The Committee on AI Economy Report Outline

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The Committee on AI Economy
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The Committee on AI Economy Report Outline: Chapters

Chapter 1: AI Economy Directions (Achieving the Inclusive AI Economic Society)

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Chapter 5: Basic Policies and Strategies for the AI Economy

The Committee on AI Economy Report Outline: Chapter 1 (1/2)

Chapter 1: Directions of the AI Economy (Achieving the Inclusive AI Economic Society)

(1) The world's leading ICT corporations widely provide AI frameworks and multiple trained models via open source and cloud platforms or APIs. Various entities use these frameworks and models to develop and utilize AI according to their own abilities and for a variety of purposes. AI is characterized by its potential for open and inclusive applications.

(2) To develop and use AI, training data is important. Since AI can use data to run effective analyses, the volume of data is important. However, the condition of the data is also important since it is sometimes necessary to process the data prior to use in training or performance. Depending on the applications, it is also important to consider what kind of data to collect, or how to combine the collected data with on-site (domain) expertise. To broadly demonstrate the value of the data, it is also important to be associated with a public API.

※ In this document, data indicates digitized data, or data in a state that can easily be digitized.

※ Generally, the value of data is based on the four V's (volume, variety, velocity, veracity), but data granularity also has an impact.

※ In the case of Banking as a Service (BaaS) in Europe, including Open Banking in the UK, the use of public APIs has accelerated open innovation through competition.

(3) By facilitating the open and inclusive application of AI in a fair and competitive environment, individuals, corporations and various other entities, based on their own ideas and decisions, can proactively participate in social and economic activities in creative ways by utilizing AI and data. We should aim to realize an Inclusive Economic Society that shares the wealth of society as a whole through increased leisure time, an enhanced sense of fulfilment and distribution according to individual contribution.

(4) In the inclusive AI economic society, user corporations do not necessarily have to depend on ICT corporations to develop AI. Proficient corporations could develop their own AI using open frameworks, or explore the use of AI services through external clouds. SMEs could also use AI to improve productivity, which is a known challenge. It is also important to aim for the sustainable development of local economies by promoting geographically balanced AI social implementation, and the activities of local AI startups.

The Committee on AI Economy Report Outline: Chapter 1 (2/2)

Chapter 1: Directions of the AI Economy (Achieving the Inclusive AI Economic Society) (cont.)

(5) In addition to Graphics Processing Units (GPU)※1 and continued improvements in calculation capacity with the development of Tensor Processing Units (TPU) ※2 at Google, frameworks that are compatible with supercomputers (e.g. Mesh-TensorFlow※3) are now becoming available. This data infrastructure is significant in terms of competitive strategies and will become an important infrastructure in the inclusive AI economic society.

※1 Primarily an Arithmetic Logic Unit (ALU) specialized in real-time image processing. Also excels at arithmetic processing required for deep learning.

※2 ALU specialized in machine learning. Facilitates high-speed calculations at low power consumption.

※3 Framework of supercomputers based on TensorFlow. Facilitates construction of huge machine learning models through distributed processing.

The Committee on AI Economy Report Outline: Chapter 2 (1/2)

Chapter 2: AI Investment for Sustainable Economic Growth and Improved Productivity

(1) Relationship Between AI Investment and ICT Investment

(1) AI is a part of ICT. For now at least, AI is not measured independently, but included in ICT investment.
(2) However, given that AI uses data, it is important to focus on the effects of data retention and use.
(3) Given that AI is supported by vast computing capacity, it is important to focus investment not only on software, but also hardware.

(2) AI/ICT Investment Effect and Challenges for Japan

(1) On the whole, past ICT investment in Japan has been insufficient in quantitative terms with limited effect on productivity improvement.
(2) By industry, the abovementioned issues are obvious in the service industry. There are also indications of particular challenges for SMEs.
(3) In Japan, outsourced development by ICT corporations (SIers (Systems Integrators)) is the mainstream for ICT investment, rather than internal development by user corporations as is the case overseas. ICT investment is effective when accompanied by organizational reform and other complementary investment. However, in Japan, the initiatives and human resources for development are often found at the ICT corporation (SIers), so it is possible that the kind of complementary investment (intangible asset investment) required by corporations and other organizations for strategic decision-making has been insufficient.
(4) In Japan, there is a certain economic rationality behind the focus on outsourced development by ICT companies (SIers), but it is possible that corporations and industries that have shifted too far that way are unable to make effective AI/ICT investments because they maintain legacy systems, lack AI/ICT human resources, and lack coordination with the abovementioned complementary investments.
(5) Given that the AI/ICT role will shift from optimization to value creation; that it will be necessary to continue to improve models based on continuous AI learning; and that system update cycles will shorten, it will also be important for user corporations to develop and use their own AI after evaluating both technologies and ROI.

