figure 3-9. Factors that make it difficult to switch from the current cloud service 【Multiple responses allowed】



3. Assessment of competitive environment in cloud service market

(1) Competition status in cloud service market

As mentioned in Chapter 2-1(5)A, while the whole market relating to information system has been expanding at present, additionally in the form of porting from on-premise, use of cloud services by businesses is on a rise. Under such market circumstances, it is supposed, as it is more important for

CSPs to acquire new CSCs rather than to secure the existing CSCs, there is some incentive by which the CSPs compete each other regarding the price and quality of the services surrounding new CSCs. Actually, it is indicated that the prices of the cloud services are on a decline mainly for IaaS^[64], and also, the types of services provided by the CSPs with the market top share are increasing each year, from which it is found that there is currently a certain level of competition regarding prices and quality.

On the other hand, as shown above Chapter 2-2, a few businesses have high shares in the cloud service market. Additionally, taking into account the fact that the characteristics mentioned above in 2(1), that is, economies of scale, economies of scope, a broad range of services provided and indirect network effects etc. constitute the factors of concentration of the market shares, in the cloud service market, the degree of market concentration is highly likely to continue to increase mainly among the Three CSPs that have already provided large-scale cloud service businesses and deploy various kinds of services that utilize information communication technologies and data as digital platform businesses. Moreover, in cloud services, in general, the costs for switching services mentioned in 2(2) hinder switching to other cloud services or on-premise by CSCs. In addition, the CSCs who have already used cloud services tend to consider introduction of the services of the CSPs they currently use upon expanding their use with priority. Based on the aforementioned, it is expected that the existing major CSPs are in an advantageous position to win new CSCs as well due to the economies of scale etc., after that, even in the phase where the number of new CSCs decreases as the market becomes mature, as active switching between services is not expected, the market is highly likely to change into a noncompetitive structure in the future.

In addition, the competitive pressure from their adjacent service sections are unlikely to work for the cloud services. As mentioned above, while the cloud service market has been expanding in the form of porting from on-premise, porting from cloud services to on-premise is less likely to be expected as mentioned in 2(2). Furthermore, the edge computing system which is a much newer IT service compared to cloud has appeared and drawn attention, and this is not recognized as substitutable to the cloud service neither.^[65]

^[64] To the question by the JFTC, “please explain an overall trend regarding the prices of your company’s cloud services so far.”, other than the answers by AWS and Google mentioned in Footnote 55, while Microsoft answered, “it is correct that the prices of IaaS/PaaS services are generally on the decline. This is particularly applicable as commoditization of IaaS services such as computing, networking and storage, etc. have been proceeded as time passes.”, Salesforce Japan answered, “With regard to costs incurred by development, etc., unlike IaaS whose prices are on the decline as it has more opportunities to be used, in our PaaS provision, we continue to provide the products in accordance with each customer company’s request, and the prices are set based on the values provided with each customer company.

^[65] As the cloud computing is an integrated processing-type computing model for which processing is conducted on the cloud side after the data is aggregated on the cloud side via a network such as the Internet, etc., in the case where the data size is huge, network delay and failure is likely to occur upon data transfer. Therefore, in the scene requiring real-time information processing in milliseconds, for example, machine control of manufacturing line of a factory and automatic driving/connected car, edge computing has been drawing attention, where a server is distributedly arranged in the peripheral parts of the network (edge) near the terminal and a part of information processing required for the server is conducted. It is assumed that a part of data processed by such edge is transferred and the linkage model is constructed to mount data analysis processing model created on the cloud side to the edge.

Thus, the edge computing compensates its weakness in the scene requiring real-time information processing not suitable for the cloud from the first and rather enables porting from the system environment only for on-premise to the one where cloud services are available.

Thus, in the case where the cloud service market changes into a noncompetitive structure and the competitive pressure from the adjacent service sections does not work, there will be concern about negative effects, such as weakening of the competitive pressure on the existing CSPs, increased costs of cloud services, stagnation of quality improvement of cloud services such as security level, data processing speed and reading speed, and connectivity between functions, less transparent trade conditions for CSCs and stagnation of technological innovations⁶⁶. Furthermore, as the competitive pressure on the existing CSPs weakens, there will also be concern about stagnation of providing new services by utilizing innovative technologies in the cloud service market.

Accordingly, it is important to ensure the environment where CSCs can choose the cloud services freely in order to prevent the negative effects of concern due to concentration of market share and implement quality improvement and cost reduction in the services through competition.

Moreover, as mentioned 2(1)D, it is significant for CSPs to enhance the ecosystem that consists of third parties such as introduction support providers and third-party software vendors, in order to secure competitiveness in the cloud service market. On the other hand, as the existing CSPs have been expanding the services and functions provided as their companies cloud services and may compete with the services of third parties in these expanded peripheral sections. Additionally, not only in the case of the service providers of IaaS/PaaS, but also, for example, in the case of the service providers who have a leading position in a certain section of SaaS may expand the functions of the said SaaS and advance to the services of IaaS/PaaS area related to the said SaaS, the same may apply. Therefore, if the market may change into a noncompetitive structure including SaaS and the competitive pressure on the existing CSPs weakens, that can cause exclusion of third parties in the peripheral sections where CSPs expand.

Accordingly, from the viewpoint of ensuring the environment where CSCs can choose the services that meet their own needs from various businesses in the expanded peripheral sections as well, it is vital to maintain the competition among CSPs by ensuring the environment where CSCs can choose cloud services freely and continue to create incentive for constructing open ecosystem in CSPs. At the same time, it is important to secure fair competition between the existing CSPs and third-party businesses in the peripheral sections.

(2) Fairness/transparency concerning transactions on cloud service

In cloud services, taking into account the fact that porting to other cloud services or on-premise is generally difficult once a particular cloud service is chosen as mentioned in 2(2), in order that the competition in cloud service market functions efficiently, it is essential to enable CSCs to assess and judge the trade terms including the details sufficiently in advance and choose properly the cloud services. For that purpose, it is especially important to make the trade terms for CSCs clear enough

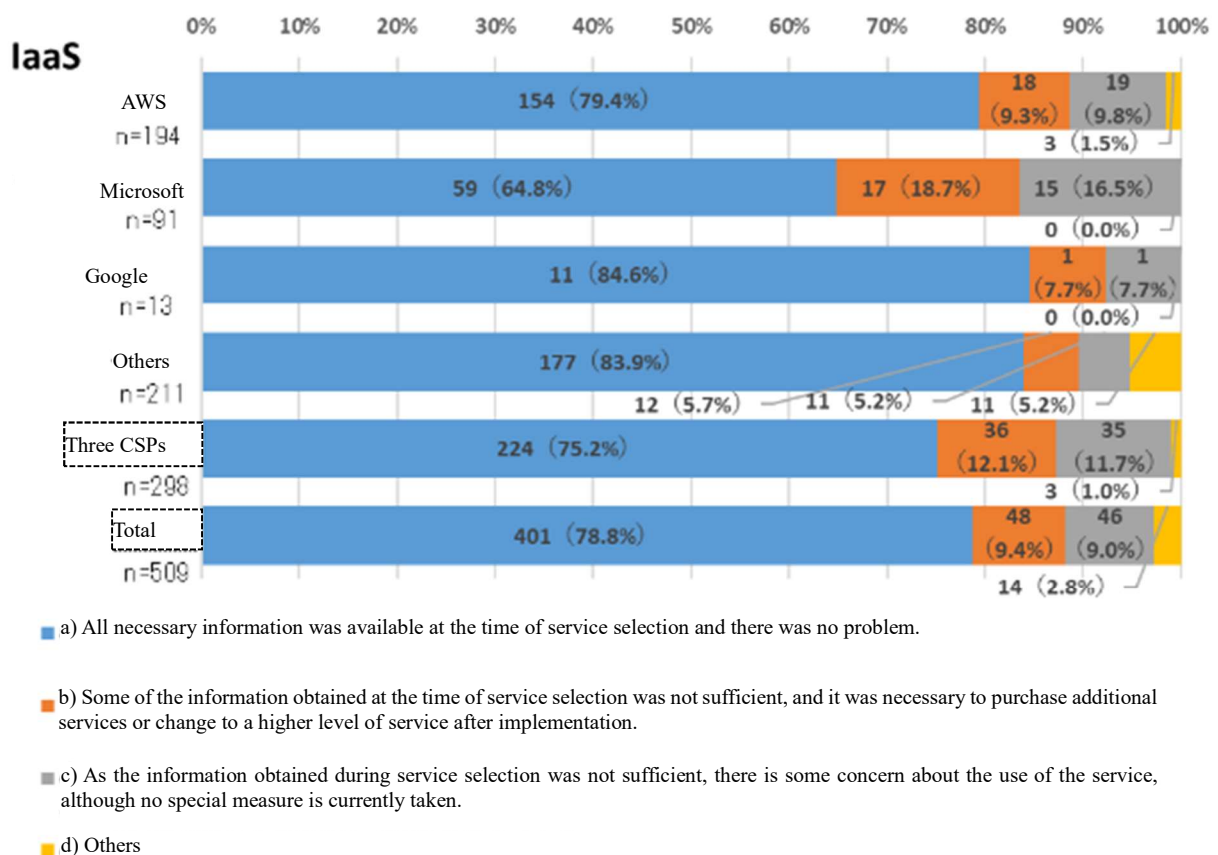
⁶⁶ It is regarded that the prices of cloud services are generally on the decline, but it is pointed out that the prices are raised at the timing after CSCs have difficulties in switching of the services.

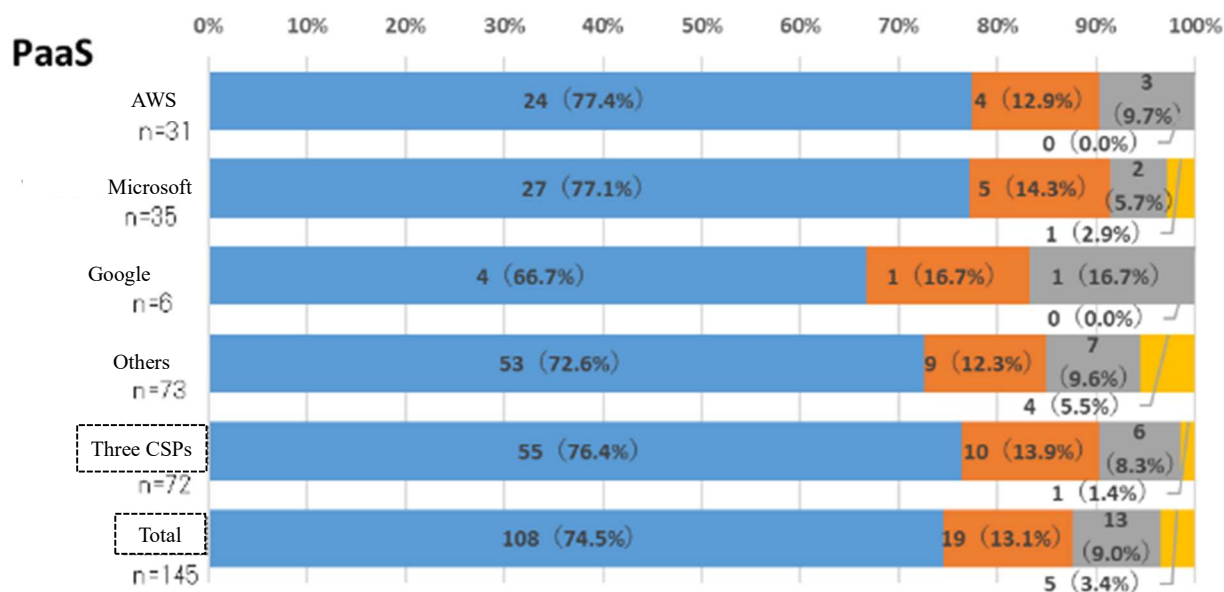
Additionally, in the report of CISPE as European trade association, it is pointed out that the prices are generally competitive in the early stage of negotiation, but they are almost always raised when the contract is renewed, whose rise rate is as much as 30 to 40% (Cloud Infrastructure Services: An analysis of potentially anti-competitive practice, ¶92 (URL: <https://cispe.cloud/studies/>)).

before introducing cloud services.

However, the problem of cloud services is also found from the viewpoint of fairness and transparency of transactions. When CSCs choose cloud services, regarding information on the specification of the resources that CSPs possess and processing performance of the system demonstrated along with it, and information on actual availability (operability) of services and countermeasures on occurrence of system failures etc., deficiency in information available for CSCs and the degree of understanding may be caused. As shown in Figure 3-10, according to the questionnaire results, the proportions of the respondents who answered, “some of the information obtained at the time of service selection was not sufficient, and it was necessary to purchase additional services or change to a higher level of services after implementation.” (Option b) and “as the information obtained during service selection was not sufficient, there is some concern about the use of the service, although no special measure is currently taken.” (Option c) are 9.4% and 9.0% for IaaS users respectively and 13.1% and 9.0% for PaaS users, respectively. Thus, it is found that there is asymmetry of information between CSPs and CSCs during service selection.

Figure 3-10. Whether the information provided when considering introducing a cloud service was sufficient or not

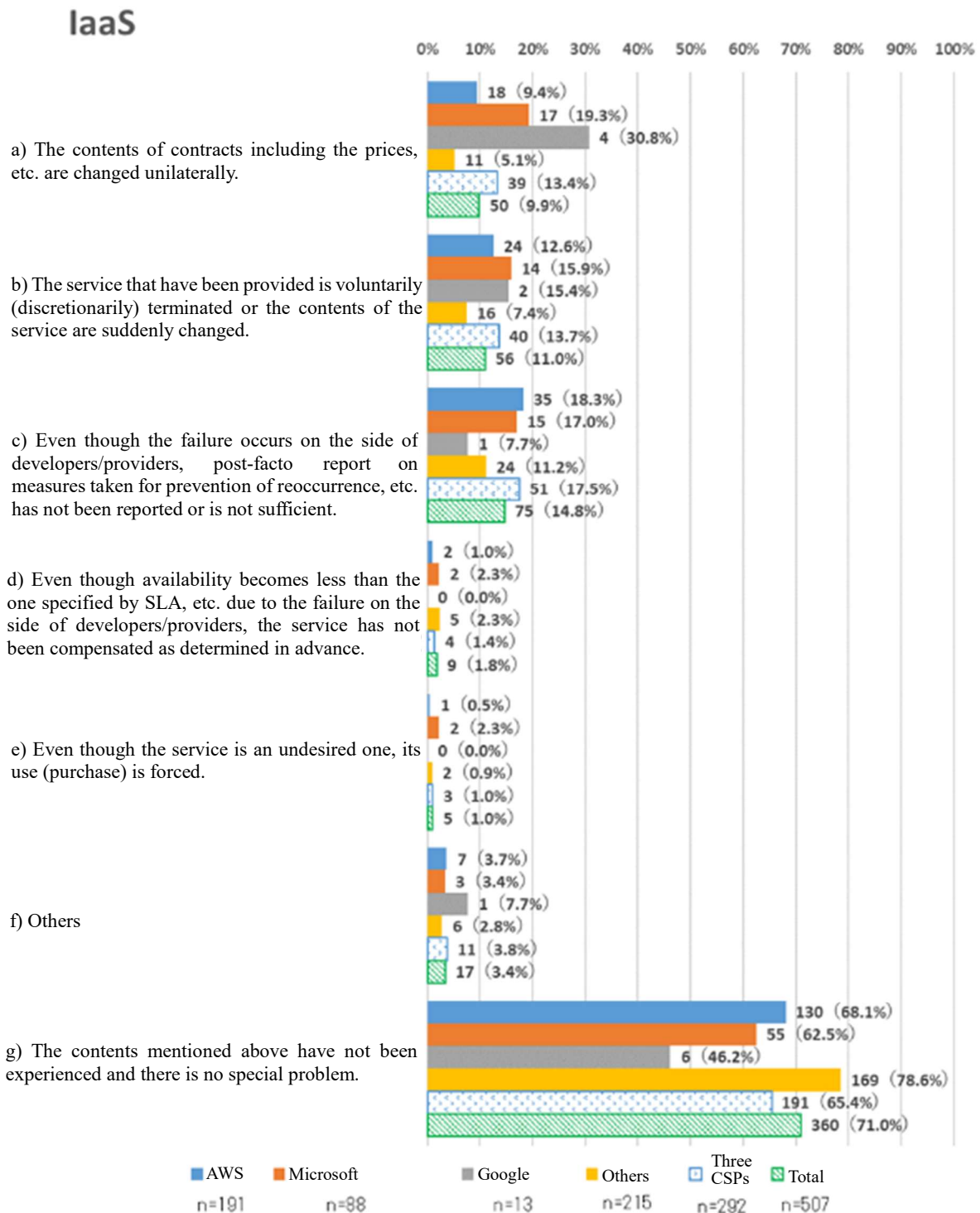




- a) All necessary information was available at the time of service selection and there was no problem.
- b) Some of the information obtained at the time of service selection was not sufficient, and it was necessary to purchase additional services or change to a higher level of service after implementation.
- c) As the information obtained during service selection was not sufficient, there is some concern about the use of the service, although no special measure is currently taken.
- d) Others

Furthermore, as shown in Figure 3-11 and 3-12, it can be seen that there is some problems of fairness and transparency regarding transactions between CSCs and CSPs, as it is found that there is a certain proportion of the CSCs that think that post-facto report is not sufficient regarding information and reoccurrence prevention on the failures, etc. that occurred as a part of CSPs' responsibility even after implementation (Option c of Figure 3-11), and the CSCs that have concern about data management by CSPs (Option a and b of Figure 3-12).

Figure3-11. Problems and complaints about provision of cloud services



PaaS

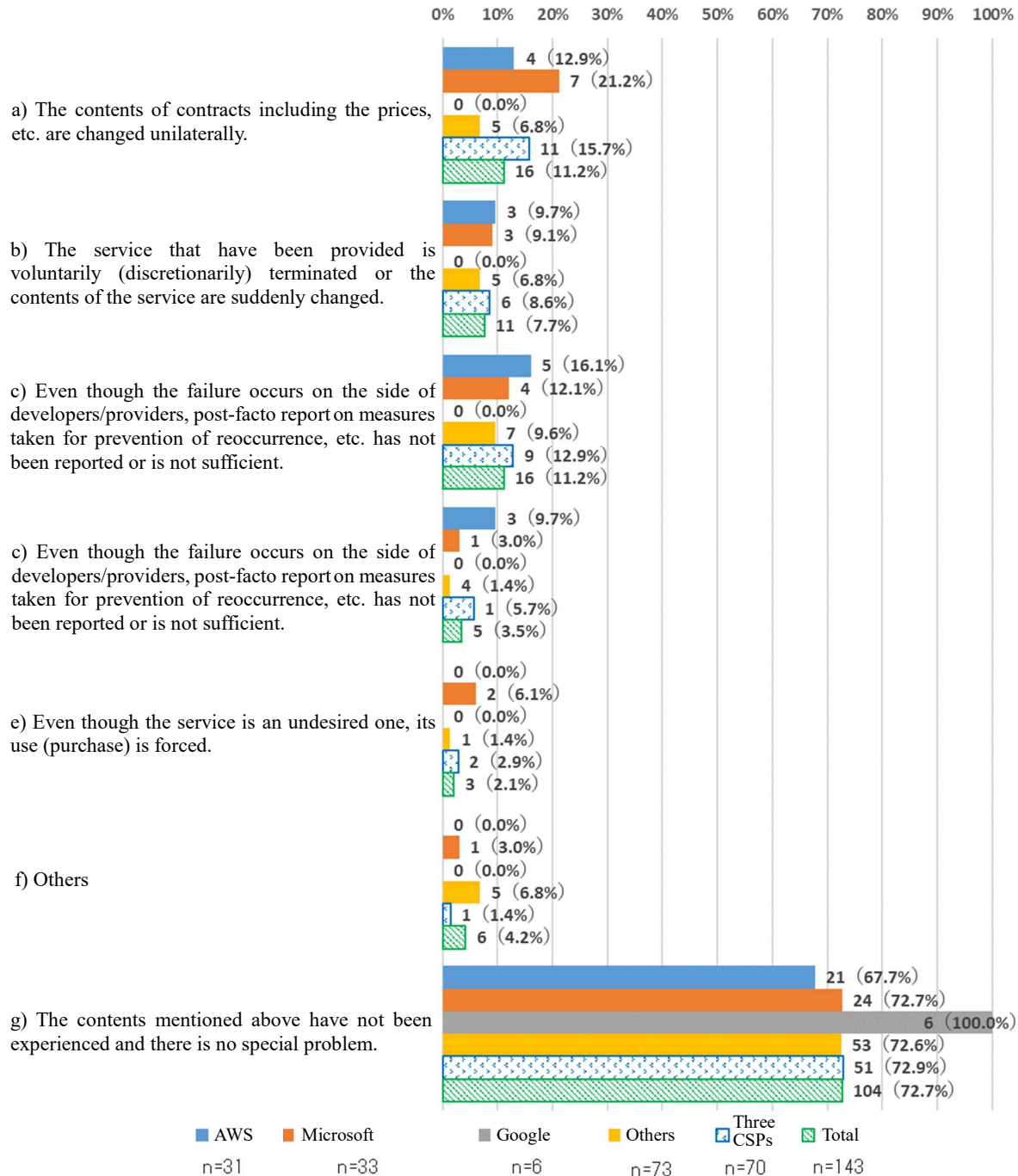
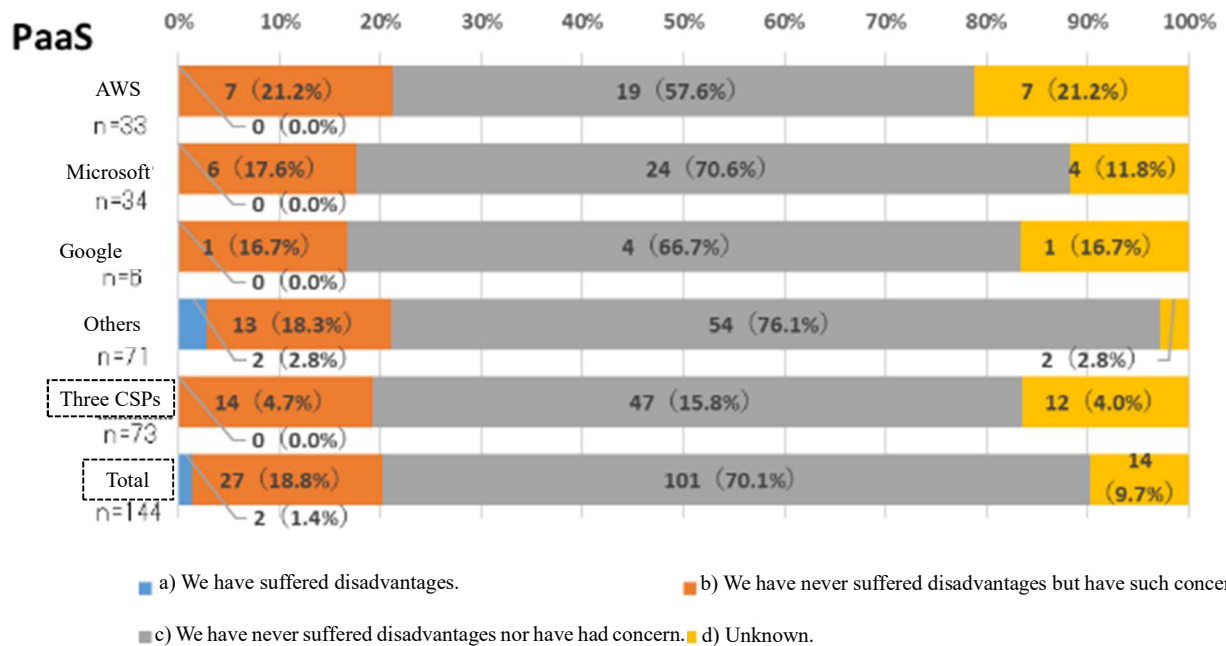
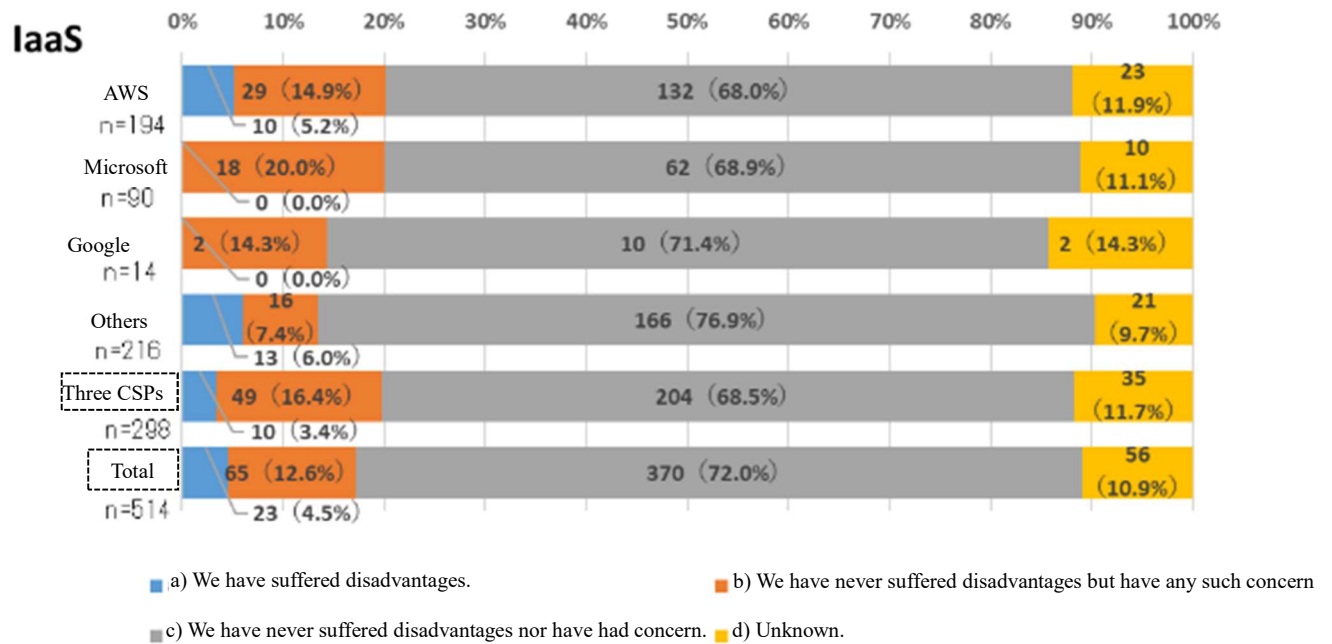


Figure 3-12. Concern about data management in CSPs



In the case where sufficient information is not disclosed, it becomes difficult for CSCs to select the services properly based on their quality and competition may be distorted. In order to ensure fair competitive environment in cloud service section, it is important to enable CSCs to select services through sufficient comparison of their quality in advance by eliminating asymmetry of information mentioned above.

Chapter 4. Views from competition policy based on competitive environment of cloud service market

The following considers the efforts to be required to prevent negative effects that may be caused through the concentration of market shares concerning the cloud services mentioned above in Chapter 3-3 and to implement the fairness and transparency of transactions. First of all, the basic policy to prevent negative effects that may be caused through the concentration of market shares and the existing efforts relating to them shall be introduced. Next, the basic policy related to ensuring the fairness and transparency of transactions, comments from CSCs, etc. and the existing efforts relating to them shall be introduced. Later, based on them, the efforts recommended to CSPs and CSCs respectively under competition policy shall be summarized^[67].

1. Prevention of negative effects that may be caused through the concentration of market shares

(1) Basic policy to prevent negative effects

In order to continue to make competition function effectively in the cloud service market, it is important to develop an environment in which a wide variety of businesses provide services and CSCs can freely select cloud services as needed, and based on the characteristics of the cloud service market discussed in Chapter 3, specifically, it is necessary to develop a competition environment to ensure the following (i) and (ii)^[68].

- (i) The contractual, technical, and economic constraints that CSCs face when switching are reduced as much as possible, such as that CSCs should be able to switch to other cloud services or port to their own on-premise option if they wish, and should not be required to bear excessive costs from the CSPs in doing so.
- (ii) Interoperability of services between different providers should be ensured and CSCs should be able to use IT services and software from different providers in a single system environment, regardless of format (cloud or on-premise), in response to changing circumstances such as their changing needs or the appearance of innovative services from new providers, with the minimum necessary contractual, technical and economic constraints faced by CSCs in doing so.

As it is difficult to implement the competition environment related to (i) and (ii) by either of the

^[67] Other than the Survey, as the efforts on information system section in the JFTC, it has published "Report on Fact-Finding survey on Information System Procurement in Government Office" in April of 2022. While the Survey mainly targets at the services as IaaS/PaaS that are used as the infrastructure of information system, the said report targets procurement of information system in government office including the system constructed on the basis of cloud services, which clarifies the views from the competition policy and the AMA, on loosely coupling of information system, design of open specification/open-sourcing of information system, development of organization/personnel structure, etc., with the recognition that it is important to develop the environment where a wide variety of vendors can easily access through avoidance of vendor lock-in, etc. The basic views that avoidance of vendor lock-in should be born in mind and that it is desirable for a wide variety of vendors to access to the market are common to this report.

^[68] Additionally, in the Opinion Exchange Meeting on Cloud Services, there was an opinion that since data is the goods that have a nature to be shared in common, it is also desirable to improve its transferability in this regard as it greatly contributes to its utilization and application. Additionally, there was also an opinion that, although it is not an issue of competition policy, there is a concern from economic security and that ensuring availability for switching by CSCs may lead to the measures for concern from economic security.

efforts, so both of them are required to be made. The following introduces the efforts that have been made in CSPs and other entities that related to (i) and (ii).

(2) Status of related efforts

A. Efforts by CSPs

As a part of the Survey, the JFTC asked the CSPs with the market top share about the fundamental policy of each company on switching from their own service and interoperation with the services of different providers and the status of their concrete efforts. The summary of the responses from CSPs were as follows: all the companies answered that, with an understanding the needs of CSCs related to switching from their own services to the similar ones of different providers and on-premise, and interoperation with the services of different providers, they provide services in a form meeting the said needs.

【Switching from the company’s own service to the similar services of different providers or on-premise】

- In order that CSCs can avoid vendor lock-in, we have provided the options including open source^[69], solutions and various kinds of containers^[70]. By the method that does not depend on the purpose of data porting and porting destination, we provide a wide range of services and tools to port the data and workload from or to our own service.
- We understand that a large number of CSCs gradually promote switching between on-premise software and public cloud services and try to support technologies and development to meet the needs of CSCs.
- We focus on interoperability with external operation, portability of software and interoperability and portability of data. We construct the cloud services by open sources and open standards.
- We provide the tools and processes required to enable CSCs to download data, such as enabling to port to different providers.

【Interoperability with the services of different providers】

- As we design the services in order that CSCs can freely construct suitable solutions by ourselves and never prevent or restrict the CSCs from adopting the strategies such as hybrid of on-premise cloud or multi-cloud. In order to enable such a flexible response, we enable the CSCs to select OS, programming language, web application platform, database and other services that are required for our use case. Moreover, we also support various database engines which are not our own services and provided by open source licenses and other providers.

^[69] Open source (open source software) refers to the software whose source code (which corresponds to the blueprint of program) are released free of charge, and which can be modified, reused and redistributed by everyone.

^[70] Container refers to virtualization technology that can construct multiple virtualized application execution environments on one OS on the server. By constructing the system in container-type virtual environment, (if only the same container infrastructure is introduced) it becomes easy to port the system to another server environment.

- We design the cloud service so that it is open and interoperable. We understand that most of CSCs use multiple clouds at the same time. Thus, we intend to develop and support the technologies that meet the needs of the CSCs.
- We consider that it is important to develop the environment in order to demonstrate the true value of cloud including data portability in order to enable optimization of CSCs', innovation and transformation. Because of that, we construct a large number of our products by open source and open standards and recommend CSCs to construct multi-cloud environment.
- We enable CSCs to integrate our services with various software solutions and database that they use across their enterprises.
- We open the system structure to the public. We provide the environment where we can provide the services on one-stop, such as network and datacenter by multi-cloud/hybrid cloud including the cloud services of other companies, additionally including data utilization.

On the other hand, it is shown that there are some parts where the efforts by CSPs are not always sufficient from the standpoint of CSCs. Specifically, with regard to the factor that prevent switching of cloud services as mentioned Chapter 3-2(2), it is indicated as the said factor that it costs dearly to extract the data in order to port data from the existing cloud services. With regard to the factor to impede multi-cloud, as mentioned in Chapter 2-1(5)B, a certain number of respondents answered that technical difficulty to link the cloud service that CSCs use with the ones of different service providers impedes the multi-cloud.

Base on above-mentioned, while CSPs recognize and correspond to the needs of the CSCs related to switching services and multi cloud, and hybrid cloud, it is supposed that some of the efforts taken based on the said recognition are not always sufficient for CSCs.

Accordingly, from the viewpoint of promoting switching services and multi-cloud, and hybrid cloud in accordance with the needs of CSCs, it is required for CSPs to take incessant efforts in order to minimize technical, contractual and economic factors that prevent them.

B. Other efforts

(A) Efforts in Europe

a. Voluntary restraints approach based on “Regulation on a Framework for the Free Flow of Non-Personal Data in the European Union”^[71]

In Europe, for development of digital economy through data utilization, aiming at abolishment of the restraints that prevent free flow of data in EU, etc., “Regulation on a Framework for the Free Flow of Non-Personal Data in the European Union” was established in

^[71] REGULATION (EU) 2018/1807 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 14 November 2018 on a framework for the free flow of non-personal data in the European Union.

November of 2018 (entered effect in May of 2019). In this regulation, based on the recognition that the vendor lock-in in the private sector is one of the causes to prevent free flow of non-personal data in EU, the followings were specified (Article 6): (i) EC shall encourage and promote to establish voluntary code of conduct in order to facilitate switching between data processing service providers including CSPs (including SaaS providers), and furthermore, (ii) upon doing so, EC shall closely cooperate with all the interested parties (including small and medium enterprises, start-up enterprises, users and CSPs.)

As a result, establishment of voluntary code of conduct was discussed in “SWIPO (Switching Cloud Providers and Porting Data)” as the body that consists of the interested parties of cloud services, and in November of 2019, the codes of conduct for IaaS market and for SaaS market were established and announced, respectively. CSPs can voluntarily declare compliance with the code of conduct for each service, with regard to the code of conduct for IaaS^[72], eight businesses and 16 services^[73] have declared compliance.

Additionally, with regard to the code of conduct for SaaS^[74], the information on the businesses that declared compliance has not been published (information on publication as of May 19 of 2021)^[75].

Among these, the code of conduct for IaaS required by the providers shall be roughly classified into the following two points: the first point is to provide technical support that enables CSCs to switch to the services of other providers and on-premise, which requires to provide technical support in order that business data of CSCs produced upon using cloud services and system construction data, log, virtual machine, container, source code, IT information and authentication information, related metadata information (these collectively refer to “infrastructure artifact”^[76].) can be ported from the service provided by their own companies to the ones provided by other businesses^[77]. The second point is to provide the information concerning the available methods for switching from the service their own companies provide and data porting (including the information on technical constraints.) and the fees that cost for porting (the prices corresponding to the expected amount of infrastructure artifact), etc. for potential CSCs before signing the contract relating to

^[72] 「Code of Conduct for Data Portability and Cloud Service Switching for Infrastructure as a Service (IaaS) Cloud services」 (Version: 2020 – V.3.0, Date: 27 May 2020)

^[73] More specifically, they are eight companies of 3DS Outscale, AWS, Aruba SPA, CoreTech, Infoclip, Irideos, OVH Cloud and Scaleway. Additionally, AWS targets the 3 services of Amazon EC2, Amazon S3 and AWS Cloudtrail for declaration.

^[74] “SWIPO AISBL Code of Conduct Switching and Portability of data related to Software as a Service (SaaS)” (Version: 2020, Date: 08-07-2020)

^[75] https://swipo.eu/wp-content/uploads/2021/06/SWIPO-Register-of-Adherence-Declarations_24.06.2021.pdf

^[76] “Code of Conduct for Data Portability and Cloud Service Switching for Infrastructure as a Service (IaaS) Cloud services”(Version: 2020 – V.3.0, 27 May 2020) 3.4

^[77] 5.2 of the same.

More specifically, the following methods are indicated: provision of simple and safe means to import and export infrastructure artifact of CSCs (DP01), provision of API that enables to transfer infrastructure artifact (DP04), use of open standards and open protocol upon transfer (DP06), and provision of self-service interface by which CSCs can regularly extract data (DP07).

provision of cloud services^[78].

b. Voluntary restraints by “Data Act”^[79]

Furthermore, in February of this year, EC published “Data Act” that aims at securing fairness of data access within EC and promote its use. In this Act, “Regulation on Framework for the Free Flow of Non-Personal Data in the European Union” is considered to be an important component, based on the assessment that the voluntary restraint approach by the said regulation mentioned above in a) does not have a large impact on the EU market and its effectiveness is limited, the regulations to facilitate the switching of data processing services such as cloud services (including SaaS) are incorporated.

While this Act has not been effected (as of May of 2022), the outline of the main relevant text in the Act is as follows.

- (i) Removing obstacles to effective switching between providers of data processing services (Article 23)
 - Data processing service provider shall enable the customer to switch to the similar services of different providers by taking measures specified in Article 24, 25 and 26.
- (ii) Contractual terms concerning switching between providers of data processing services (Article 24)
 - As the rights of the customer and the obligations of the provider in relation to switching of data processing services, it shall be clearly defined in the written contract that the customer, upon request, can switch to the data processing service offered by another provider or port all data, applications, etc. generated by the customer.
- (iii) Gradual withdrawal of switching charges (Article 25)
 - After three years had passed from the effective date of Data Act, the data processing service providers shall not charge the costs for switching (for three years from the effective date of Data Act, the data processing service providers can charge reduced costs.).
- (iv) Technical aspects of switching (Article 26)
 - Data processing service providers that do not provide access to the operating services, software and applications that are deployed on those infrastructural elements shall ensure that the customer, after switching to a service covering the same service type offered by a different provider, enjoys functional equivalence in the use of the new service.
 - Data processing service providers other than those covered above shall ensure compatibility with open interoperability specifications or European standards for

^[78] 5.1, 5.4, 7, etc. of the same.

^[79] Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on harmonised rules on fair access to and use of data (Data Act) (published in February 23 of 2022)

interoperability as well as make open interfaces available and free of charge.

(B) Efforts in Japan (“semiconductor/digital strategy”)

With regard to the policy of the measures on cloud services in Japan, “Basic Policy on Economic and Fiscal Management and Reform 2021 Four Driving Forces that Open the Way to the Future of Japan -Green, Digital, Creation of Vibrant Local Regions, Measures against Declining Birthrate-“ (cabinet decision on June 18 of 2021) sets the target as “acceleration of DX in the private sector” and intends to secure improvement in reliability, interoperability and resilience of cloud services. “Semiconductor/digital strategy” announced by Ministry of Economy, Trade and Industry in June of 2021 locates the cloud service as playing the role as social and economic essential infrastructure for the future and indicates the direction to be pursued by digital industry in Japan including cloud services. In these, for example, along with the goal to be achieved that “it is necessary to secure interoperability that enables multiple cloud to be used in cooperation so that various options can be secured and optimal technologies and services that correspond to the needs both within and outside Japan, including from global cloud to region cloud, and private cloud, according to use purpose and the degree of data agility handled,” the response measures in the future “to secure the appeal to digital enterprises that develop and operate and conduct research and development of cloud, etc. rooted in Japan and continuous response ability for CSPs that provide services rooted in Japan and to review the measures in order to clarify the direction to commercialization that can be a source of profits” are described^[80]. Thus, considerations have been currently made toward development of digital industry.

Additionally, the material for the 5th review conference of strategy for semiconductors and the digital industry held in April of 2022 describes “in order to handle data with high confidentiality while making use of cutting-edge cloud technologies, it is considered to be useful to construct ‘hybrid cloud’ that makes the best use of the strengths of both public cloud and private cloud and to promote technical development toward improvement of convenience and enhancement of security.”^[81] Thus, toward promotion of hybrid cloud, consideration toward implementation of technologies that enables CSCs safety and low-cost data linkage between clouds for promotion of hybrid cloud.

(C) Examples of efforts for avoidance of vendor lock-in by CSCs in Japan

The CSCs in Japan have already made certain efforts to avoid vendor lock-in in light of difficulties of switching of cloud services. The followings are the examples on the side of such CSCs.

^[80] Ministry of Economy, Trade and Industry, “Strategy for semiconductors and the digital industry” June of 2021, p26, 27.

^[81] The 5th review conference of strategy for semiconductors and the digital industry (April of 2022) Material 3, “Toward bolstering supply chain of digital industry base”, p16, 51

a. Efforts made by government (government cloud)

In the government information system, it is supposed that the government cloud shall be organized as the use environment of multiple cloud services where Digital Agency provides common basis and function, in order to construct the quick, flexible, secure and highly cost-efficient system by making the best use of advantages of cloud services and construct highly convenient services^[82]. It is expected that operation of government cloud will be gradually operated from now on after going through preliminary projects by local governments^[83], and the cloud services subject to the government cloud in 2021 FY as used in such preliminary projects are Amazon Web Services (AWS) and Google Cloud Platform (GCP)^[84]. It is supposed that this government cloud is constructed by “multi-cloud method” where multiple cloud services are mutually connected and, upon constructing the system on the government cloud, trade terms, etc. of each cloud service subject to the government cloud shall be compared, the cloud services to be used as a main environment shall be decided and then the system shall be constructed on them. Additionally, in order to avoid cloud lock-in, and enable switching of services for the future, it is required to release technological information that contributes to preliminary verification on switching and secure data portability including tools that facilitate porting and provide support services in the procurement specification document of the government cloud, etc.

b. Efforts by National Institute of Informatics

Cloud Support Office of Inter-University Research Institute Corporation/Research Organization of Information and Systems (hereinafter referred to as “NII Cloud Support Office”)^[85] provides various kinds of services to support introduction/use of cloud services targeting the university/research institute.

NII Cloud Support Office points out that the information on porting support of data, etc. upon selecting cloud services serves as a reference for the following reasons^[86]: that is, for the reasons that significant changes in the specification and contractual conditions after introduction of cloud services and the state of termination of the services themselves may occur or that the status that CSCs may desire switching more advantageous cloud services from the viewpoint of prices and service selection, etc. due to the circumstances of the CSCs, it is required for CSCs to assume switching to the services of other CSPs at the timing of

^[82] With regard to the use of cloud services in the government, from June of 2018, based on “Basic Policy on Use of Cloud Service in Government Information System” (approved by CIO liaison conference on June 7 of 2018), Cloud-By-Default Principle (the use of cloud services shall be determined as the first candidate) supposed to be adopted for government procurement.

^[83] “Priority Policy Program for Realization of Digital Society” (Cabinet approval on June 7 of 2022) p94.

^[84] The Digital Agency, “Result of public Tender on Cloud service provision for development of government cloud in Digital Office- Preliminary Business and Website Configuration by the Local Government in 2021 FY” (October of 2021).

^[85] <https://cloud.gakunin.jp>

^[86] “Cloud Start-Up Guide for Universities/Research Institutes, Ver.31” by National Institute of Informatics, Cloud Support Office (p20) (<https://cloud.gakunin.jp/dist/pdf/startupguide-v3.1.pdf>)

cloud service introduction.

Additionally, NII Cloud Support Office creates the list^[87] of the items subject to selection standards and considerations upon introducing cloud services as a part of support services for introduction and use of cloud services and provide the CSCs of the said support service as the checklist at the time of introduction of cloud services. The said checklist is not simply limited to serve as the lineup of the items for CSCs at the time of introduction. Upon creating the said checklist, NII Cloud Support Office asks the CSPs^[88] that participate in support services to answer the questions regarding the state of specific measures concerning each item and then list the responses obtained after verifying the evidence regarding them^[89].

Through this checklist, the users of support services can understand whether data can be taken over at the timing of switching cloud services and the contents of cooperation obtained from CSPs, etc. at the stage of selecting cloud services. Additionally, they can select the services after comparing the measures taken by individual CSPs. In the said checklist, for example, the responses of the CSPs to the following questions^[90] are provided.

Data porting support upon termination of contracts: is it possible for users to receive support for data porting upon termination of the contract due to the users' circumstances? If possible, please answer the method.

Securing data upon termination of service use: in the case where the contract is terminated or CSPs terminate the business, is there a guaranteed method for users to extract the data completely? If there is, please answer the method to acquire the data (download, provision of physical medium, etc.).

Portability of server image: is it possible to download a server image to an on-premise environment and another provider's cloud? If possible, please answer the terms and methods thereof.

Portability of user data: is it possible to port user data to an on-premise environment or another provider's cloud? If possible, will any tools or methods be provided?

2. Ensuring fairness/transparency

(1) Basic views for ensuring fairness/transparency

As mentioned in Chapter 3-3(2), it is considered that there are some problems of fairness and transparency regarding transactions between CSPs and CSCs, as there seems to be asymmetry of information between CSPs and CSCs. The specific comments from CSCs that could be understood

^[87] The checklist consists of 112 items related to overview of products/services, operation performance, contract application, information related to authentication, reliability, information related to support, network/communication function, management function, software environment, scalability, datacenter, security, data management, backup, reliability of CSPs, contract terms, data handling, taking over of data and third-party authentication.

^[88] 36 CSPs participate in GakuNin cloud introduction support services (as of February of 2022).

^[89] The responses are released only to the member institutions of GakuNin cloud introduction support services.

^[90] "National Institute of Informatics, GakuNin Cloud Introduction Support Service Checklist Ver.5.1"

in the Survey are mentioned below in (2).

With regard to the services for which it is not easy for CSCs in many cases to switch once they have started using, it is especially important that appropriate information is provided to CSCs before they start using the services and CSCs can voluntarily and rationally select services that are necessary for them.

Additionally, the cloud service is the one where CSCs select necessary functions within the prepared ones, and combine and use in accordance with their own needs, and in some cases, it may be used by combining with IT services of different providers. In the case where information on the cloud services that are currently used is not appropriately provided, by reason of difficulty of specifying the causes in the occurrence of failures, it becomes more difficult to combine use of the services of different providers. From the viewpoint not to impede CSCs' combining or expanding services, it is necessary that appropriate information on the contents of the service shall be provided even after the conclusion of the service and it is desirable that a system will be established to appropriately accept conclusion and negotiation from CSCs.

(2) Comments from CSCs, etc. related to fairness/transparency

This paragraph summarizes the comments on fairness and transparency given through the questionnaire to CSCs and interviews with businesses and views of major CSPs to such comments.

Additionally, as CSPs have various business styles, not every CSP falls under every item (the same shall apply to Chapter 5 mentioned below.).

A. Comments from CSCs, etc. related to information provision at the time of concluding contracts and explanations by CSPs relating thereto

<Comment from CSCs>

- The information provided by CSPs at the time of concluding contracts is insufficient. For example, as version upgrading of software by CSPs may be implemented without prior notice, operation of the said software is suspended due to such version upgrading though it is for only a short time, the system of the CSCs that use the said software may stop, or the error may be seen. Although such implementation method for version upgrading can cause a significant risk that prevents stable operation of information system, there was no explicit explanation for such version upgrading at the time of concluding the contract for cloud services but for minute precautionary statement on the website. We might not have concluded the contract if we had known such inconvenience in advance.

<Explanation by CSPs>

- We publish the contract and terms and conditions in a click-through format (whereby users enter into a contract by agreeing to the terms of service of the providers on the website) so that our customers can confirm transaction requirements before signing a contract.

In the case where we suspend significant functions of the services that our customers use, or we make significant changes to application program interface (API)^[91] that they use in the method without backward compatibility^[92], we will give them a prior notice at least 12 months in advance. However, this shall not apply to the followings: (a) in the case of occurrence of security problems or copyright and intellectual problems to our company or this service, (b) in the case of economic or technological burden is caused, or (c) in the case of violating legal provisions by us.

We have made reasonable efforts to provide customers with advance notice of scheduled upgrades, patch application, bug fixes and other maintenance (except in the event of an emergency). We also provide the service by which the customers can designate the maintenance target, and one by which a part of maintenance can be started under control of our customers depending on the circumstances. Furthermore, our customers can confirm the status of maintenance scheduled for all the services they use.

- In order to provide service and continue innovation, CSPs have been making their best efforts, updating the services by using a minor method of hundreds of times a day so that such updates do not affect adversely to customer service and even if they affect adversely, so that confusion can be minimized. Furthermore, CSPs provide the information on implementation of these updates. For example, with regard to one of our products, the updates of all the main services are posted on the website. These efforts have been made by sufficiently notifying the customers about the updates and changes to the services in order to assure smooth transition to the updated versions of our services.
- We notify the CSPs of significant changes that are likely to have significant impacts on use of services. We neither aim to nor intend to prevent or restrict using our services due to the updates. In the case where the problems occur to customers due to updating of systems, we aim at solving the problems as quickly as possible. We disclose the release notes that cover the latest changes of our products during past 60 days in order to support customers. In the release notes, description relating to details of updates and their classification (security, new functions, etc.) are also included.
- We secure transparency in our system performance and updates and our dedicated website is available to the public in order to sufficiently provide real-time information on system performance, including availability for all services. As specified in our standard contract, we make commercially reasonable efforts so that customers can use our service for 24 hours a day, 7 days a week and throughout the year, and will give a prior notice to customers if suspension of service is scheduled.

^[91] It refers to interface that connects between application and software. It defines the form to call the functions that programs have from outside and use them and is used for the purpose of data linkage and sharing between applications and software. Integrating the information and functions between information systems by making use of this system refers to “API integration”.

^[92] It refers to the status where the same series of a new product is compatible with the old one (the functions of the old product are available for the new one).

- In principle, the information of scheduled maintenance shall be informed on the website for our customers and by e-mail to their contact person. Additionally, depending on the situation, such as the occurrence of significant risks, notices are given via our salespersons.

B. Comments from CSCs and explanations by CSPs relating thereto regarding information provision concerning applicable period/conditions of discount at the time of starting provision of services

<Comment from CSCs>

- When a new service is launched, the service is often offered at a low price, under the name of “campaign price”. However, in some cases, the termination date of the campaign price and the sales price after the campaign ends may not be clearly indicated. Therefore, as long as I sign up during the campaign period, I expected I could continue to use the service at a low price at least for the portion I started using during the campaign even after the completion of such campaign. However, the price went up after the campaign ended and I was surprised to find that the higher price was applied even to the portion of the service I had already started to use during such campaign. Even if the campaign is over and the price is raised, it may be difficult to switch to another provider’s service, especially if the system has already been built by using that service.

<Explanations by CSPs>

- We provide our customers with free usage allowance for our services and publish the terms and conditions of it.

Additionally, when the free allowances are about to expire, we notify our customers by e-mail. Furthermore, if the monthly free usage quota exceeds 85% in the initial setting, our service is configured to provide an alert to our customers by e-mail and the customers can also set the alert related to free usage quota by themselves by using billing and cost management console.

- Although it is difficult to comment on general initiatives for customers, the legitimate efforts by CSPs to help customers switch to cloud services include the followings: offering discounts or credits⁹³ to offset the initial costs upon switching to the cloud services of the said CSPs and providing technical support, etc.

In these circumstances, CSPs strive to provide customers with information in order to improve transparency related to the potential costs. As CSPs often provide customers with the tools to support calculation of potential costs, we also provide the system to calculate the prices relating to a certain cloud service.

- When our customers receive discount from us, information relating to discount shall be provided before applying such discount. Then, our customers can select if they accept the

⁹³ In the context of cloud service, it refers to the right that can be applied to the payment for cloud service of a specific CSP.

proposed discount or not. We make such information as clear as possible in order to avoid misunderstanding by our customers regarding the discount applied period and terms.

- Whenever a campaign is implemented, we inform the period of implementation, fees, etc. on our website. Currently, with regard to IaaS we provide, we make a direct contract after our salesperson explains the contents of the contract to the subscriber. In principle, we do not provide our product under the name of “campaign price” without clearly indicating the termination date of the campaign and the sales price after the end of the campaign.

C. Comments from CSCs and explanations by CSPs relating thereto regarding information provision at the time of system failure and at the time of software version upgrading

<Comment from CSCs>

- As shown in the comment from CSCs mentioned above in A, upon implementation of updates on the CSPs’ side, CSPs may not notify the contents of the change or their implementation period in advance, or the period from such notice to implementation may be short in light of the contents required for CSCs, which may have adverse effects on the system on the CSCs’ side.

In addition, when system failure occurs on a cloud service, information about the fact that the failure occurred, the cause, response to such occurrence of failure by CSPs, and measures to prevent reoccurrence may not be provided or may be provided insufficiently, and CSCs may have difficulties in taking countermeasure against such system failure or delay to do so.

<Explanations by CSPs>

- We have made reasonable efforts for scheduled upgrades, patch application, bug patch and other maintenance (however, emergency cases are excluded). While we provide real-time information on the customers’ account-specific portal other than on the one we release in order to provide information on utilization and operation of our services, we release the overview related to the failure that have affected use of services for our customers (for detail, see the first item of <Explanations by CSPs> mentioned above in A).
- It is important to provide our customers with accurate and the latest information related to system failure for providing competitive cloud services. While especially during investigation of problems and function stop by CSPs, certainly depending on the situations, it may be difficult to provide the said information, it is a part of competitiveness of CSPs to prevent occurrence of technical problems, fix the problems quickly and provide related information to related customers. For example, one of our products enables us to notify our customers through user portal and enables an IT administrator to obtain the information quickly. Additionally, it can also set the alert by e-mail and notification to mobile devices, and receive an alert related to the problems of the services from operator portal. Thus,

customers are supposed to receive the notice related to the problems of the services in real-time without signing in the portal.

- It is essential to improve and modify service in order to provide the CSCs with the best possible user experience. We notify our customers of significant changes in the service that are likely to have a significant impact on its use, and also aim at solving the problems as quickly as possible in the case where system updating causes any problem to our customers.

We use dashboard to provide status information about cloud services provided to our customers, including messages regarding interruption, suspension of services or temporary problem. Our customers can access to detailed information related to measures taken by us against the said problems.

During occurrence of the problem, we regularly update information related to the said problem, timeline for contact, changes in status, etc. Moreover, in order to thoroughly understand the said problem and identify the points to be improved regarding reliability of cloud services, we prepare an after-the-fact analysis of the said problem. Furthermore, with regard to the problems that have broad and serious impacts, we summarize symptoms of the fault, impacts, the root causes and measures and provide the customers incident reports that contribute to prevention of reoccurrence.

- We secure transparency in our system performance and updates and our website is available to the public in order to sufficiently provide real-time information related to system performance such as service operational status of all the services, etc. As specified in our standard contract, we make commercially reasonable efforts so that our customers can use our service for 24 hours a day, seven days a week and throughout the year, and will give a prior notice to our customers if suspension of service is scheduled.
- In principle, the information of scheduled maintenance shall be informed on the website for our customers and by e-mail of their contact person. Additionally, in occurrence of system failure, we will issue the report in which affected time period, causes of failure, countermeasures for reoccurrence prevention in response to our customers' request are summarized. Depending on the situations, such as the occurrence of significant risks, notices are given via our salespersons.

D. Comment from CSCs and explanations by CSPs relating thereto regarding consulting system

<Comment from CSCs>

- Even if the inquiry is important for CSCs, such as when a system failure is suspected on the cloud service, CSPs may not respond to individual inquiries from a single CSC unless a fee-based support contract is concluded.

Moreover, CSPs unilaterally decides on matters that are supposed to require negotiation with CSPs. For example, in the case where the cloud service is suspended due to a system failure, CSPs are supposed to refund a part of the usage fee to CSCs according to the length

of the suspension based on the contents of the contract (SLA, etc.) determined in advance. However, it is unclear what kind of calculation standard the CSPs used to calculate the suspension time, and it is impossible to know whether the refund is appropriate or not. Additionally, even if the refund is less than the amount of money commensurate with the actual time of the suspension, CSPs will not be willing to negotiate.

<Explanations by CSPs>

- We provide five levels of customer support. The most basic support level is available to all customers and includes the provision of a portal that displays the state of services and alerts when the resources of CSCs are affected. Our customers may purchase the support of a higher level as needed.

We ensure transparency of support at all support levels by providing all year around access to the customer service. However, the response time may vary by support service level.

We release the service commitment mainly related to use and operating time, which is called service level agreement. In the case where the said service commitment is met, we issue service credit (which can be applied to payment of service use fees) for our customers. The calculation method of service credits is released on our website.

- It is important for the competition between cloud services to continue operating the cloud services. If we get a bad reputation that our service is degraded, our customer would select switching of other cloud services. Because of this, CSPs make a general commitment with regard to service level agreements and provide detailed information on how our customers can receive a refund.

- With regard to inquiry response concerning system failure, we review all the new issue reports submitted by our customers. According to the circumstances, while investigation of defects are ongoing, we may provide regular updates and also provide prospects of the time when defects are solved. Besides, our customers can report defects by “[transmission of feedback] function. Further, we utilize internal tracking system to implement functions and fix defects. The status of request for defects or functions shall be displayed in defect tracking system for each product. Additionally, we provide tools to aggregate, analyze and count the crash occurred during operation of cloud services and the said results are displayed on the unified error management interface. On the exclusive view, the detailed time chart of errors, the number of times of occurrence, the number of affected CSCs, etc. are displayed.

Our terms of service specify that refunds at the time of system failure can be provided in the form of credit (discount) for the service pursuant to the provision.

- With regard to inquiry response concerning system failure, we provide support for the services our customers purchased at no extra charge. Furthermore, comprehensive information related to the performance of the system including unscheduled service

suspension is provided in real-time (for details, see the fourth item of <Explanations by CSPs> mentioned above in A).

- With regard to inquiry concerning system failure, we provide responses via our salespersons, etc. Other than this, we also provide responses to the inquiry from the portal site for our customers. Additionally, we stipulate the calculation method for the amount of refund by SLA in terms of service use. The measures are taken based on a statement by our customers after making fact-checking.

(3) Status of related efforts

In Japan, from the viewpoint of promoting safe use of cloud services, efforts have been made to secure appropriate information disclosure on cloud services and security as follows. These efforts are made for the purpose of securing information disclosure and quality of a certain level and it is expected that such efforts can contribute to dealing with the problem of asymmetry of information between CSPs and CSCs.

In this section, all of “cloud services” shall include SaaS.

A. “Information Disclosure Guidelines for Safety and Reliability of Cloud Services”

From the viewpoint that it is required to develop the environment where CSCs can obtain sufficient information for comparison, assessment and selection, etc. of cloud services with the prevalence of cloud services, Ministry of Internal Affairs and Communications has established and announced the information disclosure guidelines of various service sections which is generically called “Information Disclosure Guidelines for Safety and Reliability of Cloud Services.” As the examples of utilization in the private sector based on this, Japan Cloud Industry Association (ASPIC) has established certification system by section which proves that information disclosure from CSPs is appropriately provided, in accordance with the above-mentioned guideline. The business to enable the service providers that receive certification to display the mark of certification on their web page and advertisement, etc. for the said service has also been advanced.

B. “Information Security Guideline in Cloud Service Provision”

Ministry of Internal Affairs and Communications has established and announced “Information Security Guideline in Cloud Service Provision” which summarizes desirable information security countermeasures to be implemented upon provision of cloud services by CSPs. This guideline indicates the status of the internal organization, management method of information asset such as CSCs’ data, etc. and countermeasures required for operational management and facilities of services, etc. as well as best practices. Additionally, in September of 2021, revision was made (third version) by taking into consideration changes in the environments surrounding cloud services, from the viewpoint of consistency in the status of responsibility boundary in cloud services and international standards, etc.

C. Information Security Management Guideline for the use of cloud computing services

Ministry of Economy, Trade and Industry established and announced “Information Security Management Guideline for the Use of Cloud Computing Services” that describes (i) what CSCs should do by themselves, (ii) what they should request for CSPs, and (iii) information security management system in cloud computing environment, as CSCs need to recognize security management measures that cannot be achieved only by the CSCs and request various information for CSPs as well as develop information security system corresponding to the cloud computing system within their own organizations.

D. Information system Security Management and Assessment Program (ISMAP)

Other than the above-mentioned A to C, with regard to information security measures of cloud services used in government information system, “Information system Security Management and Assessment Program,” commonly called “ISMAP,” has been established. This system shall intend to secure security standard in cloud service procurement by the Government and aim at contributing to smooth introduction of cloud services thereby, and register the services in advance, based on the standard established by taking into account international standards, etc., via the process to audit if each standard is appropriately implemented. In principle, government agencies, etc. are supposed to conduct procurement from the registered services.

Additionally, while the cloud service procurement using ISMAP is only required of government agencies at this stage, it is expected to contribute to promotion of the proper use of cloud services by reference to the released list, etc. in the private sectors, etc. as well.

3. Efforts recommended for the parties concerned under competition policy

Based on the above-mentioned 1 and 2, from the viewpoint of securing the environment where CSCs can rationally select various cloud services and transparency/fairness of transactions, the efforts recommended for CSPs and CSCs respectively are shown as follows.

(1) Recommended efforts to be undertaken by CSPs

It is recommended for CSPs to minimize technical, contractual, and economic constraints that prevent CSCs from switching to cloud services of other CSPs or on-premise, or from implementing multi-cloud or hybrid cloud services and to provide CSCs (and prospective CSCs) with information that contributes to their service selection prior to signing a contract.

More specifically, the above-mentioned efforts recommended to be undertaken by CSPs include the followings.

- Notify CSCs (prospective CSCs) of the availability of migration to the cloud service of another CSP or on-premise after they start to use the target cloud service, and the restrictions and technical limitations concerning the method, cost conditions, procedure and other requirements specified by the CSP (the original provider) for such porting prior to signing a contract concerning use of cloud services.
- Minimize as much as possible trade terms that impede porting to cloud services, on-premises,

multi-cloud or hybrid cloud, such as a Data Transfer Fee paid to CSPs (hereinafter referred to “Data Transfer Fee”) when CSCs input or output (transfer) data to cloud services via the Internet.^[94]

- Enable the import and export of CSC data stored in cloud services including the data and setting conditions created by CSCs, as long as possible, by targeting the CSCs that desire porting to cloud services of other services, on-premise, multi-cloud or hybrid cloud.
- Ensure interoperability of third-party software that operates in CSPs’ services, as far as technically possible. In particular, open the same range of functions to third-parties under equivalent conditions to the extent that its own software can access them.
- Notify CSCs, prior to signing a contract for the use of cloud services, of the terms and conditions that are important for them to judge the quality of such cloud services and make the most appropriate choice, such as conditions/restrictions concerning use of services and the method to provide information concerning system failure.
- In the case where the CSPs connects multiple IT services provided by different providers, CSPs should publish information related to updates, failures in their own responsible areas, and setting of security that may have impacts on such connection promptly and at the easy-to-find place, so that CSCs can verify availability and safety of the whole system environment, understand the causes of problematic events and take necessary measures.
- Construct a system to receive consultations and negotiation of important and reasonable contents.

(2) Recommended efforts to be undertaken by CSCs

It is recommended for CSCs to confirm that a prospective cloud service meets the CSC’s needs concerning system migration and data portability, as well as to consider internally what conditions should be met to stop using the target cloud and exit from the service before signing the contract regarding the use of the cloud service. More specifically, these efforts include the followings.

It is also recommended for CSCs to retain and train personnel with expertise in cloud services from the viewpoint of correcting asymmetry of information between CSCs and CSPs as well as implementing these efforts effectively.

- Predetermine conditions for terminating the contract (maximum allowable cost increase, and policy for dealing with technical obsolescence, etc.), in consideration of the possibility that the CSC may need to leave the CSP’s service, and periodically verify the service according to such conditions.
- Confirm whether any method to retrieve CSC’s data stored on the cloud service in a complete form in the case of termination of the contract is widely provided to users in general (e.g., whether APIs are open to the public), and if provided, check such a method. In the case where such

^[94] Even in the case where the transfer fee is charged by the CSP as the original provider, switching or multi-cloud may be feasible by providing CSCs with financial compensation from another CSP that provide cloud service as the destination provider, etc. However, as attempting to restrict a business partner by asking CSCs to shoulder unreasonable burden itself cannot be judged as an efficiency competition based on prices and quality, even if switching and multi-cloud becomes available by the measures taken by the CSP as the destination provider, it does not mean that there is no problem of competition policy.

provision of method cannot be confirmed, confirm with CSPs about the conditions and range, etc. where data can be extracted upon termination of the contract. Otherwise, the agreement with CSPs in the case where individual negotiations of the contract contents are available, such agreement should have stipulation that the said CSPs shall support system mitigation and the necessary data shall be exchanged.

- Especially for critical information systems that are likely to be migrated, design to facilitate migration from the cloud service, by prioritizing technologies that can operate in the cloud environment of a different CSP or technologies with high portability (e.g., open source software, containers, etc.)

Chapter 5. AMA views on conducts that may restrain competition

This section summarizes the AMA views from the perspective of preventing AMA violation, upon obtaining explanations from major CSPs on the issues which had emerged from interviews with CSCs, etc.

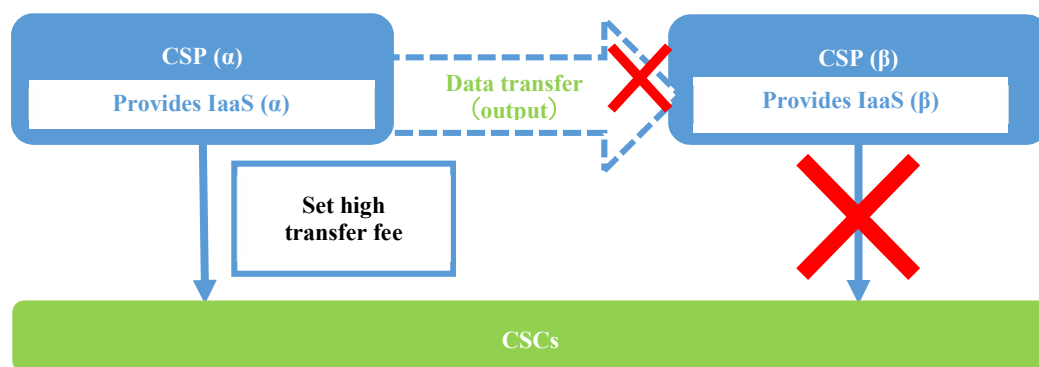
1. Conducts that could have negative effects on the competition in the cloud services market

(1) Setting of a Data Transfer Fee

A. Comment from CSCs and explanations related thereto by CSPs

< Comment from CSCs >

- We have heard that the Data Transfer Fee on CSCs' input or output (transfer) of the data to IaaS via the Internet for use is set free for input, but expensive for output. Thus, as the high Data Transfer Fee of several millions of (or, tens of millions of) yen would be charged if we attempted to extract all the accumulated data in the storage so far, such Data Transfer Fee would be a hurdle to switching the cloud service.



<Explanations by CSPs>

- To support our customers' business development in all regions and countries and their providing better services for their customers, and to provide the highest level of reliability, security, and performance for our customers with minimum cost, we continue to invest in network infrastructures and innovations. Our Data Transfer Fee reflects the costs to provide such network service. As a result of the optimization of our operations, we are voluntarily expanding the free data transfer allowance from our cloud service to the Internet. At present, such free data transfer allowance is applied to most of our customers (based on the number of customers).

No Data Transfer Fee is charged on data transfers into our cloud service. Once the data is mitigated into our service, some customers have never transferred their data outside our service, and others do outside our service millions of times, following each customer's needs. Concerning the excess of the free quota, charging a fee for data transfer outside our service allows CSCs to pay a fairly calculated fee based on its usage, which also allows them to pay the

fee charged only for the service and functions they use.

- As with the case of providing access to storage and computing resources for the customers, data transfer also incurs certain actual costs on CSPs. Therefore, CSPs request their customers to pay the fees for data transfer.

Many CSPs may choose not to charge CSCs for data input so as to support switching from other cloud services, and instead recover the cost of data transfer at the time of the CSC's data output.

As well as in other services, CSPs provide CSCs with information about such costs for data transfer.

- We invest in the development and maintenance of our network infrastructure and charge an egress fee for the transfer of the data output from our cloud services in order to promote the efficient use of cloud resources. We ensure all the data transfer costs are clear and transparent by posting the explanation about network egress fee pricing on our website.
- Our service that connects to our IaaS via the Internet is on a capped pay-as-you-go basis, which means no high transfer fees will be charged. Fees are listed in the Terms of the Service and other documents.

B. Views from the AMA

The terms and conditions of a business transaction shall basically be left to the voluntary judgment between transaction parties. Therefore, setting a high Data Transfer Fee in itself would not necessarily be a problem under the AMA.

However, the high Data Transfer Fee at the time of output can make CSCs difficult to extract data accumulated in the cloud service and port it to other cloud services or on-premises, and consequently, it may make the CSCs difficult to switch to other cloud services or on-premises.

In this circumstance, setting an unfairly high Data Transfer Fee by a CSP influential in the cloud services⁹⁵ market shall be a problem under the AMA, if it causes a foreclosure effect⁹⁶ (i.e., in the case that it will prevent CSCs from using cloud services provided by other CSPs, which may result in the exclusion of other CSPs or the decrease in trade opportunities for such other CSPs)⁹⁷ (Paragraph 14 (interference with a competitor's transactions) of the Designation of Unfair Trade Practices, and/or private monopolization).

Additionally, from the viewpoint of competition policy, even in the case where there is no

⁹⁵ Whether or not an enterprise is influential in a market is in the first instance judged by whether or not it has a share exceeding 20% in the market (Guidelines Concerning Distribution Systems and Business Practices under the Antimonopoly Act, Part 1-3(4)).

⁹⁶ "Cases where vertical non-price restraints have foreclosure effects" refer to cases where a vertical non-price restraint tends to cause a situation that new entrants to the relevant market and the enterprise's existing competitors are excluded and/or opportunities available to them are reduced (for example, a situation where such restraint makes difficult for them to easily acquire alternative trading partners, and causes an increase of their expenses for the conduct of business and/or their discouragement from entering the market or developing new products.). In determining whether a case has foreclosure effect, pro-competitive effects, which may be recognized in such as cases with quality or service improved, are also taken into account. (Guidelines Concerning Distribution Systems and Business Practices under the Antimonopoly Act, Part 1-3(1), (2)a, and (3).)

⁹⁷ In the case where foreclosure effects are recognized in the relevant cloud service market by the CSP's interference with transactions between another CSP and the CSC, unjustness in terms of unfair trade practices can be found. Additionally, even if such effects are not recognized, unjustness may be found due to unfairness of the CSP's conduct as competition means.

problem under the AMA, it is desirable that the Data Transfer Fee at the time of output should be reduced as much as possible, so as not to prevent CSCs from switching the cloud services.

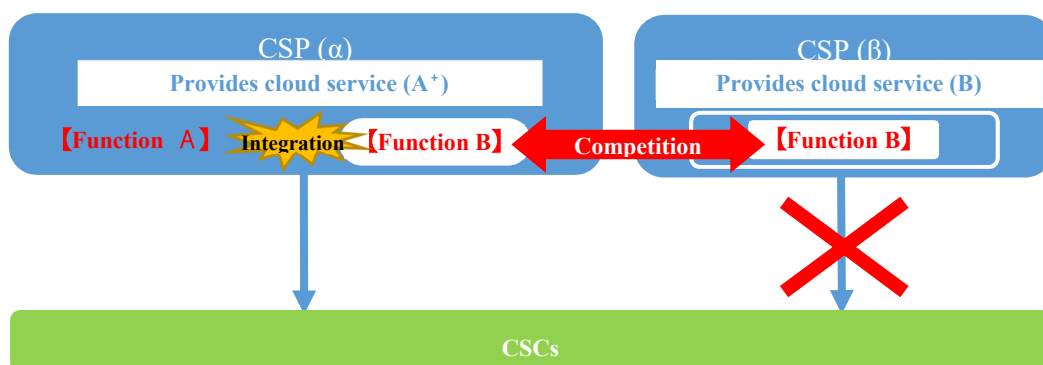
(2) Integration of different functions that are traded independently

A. Comment from CSCs and explanations related thereto by CSPs

<Comment from CSCs>

- In a situation where two different types of functionality, Function (A) and Function (B), are provided in the market as different Cloud Services (A) and (B) respectively, CSP (α) that provides Cloud Service (A) may integrate Function (B) into the Cloud Service (A) and provide it to users as a new Cloud Service (A+): as examples, a SaaS groupware may be integrated with another SaaS' function, or IaaS or PaaS may be combined with a specific SaaS or software.

This makes CSP (β) that provides Cloud Service B difficult to ensure its CSCs.



<Explanations by CSPs>

- Integrating different functions into a single product is a hallmark of technology products. For example, early productivity applications and “spell check” services were separate applications, but later spell check functionality was embedded into the productivity applications. Similar to this example, SaaS is also oriented toward adding functionality that increases the value of the service. The same is applied to the activities using IaaS or PaaS toward innovation.

On the other hand, SaaS services that depend on the infrastructure of a CSP should not be regarded as “combined” services of software and certain hardware or the public cloud. CSPs design the SaaS services from the outset to be dependent on the infrastructure of the datacenter of the said CSPs. These SaaS services are not designed to run “on” IaaS nor to be portable between different cloud services. SaaS services should be regarded as a single service that is managed in a manner including the cloud-based hardware on which the said service is running.

- Our collaboration applications and productivity applications are provided individually as tools available to all customers with our accounts, and also provided as part of our SaaS service, a tool set with additional functionalities that individuals or corporations can purchase.

B. Views from the AMA

Providing a service to the counterparty of a transaction by the combination of multiple functions with adding new values is one of the methods of technological innovation and sales promotion, and such conduct in itself would not necessarily be a problem under the AMA.

However, providing the service for CSCs by CSP(α) with the integration of Functions (A) and (B) may cause situations in the market of Function (B) related services, such that existing competitors' business activities are impeded and/or entry barriers are raised, depending upon CSP(α)'s position in the market of the Function (A) related services and other factors.

Accordingly, in the case CSP(α) is influential in the market of Function (A) related services, its integrating Function (B) into the Cloud Service (A) and providing it to CSCs as a new Cloud Service (A⁺) shall be a problem under the AMA, if such conducts cause foreclosure effect for the Cloud Service (B) market (i.e., in the case that such conducts may result in the exclusion of existing competitors and/or new entrants or the decrease of trade opportunities for such players, such as the situations that such players' cost of business activities will be raised as it will no longer be easy to secure contracted users, or their incentives to enter the market or develop new products will be undermined.). (Paragraph 10 (tie-in sales, etc.) of the Designation of Unfair Trade Practices, and/or private monopolization)⁹⁸.

In addition, the sales method to provide bundling multiple services to CSCs may cause similar effects⁹⁹. Thus, sales of bundling multiple services to CSCs shall be a problem under the AMA, if it causes the same effect as the above-mentioned.

To enable other CSPs and software vendors to provide their services in a fair competitive environment and to allow users to select the services they need from a wide variety of services; it is desirable that each function and service shall be provided as an independent service under reasonable conditions so that users can individually select each function and service that is subject to function integration or bundling.

⁹⁸ Guidelines Concerning Distribution Systems and Business Practices under the Antimonopoly Act, Part 1, Chapter 2-7.

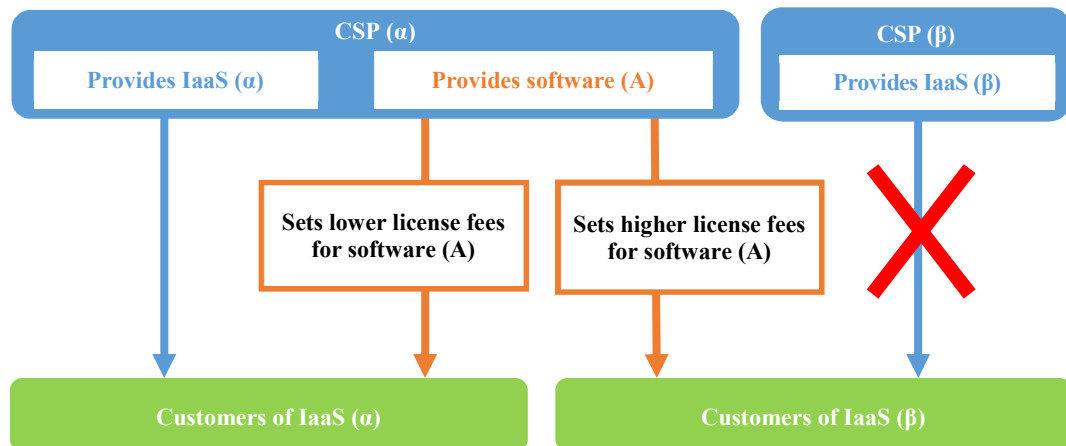
⁹⁹ In the Opinion Exchange Meeting on Cloud Services, it was pointed out that major CSPs are trading with major customers with one lump-sum and fixed price contract covering various services, rather than with multiple contracts each for individual service, and under such circumstances, it becomes difficult for venture enterprises to enter the market even if they develop a single excellent service. It was also pointed out that it is necessary to make CSPs continue selling individual services and functions, from the viewpoint of improving an environment where CSCs can freely select the services that meet their needs.

(3) Self-preferential treatment in the licensing of software used in cloud services

A. Comments from CSCs and explanations related thereto by CSPs

<Comments from CSCs>

- The CSP (α) that provides Software (A) used on the cloud service sets different license fees for the license of Software (A) between (i) for the use on the IaaS (α) provided by CSP (α) itself; and (ii) for the use on the IaaS (β) provided by another CSP (β). The license fee amount for using software (A) on the IaaS (β) is much higher than the one on the IaaS (α) for the same amount of use.
- For the license of Software (B) (e.g. OS which was originally provided for on-premise by CSP (γ) itself), CSP (γ) sets disadvantageous business terms for the case of bringing the Software (B) into the IaaS (δ) of another CSP, compared to the case of bringing it into the IaaS (γ) provided by CSP (γ) itself. Therefore, on CSCs' switching from on-premise to cloud services, in the case the CSC would like to keep using Software (B) on IaaS (δ), the CSC needs to pay a higher license fee compared to using it on IaaS (δ). Additionally, only in the case of using the said Software (B) on IaaS (γ) provided by CSP (γ) itself, CSCs can enjoy an extension of the support period for free, which is charged when using the software on IaaS (δ).



<Explanations by CSPs>

- A customer who has a license for certain software and wishes to operate newly that software on a cloud service may receive an additional discount for the use of the software license from the relevant CSP. For example, we apply a discount rate to our customer who has been paying additional fees for the guarantee of our certain software, when the customer switches its information system for operating said software to our cloud service. As a matter of course, the customer may also purchase services related to such software from other CSPs who have obtained the software license from us, and the CSP other than our company can

offer the same discount to the customer as we do.

Given the various needs for cloud services, there is no software solution that can be considered essential for CSPs to operate cloud service businesses.

- Our license fees are not affected in any way by whether customers use SaaS through our IaaS.
- Our customers also raise a concern about the conduct of other CSPs as indicated herein.

B. Views from the AMA

The terms and conditions of a business transaction shall basically be left to the voluntary judgment between transaction parties. Therefore, different fee amounts for a stand-alone software license on certain functions per each CSC due to the setting of the license fee would not necessarily be a problem in itself under the AMA.

However, a CSP's preferential treatment of CSCs of its IaaS in the licensing of software may have an effect to interfere with transactions between the competitors of the said CSP and the CSCs in the market of IaaS, a service other than the software.

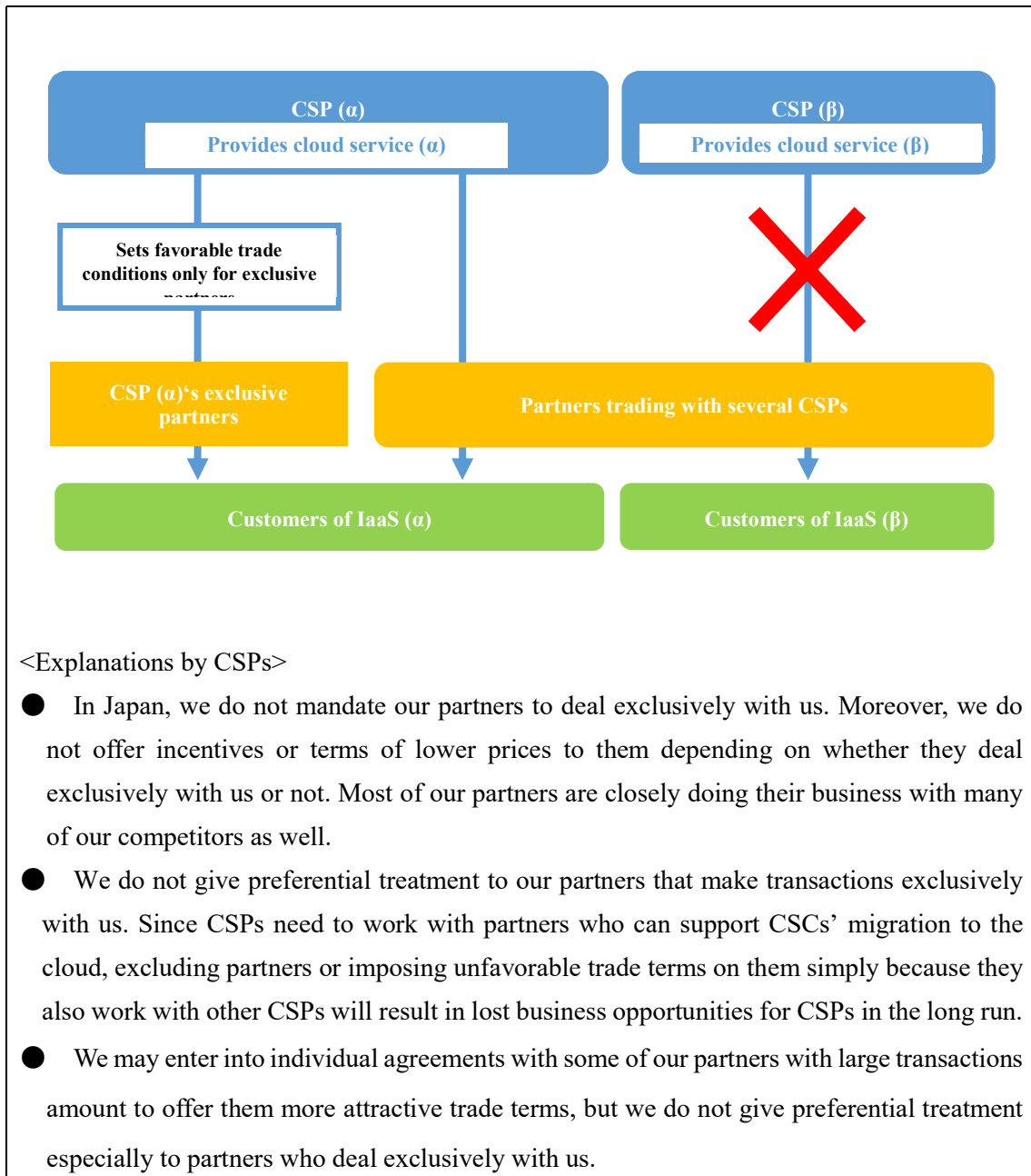
Accordingly, setting an unfairly high software license fee by a CSP influential in the software market only for CSCs of IaaS provided by such CSP's competitors would be a problem under the AMA, if it causes foreclosure effect (i.e., in the case that it will prevent such CSCs from using cloud services provided by other CSPs, which may result in the exclusion of such other CSPs or the decrease in trade opportunities for such other CSPs). (Paragraph 3 (discriminatory consideration), Paragraph 4 (discriminatory treatment on trade terms, etc.), and/or Paragraph 14 (interference with a competitor's transaction) of the Designation of Unfair Trade Practices, and/or private monopolization).

(4) Preferential treatment for exclusive partners

A. Comment from CSCs and explanations related thereto by CSPs

<Comment from CSCs>

- Our company is currently a partner of several CSPs and has concerns that any of such CSPs could give preferential treatment to the partners who deal solely with the CSP. For example, we are concerned that a CSP might make its major customers retained through us switch its partner in charge to the CSP's exclusive partner, by arbitrarily giving incentives or setting lower invoice prices to the exclusive partner.



B. Views from the AMA

A CSP's setting different invoice prices or trade terms with its partners depending on whether the partners handle only the said CSP's cloud service or they also handle other CSPs' cloud services may function as a restriction on the handling of services of other CSPs in competition with such CSP since such action creates an incentive for the partner to become effectively the CSP's exclusive partner. Additionally, a CSP's requesting its partners to achieve a certain sales volume (sales amount) close to the limit of each partner's capacity may function as a restriction on the handling of services of other CSPs.

Offering favorable purchase prices or trade terms only to its partners who do not handle other CSPs' services or requesting sales volumes (sales amount) close to the limit of each partner's handling capacity by a CSP influential in the market would be a problem under the AMA if it causes

foreclosure effect (i.e., in the case that it will prevent partners from handling other CSP's services, which may result in the difficulties for other CSPs to retain partners and conduct its business, and the exclusion of such other CSPs or the decrease in trade opportunities for such other CSPs). (Paragraph 3 (discriminatory consideration), Paragraph 4 (discriminatory treatment on trade terms, etc.), Paragraph 11 (trading on exclusive terms), and/or Paragraph 12 (trading on restrictive terms) of the Designation of Unfair Trade Practices, and/or private monopolization).

Introduction support providers who are familiar with cloud services of multiple providers are important in facilitating CSCs' switching, as verifying objectively the difficulties of CSC's switching or proposing to CSCs necessary technologies for their switching. Since the enclosure of introduction support providers by a CSP can have the effect of making CSC's switching difficult, in the views of the competition policy, it is desirable that trade terms making it advantageous for introduction support providers to trade only with that CSP shall be minimized as much as possible, even if that would not be a problem under the AMA.

2. Conducts that could have negative effects on the competition in markets other than the cloud services market.

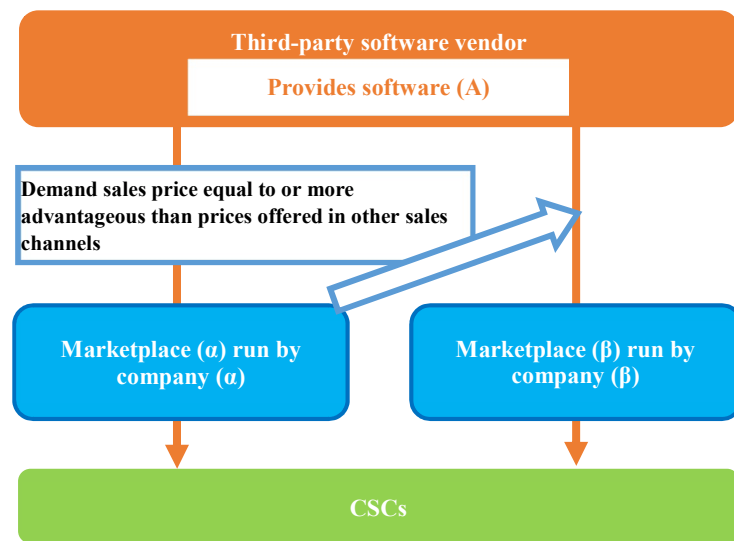
(1) Parity clauses on sellers in the marketplace

A. Comment from CSCs and explanations related thereto by CSPs

<Comment from CSCs>

- CSP (α) substantially imposes parity clauses (the terms to require equal to or more favorable conditions compared to those for other commercial channels) for sales price on third-party software vendors to list its software in the Marketplace (α) operated by the CSP (α), by setting a condition as one of the trade terms with them for such listing that the CSP can immediately remove the third-party vendor's software from the Marketplace (α) when the sales price of the software in the Marketplace (α) is set higher than that to users in any other commercial channel.

As the sales price set in the Marketplace (α) includes sales commission paid to the Marketplace (α), in the case where a third-party software vendor that lists software in the Marketplace (α) sells said software in another Marketplace (β) with lower sales commission, to match the sales price at the Marketplace (β) with the one at the Marketplace (α), the vendor is required to set the price for the software itself at the Marketplace (β) higher than the one at the Marketplace (α).



<Explanations by CSPs>

- We provide the marketplace where our customers can search, purchase, deploy and manage software run on our cloud service. The purpose of the parity clause in our terms and conditions was to improve the customer experience by ensuring that the third-party sellers would not discriminate against our customers by setting their selling prices on the marketplace higher than those offered on other sales channels. Our company, however, has revised the terms and conditions and now does not set parity clauses, nor does it substantially impose parity clauses on sellers for their selling prices.
- It is not common practice to prohibit setting lower selling prices at other platforms as a condition of using a marketplace, and our marketplace contracts do not require any such commitment.

Unlike marketplaces for mobile devices (app store), marketplaces for cloud services have relatively low transaction volumes and are not the only way for software vendors to offer their solutions to customers, so it is of low importance to make use of the marketplace to ensure competitiveness in sales of the solutions.
- We do not remove listings of software based on their listing prices compared to those at other platforms or sales channels.
- We do not impose such conditions on third-party software vendors.

B. Views from the AMA

In the case a CSP operating a marketplace sets parity clauses for prices or product lineups on software vendors using that marketplace when a software vendor sells software in a commercial channel with a lower sales commission than the Marketplace (α), the software vendor would have to increase the wholesale price of the software itself at least by the difference in sales commissions. As a result, the software vendor would be limited in their ability to offer discounts and expand their

product lineups in sales outside of the marketplace (α).

In addition, other distributors dealing with the same software will not be able to differentiate themselves in terms of selling prices, etc. in their own commercial channel, and it may result in situations such that: (i) new entry into the software distribution business would be impeded because of low commissions; or (ii) incentives for competition over the variety of product lineups would be decreased.

Thus, depending upon a CSP's position in the market of software distribution, etc., such CSP's imposing parity clauses on software vendors listing their software in the marketplace operated by the CSP (including cases where the situation is evaluated to be in the same reality as imposing parity clauses) may impede competitions among software vendors and/or software distributors, and prevent CSCs from enjoying the benefits of competition over price and product lineups enhancement.

Setting parity clauses solitarily by a business influential in the software distribution market or in parallel by multiple businesses would be a problem under the AMA if it causes a price maintenance effect^[100] or foreclosure effect. (Paragraph 12 (trading on restrictive terms) of the Designation of Unfair Trade Practices, and/or private monopolization).

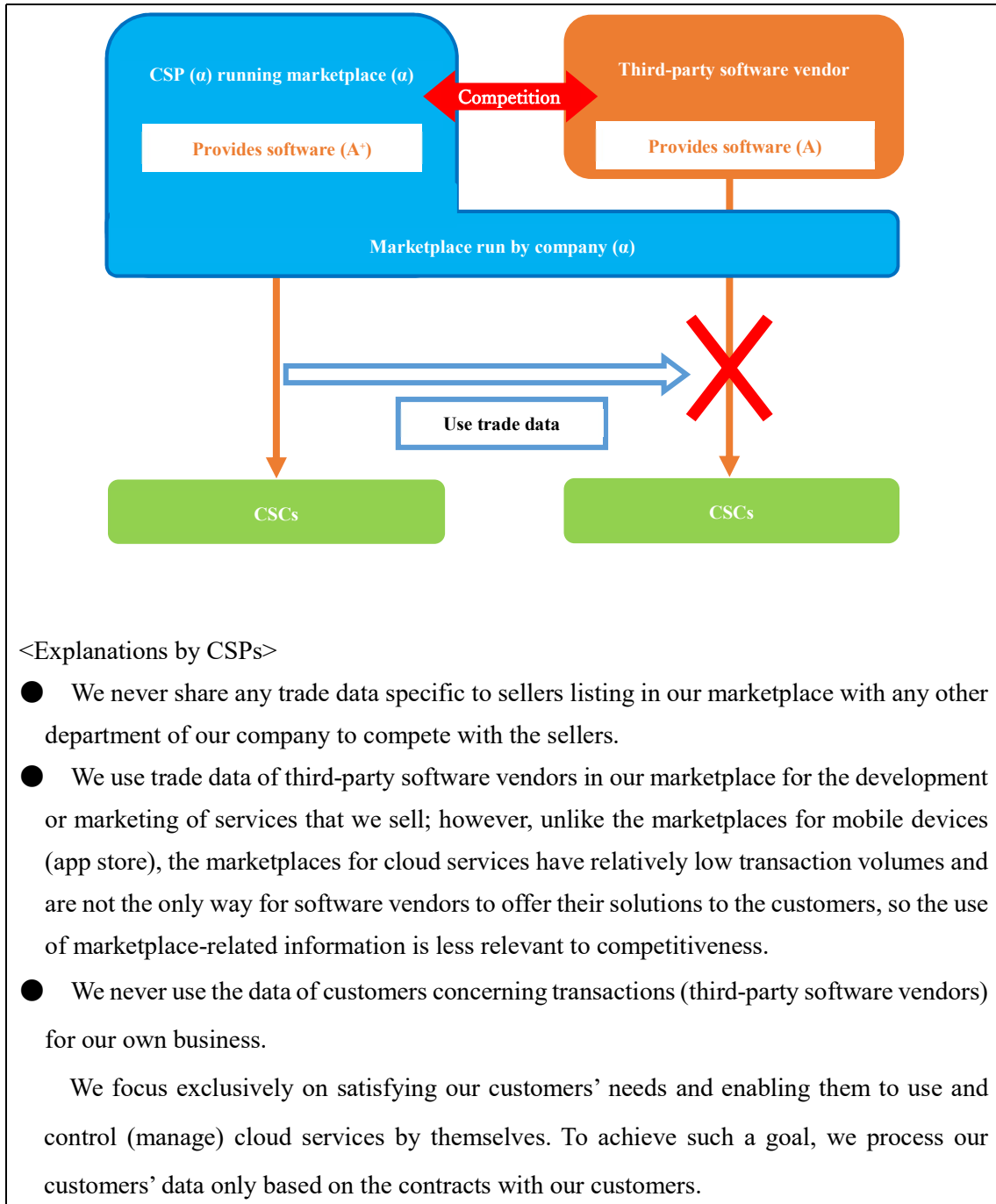
(2) Marketing using data on sales and purchases made by third-party sellers in the marketplace

A. Comment from CSCs and explanations related thereto by CSPs

<Comment from CSCs>

- While CSPs may operate marketplaces or other platforms, we suspect that they can use their position to leverage trade data such as sales amount, sales prices, or customer information from third-party software vendors for developing and marketing such CSP's own services with advantage.

^[100] "Cases where vertical non-price restraints have price maintenance effects" refer to cases where a vertical non-price restraint tends to impede competition among a counterparty to the restraint and its competitors and enable the counterparty to reasonably freely control its prices in its own discretion and thus maintain or raise its prices for a product or products in question. (Guidelines Concerning Distribution Systems and Business Practices under the Antimonopoly Act, Part 1-3(2) b.).



B. Views from the AMA

CSPs offer various functions on their own cloud services by providing managed services, etc., and may compete with third-party software vendors that sell software for such CSPs' cloud services on the marketplace. As operators and managers of the marketplace, the CSPs technically can obtain sales information, customer information, and other transaction data related to the transactions made by competing third-party software vendors on the marketplaces.

In such case, it would be a problem under the AMA that a CSP uses the sales information, customer information, or other transaction data of a competing third-party software vendor obtained by taking advantage of its position as the marketplace operator to develop or market its

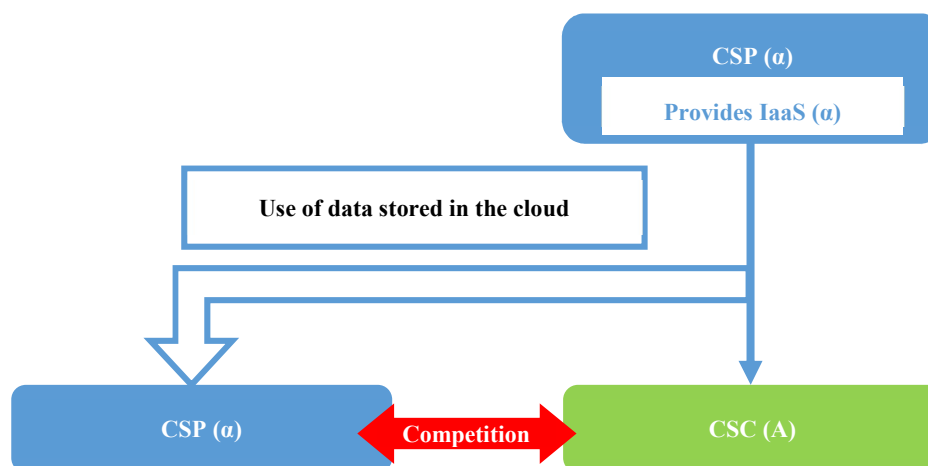
own services to its own advantage, and unjustly interferes with transactions between the competing third-party software vendor and its counterparty (Paragraph 14 (interference with a competitor's transactions) of the Designation of Unfair Trade Practices, and/or private monopolization).

(3) Handling of CSCs' data in connection with the use of cloud services

A. Comment from CSCs and explanations related thereto by CSPs

<Comment from CSCs>

- In the case a CSP is engaged in a business other than the cloud service and that business competes with the business of a CSC of the CSP, we have a concern that the CSP may access data of confidential business information stored by the CSCs on the cloud service and use it for its own business.



<Explanations by CSPs>

- We have contractually agreed not to use customer contents (i.e. data stored by customers on our cloud services) for competing with customers' products or services.

We provide our customers with tools and advanced encryption services that can be used to protect the customers' content on the cloud service. Customers can also use the encryption services provided by third parties when using our services. Encrypted contents on the cloud service are unusable unless an appropriate decryption key is applied.

Unless requested by the customer, or necessary to prevent fraud or abuse or for legal compliance, we prohibit our employees from remotely accessing the customers' data for any purpose, even for service maintenance. Our systems are designed to prevent such conduct.

- Our cloud service allows access to our customers' data only in very limited situations, such as in the event of a security issue or violation.

CSPs contractually clarify that the data on the cloud services are owned by the customer,

not the CSPs. Though CSPs technically may view their customers' data for data center management purposes, their practice is not to do so.

- We process our customers' data based on the contract with the customers and do not use confidential data related to customers' operations, transactions, etc. for our own business.

While we may process the customers' data for operation purposes, the administrator of the customer's data is the said customer. We never access customer data without a legitimate need to do so, except in rare cases when necessary to support the customer's use of the service and then only with the customer's permission. Our customers think that they should have both the highest level of security and the highest level of control over the data stored in the cloud service. Therefore, we provide our customers with resources designed to help them understand what information we collect, why we collect it, and how they can manage it. Additionally, we have taken the following additional steps to prevent many and unspecified our employees from viewing customer data: (i) restricting and monitoring the conduct of the employees who are authorized administrative access to our company's resources; (ii) establishing and maintaining a formal process for authorizing and revoking employees access to such resources; (iii) managing and recording approvals by workflow tool, and enforcing employees access rights in all the relevant layers of the system; and (iv) actively monitoring access pattern and always investigating abnormal events by the deployment of a dedicated security team. Furthermore, as part of our commitment to transparency and security, customers may review and audit logs of access to their data.

- To address the threat of inappropriate access by insiders, we comply with a control standard for the audit of internal controls over information systems in financial reporting, "Service Organization Controls (SOC)". We also comply with the evaluation standards including the official standard for information security management for cloud services (ISO27017) to deal with insider access. Our compliance with these standards has been evaluated by an independent third-party review organization.

B. Views from the AMA

CSPs and their group companies may be conducting businesses other than cloud services, and depending on the nature of such business, they may compete with CSCs of their cloud services. It may be technically possible for a CSP to access the data that such competing CSCs stored on the CSP's cloud service.

In such a case, it would be a problem under the AMA^[101] that a CSP uses the confidential information or other data of a CSC accessed by taking advantage of its position as the CSP to take advantage of the business activities of another business that competes with that CSC, and unjustly interferes with transactions between the competing CSC and its counterparty. (Paragraph 14 (interference with a competitor's transactions) of the Designation of Unfair Trade Practices).

^[101] Besides, CSPs' usage of CSCs' confidential information may primarily cause a problem under the contract and also would violate other laws and regulations than the AMA.

3. Conducts that may cause disadvantages to CSCs

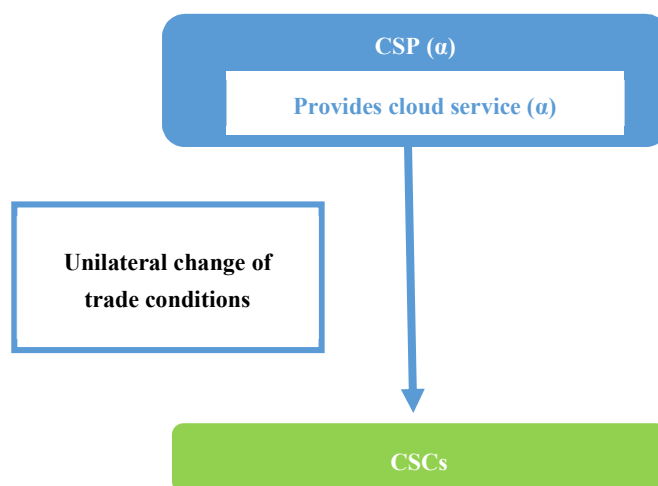
(1) Trade between CSP and CSCs

A. Comment from CSCs and explanations related thereto by CSPs

<Comment from CSCs>

- The fees and contents of cloud services (including SaaS) are sometimes changed unilaterally. If prices are raised at the time that our cloud service usage amount has increased and data has been accumulated, we can do nothing. For example, the price of groupware was raised, but it was difficult to extract data from the groupware and once we had started using it, it was not easy to change the service, so, we had no choice but to accept the price increase.

In addition, CSPs can terminate their services without prior notice. In the case some of the services used are terminated, CSCs are responsible to migrate to other services and continue their business operation (at each CSC's expense).



<Explanations by CSPs>

- We notify our customers in case where such situations arise (same as the first item of Chapter 4-2(2) A. <Explanations by CSPs>). For example, we make at least 90 days prior notice to our customers on changes that cause adverse effects to them in our service level agreement. Additionally, we make at least 30 days prior notice to our customers if we increase rates for existing services or introduce new fee rates.
- The need to support software solutions is not a new phenomenon unique to cloud services; for example, support must continue even for OS for on-premise. Software vendors have conventionally addressed this issue by general support policy to provide certainty to customers, and such an approach is also common for CSPs. Similarly, CSPs have reasonable restrictions on the termination of contracts with their customers. For example, our cloud

services contract limits the cases we may terminate or restrict the contract with our customer, and stipulates that we should make 30 days prior notice on suspension of the service due to the customer's default on payment.

The issue of potential price increases is not also unique to cloud services. We believe that customers developing workloads (solutions on the cloud services) that can be easily migrated to other cloud services would not take this issue as a significant concern. On the other hand, for customers who plan to develop large workloads with unique dependencies on cloud services, negotiation for a price guarantee may be the best option, and for some, a long-term contract may be the best option.

Nonetheless, even without such a personalized price guarantee, there are limits for CSPs to raise their general prices. This is because cloud services are in a relatively early stage of adoption, and the CSPs are competing with each other to win new workloads from existing customers and acquire new customers. CSP's strategies to raise prices for customers who the CSP believes would not switch to new cloud services in the short term are likely to backfire. In the case where CSPs are not playing fair, it is highly unlikely that they will be able to obtain customers' future workloads, even if the customers do not switch existing workloads.

- We may make business decisions that lead to the need to change our services and/or contract terms as technology evolves, in order to continuously make improvements and provide the best possible user experience in the new and rapidly developing cloud services sector. However, our customers always receive prior notice on changes to products or contracts which may affect their use of the cloud services. Our customers are also given advance notice and the opportunity to discontinue the use of the service, in case of changes to the contract terms.

B. Views from the AMA

The terms and conditions of a business transaction shall basically be left to the voluntary judgment between transaction parties.

However, unilaterally changing the trade terms with CSCs, such as one-sided price increases for services, by a CSP in a superior bargaining position over the CSCs, would be a problem under the AMA, if it unjustly causes a disadvantage to the CSCs in light of normal business practices. (abuse of a superior bargaining position).

A CSP has a superior bargaining position over a CSC as the counterparty of the transaction in cases such as where the CSC has no choice but to accept the CSP's request significantly disadvantageous to the CSC because the CSC's difficulty in continuing trade with the CSP would be a major obstacle to its business operation. To make such a judgment, the following factors shall be comprehensively considered: (i) the degree of CSC's business transactions' dependence on the

CSP; (ii) the CSP's market position¹⁰²; (iii) the possibility for the CSC to change CSP; and (iv) other specific facts that indicate the necessity to trade with the CSP. Especially, in transactions between CSPs and CSCs, switching may be difficult for the reasons such as that costs for switching or learning innovative technologies and knowledge on the new services would be required, as mentioned in Chapter 3-2(2). In the cases, as the foregoing, a CSC has difficulty switching services immediately to other CSPs' ones, and is highly required to continue the transaction with the CSP that the CSC is currently dealing with, it is more likely to be judged that the said CSP is in the superior bargaining position over the CSC as its customer.

Whether a CSP's conduct unjustly causes a disadvantage to the CSCs in light of normal business practices shall be determined for each case with consideration of the multiple factors such as (i) the nature of the disadvantages to the CSCs due to changes in the contracts or trade terms; (ii) whether the changes have reasonable reasons or not; (iii) the period from the notification to the implementation both on the changes in the contracts or trade terms; (iv) whether the CSCs are forced to agree with the changes in the contracts in order to continue the use of cloud services despite the CSCs have no benefit to agree; and (v) the number of the CSCs who have no choice but to accept the disadvantages associated with the de facto coercing.

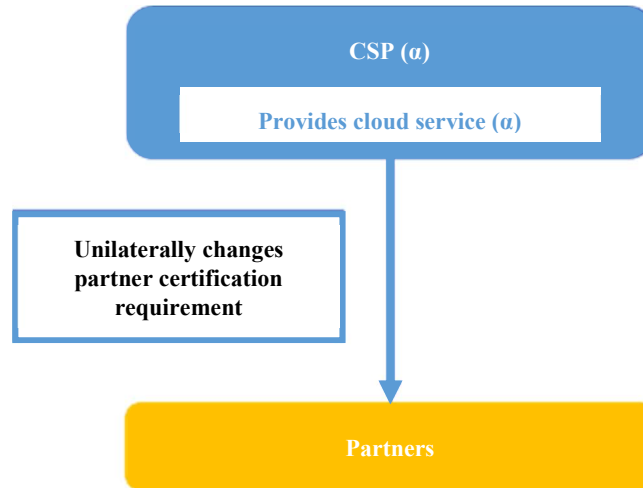
(2) Trade between CSP and partners

A. Comment from CSCs and explanations related thereto by CSPs

<Comment from CSCs>

- To become CSP's partner, a business is required to meet the certification requirements stipulated by the CSP, such as sales amount, the number of qualified persons, and the number of adoption cases published. These certification requirements can be changed unilaterally by the CSP, and become more stringent each time they are renewed. In the case where the certification requirements are changed, we, a partner, may be forced to take action to continue our partnership agreement with the CSP.

¹⁰² In the evaluation of the market position, the scale of the market share and its rank order shall be considered. As described in Chapter 3-3(1), in the case where the degree of market concentration continues to increase in the future, it is more likely to be judged that the CSPs with top market share have a superior position over the CSCs as their customers.



<Explanations by CSPs>

- Since we had established partner ranking and its requirements, we have updated our partner rank requirements once before, in order to improve our CSCs' customer experiences by making our partners improve their knowledge, experience, and outcomes for clients using our services, as well as enabling the CSCs to find partners of high quality. Upon the update of the partner rank requirements, we gave notice more than 12 months before the update.
- CSPs need to work with partners who can help CSCs' migration to cloud services. CSPs alone cannot work with all the CSCs who want to migrate to the cloud services. Accordingly, offering terms unbeneficial to the partners does not make sense for the CSP as well. Nonetheless, it is extremely material to secure the partners' abilities at a basic level. It is also important for the CSP not only to check that the partners have sufficient knowledge of the products and services they sell but also to ensure that they robustly take preventive measures to avoid issues such as fraud or other potentially illegal activities. Likewise, while it is important to have a large-scale partner network, supporting the partners is costly. Therefore, it is also important for the partners to sell enough products and services to at least cover the cost and administrative burden of our support for the partners. Finally, concerning the changes to the partner program, the CSPs have the interest to ensure that the partner program remains stable and attractive. Needless to say, necessary updates shall be made as needed. The update includes new certification requirements on the launch of new products or services, new procedures to meet changing legal requirements, or other improvements to make the partner program more successful and more efficient.
- We aim at the growth of our cloud services business through our partners including resellers that provide additional services and expertise to the customers. Therefore, we have no reason nor motive to excessively control existing or prospective partners. However, our certification requirements for the partners may change depending on the changes in customers' needs (request for further enhancement of security and safety measures, etc.) and

development and improvement in the cloud services technologies that require more specialized knowledge.

- For certain types of partners such as reseller partners, there may be sales or certification requirements that must be met under the partnership agreement, but no changes that would make it more difficult to maintain partnership agreement have been made.

B. Views from the AMA

As with the above-mentioned (1) B, the terms and conditions of a business transaction shall basically be left to the voluntary judgment between transaction parties.

Therefore, CSPs' setting or changing the certification requirements for becoming a partner on renewal of a partnership agreement with an existing partner or change of the terms and conditions in a partnership agreement in itself would not necessarily be a problem under the AMA.

However, such unilaterally setting or changing the trade terms with partners by a CSP in a superior bargaining position over the partners would be a problem under the AMA, if it unjustly causes a disadvantage to the partners in light of normal business practices. (abuse of a superior bargaining position).

A CSP has a superior bargaining position over its partner as the counterparty of the transaction in cases such as where the partner has no choice but to accept the CSP's request significantly disadvantageous to the partner because the partner's difficulty in continuing trade with the CSP would be a major obstacle to its business operation. To make such a judgment, the following factors shall be comprehensively considered: (i) the degree of the partner's business transactions dependence on the CSP; (ii) the CSP's market position; (iii) the possibility for the partner to change CSP to be dealt with; and (iv) other specific facts that indicate the necessity to trade with the CSP. With doing business with a CSP, the CSP's partners may obtain certifications set by the CSP, or enhance technical knowledge specific to the CSP's cloud services. In the cases a partner has made a large investment related to a CSP as in the foregoing, the partner will become highly required to continue the transaction with the CSP, then it is more likely to be judged that the said CSP is in the superior bargaining position over the partner as the counterparty.

Whether a CSP's conduct unjustly causes disadvantage to CSP's partners in light of normal business practices shall be determined for each case with consideration of the multiple factors such as (i) the nature of the disadvantages to the partners due to changes in the contracts or trade terms; (ii) whether the changes have reasonable reasons or not; (iii) the period from the notification to the implementation both on the changes in the contracts or trade terms; (iv) whether the partners are forced to agree with the changes in the contracts in order to continue to be the CSP's partners despite the partners have no benefit to agree; and (v) the number of the partners who have no choice but to accept the disadvantages associated with the de facto coercing.

Chapter 6. Future Commitment of the JFTC

In this report, we have clarified the views from the AMA and the competition policy, as well as the actual transaction and competition conditions in the cloud services sector, in light of the fact that, with the digitalization of the economy, the use of cloud services has been enhanced as a foundation to support the business activities of many businesses.

Needless to say, the innovativeness of the cloud services has been created by the CSPs' efforts such as timely investment in technology development, human resource, equipment, and so on, and fostering of the corporate culture that enables them. At present, it is supposed that the market of cloud services has been expanding, and CSPs have been competing with each other at a certain level for prices and quality, mainly to acquire new customers.

On the other hand, in light of the changes in the market share stipulated in Chapter 2-2, characteristics of the market described in Chapter 3-2, and others, in the cloud services market, large-scale cloud service businesses have already been developed, the degree of market concentration is likely to keep increasing around the Three CSPs and others who are deploying various services utilizing information and communication technologies and data as the digital platform businesses, and the market structure is likely to change to non-competitive as the market matures. There are concerns about the adverse effects associated therewith for the future.

From the viewpoint of preventing the adverse effects of the market share concentration, the JFTC expects the CSPs and the CSCs to make voluntary efforts indicated in Chapter 4-3, in order to minimize technical, contractual, and economical constraints that would prevent CSCs from migrating into other CSPs' cloud services or on-premises, achieving multi or hybrid cloud computing, or using third-party software together, and to allow CSCs independent and rational choices of services with eliminating information asymmetry from the perspective of ensuring fairness and transparency in transactions. The JFTC also hopes that these efforts will continue to promote fair and free competition in the cloud service sector.

In particular, since the CSCs are considered to play a significant role in ensuring continued effective competition in the cloud services market, the JFTC will actively inform not only CSPs but also CSCs of the detail of this report, including the recommended actions to be taken by the CSCs that are summarized in this report.

Furthermore, as mentioned above in Chapters 4-1(2) and 2(3), in the cloud services sector, concerned government ministries and agencies are advancing various efforts, including those to lead the promotion of multi-cloud and hybrid cloud, those to avoid vendor lock-in in procurement, and those to secure appropriate information disclosure and security. Those efforts may relate to the prevention of the adverse effects concerned due to market share concentration and securement of fairness and transparency, which this report pointed out. The JFTC will actively disseminate this report to concerned government ministries and agencies who are making relevant efforts, and also ensure a competitive environment in the cloud services sector through collaborations with such ministries and agencies as required.

In addition, the JFTC will continue to closely monitor the conditions of the competitors in the cloud services sector, which are expected to change significantly in the future, and will continue to take strict and appropriate measures on specific cases that raise issues under the AMA, including the competition-restricting

conducts which this report pointed out. Especially, it is expected that the range of services provided as the cloud services will expand in the future, and, by such CSP's expansion of the services and functions, there may be cases CSPs compete with other business operators in such expanded service areas. Therefore, we will also closely monitor the conditions of the competitors in such business areas.

Finally, competition authorities in various countries and regions overseas are also highly interested in the business activities of the CSPs which are operating globally. The JFTC will continue to exchange views with other competition authorities in each country and region at various levels, collaborate with them by utilizing the International Competition Network (ICN), the Organization for Economic Co-operation and Development (OECD), and other fora, and work to improve the competitive environment.

Glossary

A

API (Application Programming Interface)

Interface that connects between applications and software. It defines the form to call the functions that programs have from outside and use them and is used for the purpose of data linkage and sharing between applications and software. Integrating the information and functions between information systems by making use of this system refers to “API integration.”

Application

Software that runs on OS for a certain purpose. There are many kinds by purpose, including spreadsheet software, database management system and image editor etc.

Availability

A degree and ability by which a system can continue to operate without system shutdown due to system failure etc.

C

Container

Virtualization technology that can construct plural virtualized application execution environments on one OS on the server. Through system construction in virtualization environment of container type, (as long as the same container base is introduced), switching to another server environment becomes easier.

Credit

The right to be able to apply to the payment of the cloud services of specific CSPs, in the context of cloud services.

CRM (Customer Relationship Management)

Applications that manage information related to customers (customer information, track record of sales and purchases of products and services to customers and provision of maintenance services, and the response status to inquiries and complaints from customers, etc.).

D

Datacenter

Facility and building where server and network-related devices are intensively installed and operated.

G

Groupware

A communication system whose purpose is to share information within businesses by making use of the network, and its main functions include e-mail, electric bulletin board, document sharing library, business chat, scheduler, workflow, and it is the application that provides these to CSCs in a complex manner.

H

Hosting

A service that rents to customers all or a part of the server and the resources of network devices, etc. possessed by the providers, in addition to the racks, space, and power sources, etc. in the data center, and also provides operation of system monitoring etc. It is also called a rental server.

Hybrid Cloud

A system and service or its usage environment used by linking public cloud and private cloud, and on-premise in accordance with the requirements.

I

IaaS (Infrastructure as a Service)

A service that provides infrastructure resources via network, including server, storage and network.

Infrastructure

Equipment including server and storage as the foundation in IT services.

L

Lock-in

A condition in which it is difficult for users to switch to the same type of service from a different provider due to reasons such as the use of vendor-specific technology or a complex system built on the provider's service.

M

Middleware

One of the elements that configure computer, software that is arranged between OS and application and assists the functions of OS and application.

Multi-cloud

To use a combination of cloud services of different CSPs.

O

On-premise

An information system in which a business possesses the necessary equipment, etc. as IT assets in its own company (or in a subsidiary, etc. responsible for the information system), and establishes and operates the system in its own company, etc.

Open source (open source software)

A software whose source code (which corresponds to a blueprint of program) is available for free and can be modified, reused, and redistributed by anyone.

P

PaaS (Platform as a Service)

A service to provide middleware resource, such as OS and a platform to operate applications on the OS, in addition to an infrastructure resource, via network.

Partner

An introduction support provider that provides system integration and consulting, etc. using the cloud services of the said CSP under the partner system established by a CSP (the system permits resale, etc. of the cloud service provider's services and assigns a type and rank according to the cloud service provider's qualification status, sales performance, etc.).

Private Cloud

In contrast with public cloud, a cloud service in which resources are secured exclusively for specific CSCs, and established and operated. There are two types of cloud services: “hosted type (use type)”, in which the resources of a CSP are used via network and “on-premise type (possession type)” that establishes and operated the cloud environment exclusively for CSCs to the datacenter, etc. of CSCs themselves.

Public Cloud

A cloud service provided by CSPs through network such as the Internet etc. to an unspecified large number of CSCs including businesses and individuals.

Q

Quantum computing

The computing that has improved arithmetic capacity by using the laws of quantum mechanics.

R

Redundancy

To take countermeasures in order to be able to continue operation even if a problem occurs in the system or the server: it is common to take backup of data and operate on plural devices.

Region

The place where the cloud services to be used are physically located: for example, in Japan, it is described as “Eastern Japan” or “Tokyo” in Japan.

Resource

A collective term of the resources that are required to run a system, such as network, server, storage and application, etc.

S

SaaS (Software as a Service)

A service to provide applications that operate on the cloud infrastructure via network.

Server

Software that provides the services to CSCs via network and a computer operating such software.

SIer

A company and an individual that takes on establishment and operation of systems. It is an abbreviation of a system integrator.

SLA (Service Level Agreement)

An agreement that specifies the responsible area of CSPs, the standard of service availability and the upper limit period for suspension of use.

Storage

A service that allows users to store and share files, or the location where they are stored.

V

Virtualization

A mechanism that uses virtualization software to abstract resources (CPU, memory, storage) such as physical servers and to create a pseudo-computer environment in which operating systems and applications can be run independently. For example, if a server is virtualized, the resources of one physical server can be divided

into plural resources and plural server environments can be constructed, and the resources of plural physical servers can be integrated into one server environment.

W

Workflow

A pattern of business activities and a series of flows in a certain business or activity.

Workload

An aggregation of solutions and software on the cloud in the context of cloud services.