The Committee on AI Economy Report Outline: Chapter 2 (2/2)

Chapter 2: AI Investment for Sustainable Economic Growth and Improved Productivity (cont.)

(3) AI Investment and the Outlook for Economic Growth and Productivity

(1) Some consulting companies (Accenture, McKinsey etc.) are making specific predictions about AI investment and its contribution to economic growth and productivity improvement.

※ Ultimately, we also plan to reflect the results of the corporate questionnaire surveys undertaken for this Committee.

(2) On the other hand, it is necessary to keep an eye on the potential for accelerating the widening gap between entities that engage in AI investment and utilize the accumulated data associated with it, and entities that do not.

(4) Approaches to AI Investment Statistics

(1) Data is comprised by data on the Internet ("net data" hereafter), data about on-site operations at manufacturing sites ("real data" hereafter), and so on. Given that various entities can easily obtain net data and use it for social and economic activities, and that corporations with relevant on-site operations can introduce IoT or other new technologies to extensively accumulate real data, data should be positioned as a "new asset". In addition to the existing production factors of tangible assets (hardware etc.) and intangible assets (software etc.), data as an intangible asset is positioned as a production factor in AI investment statistics. It is considered meaningful to measure the impact of data on productivity improvement.

※ We need to bear in mind that intangible assets have major spillover on Total Factor Productivity (TFP).

(2) Given that overseas corporations retaining large amounts of data use the data worldwide, including Japan, to make profits, it is also important to focus on the increase in the (cross-border) distribution ratio of data as an intangible asset, and, conversely, the likelihood of some decline in the labor share. In the future, we must deepen the discussion around the ownership and compensation of data as a production factor.

※ Indications are that the nature of data ownership and the debate about data portability are related.

(3) We also need to bear in mind measurement issues in the digital economy such as the treatment of cloud services usage, and that some intangible assets, such as data, are positioned as intermediate goods (parts etc.) in GDP and other National Accounts.

(4) It is conceivable that uncertainty in economic society will rise again due to progress with AI, but it is also expected that economic research and analytical methods will change because of the predictability of AI, and that responses to such situations will be precise.

The Committee on AI Economy Report Outline: Chapter 3 (1/2)

Chapter 3: The Industrial Infrastructure (Labor, R&D) Supporting the AI Economy

(1) Employment Transformation in the AI Economy

(1) Several studies have presented concrete figures on the impact of substituting existing employment with AI.
(2) It is believed that unemployment in the technology sector has, so far, mainly involved routine tasks, and that non-routine manual work has absorbed surplus workers.
(3) Although it depends on what kind of technological progress is achieved using AI in robotics and communications in the future, it is also believed that, depending on the task, technology substitution will progress in these areas and that the ability to absorb surplus workers will decline.
(4) On the other hand, new technologies will create new jobs, but it is possible that any employment increase associated with economic growth based on AI proliferation will be delayed. For now, it is important to increase employment in the areas of design, development, and manufacturing, as well as management and organizational reform.

(2) Validity of Japanese Employment Practices in the AI Economy

(1) In Japan, (a) the occupational labor market seen in the U.S. and elsewhere has not taken hold, and adjustments costs for regular employees are high under Japanese employment practices (lifetime employment, promotion by seniority) supported by postwar rapid economic growth; (b) technology substitution has not made much progress possibly because the focus is on training generalists premised on rotation every few years, and incentives to introduce new technologies or operational reforms do not work. On the other hand, there are advantages to the *suriawase* approach, which is based on technologies and knowhow mastered mainly in manufacturing settings, and production systems that have been crafted in fine detail, including a history of working on robust automation to the point where further automation is limited. From an international perspective, routine tasks are still relatively common, mainly among white-collar workers.
(2) We should bear in mind that compared to employment costs, ICT costs will be substantially reduced due to the spread of AI. As technology takes over the remaining routine tasks, the impact may be greater than in other countries.
(3) In Japan, substitution by irregular employment has been an alternative to substitution by ICT. Given the adjustment costs for irregular employment, we need to bear in mind that the impact of AI on irregular employment may be enormous. Retraining and learning new skills will be particularly important.
※ Ultimately, we also plan to reflect the results of the corporate questionnaire surveys undertaken for this Committee. (Explanations based on data showing actual results, not only expectations, are also necessary.)
(4) If, for argument's sake, Japanese corporations make no progress with AI usage, we still need to bear in mind that this may result in further technological unemployment when Japanese corporations lose their competitiveness due to advances in AI usage at overseas corporations.

The Committee on AI Economy Report Outline: Chapter 3 (2/2)

Chapter 3: The Industrial Infrastructure (Labor, R&D) Supporting the AI Economy (cont.)

(3) Japanese HR Training Systems in the AI Economy

(1) In addition to the critical shortage of computer science PhDs, the current education system does not produce enough AI human resources, such as human resources with programming and data analysis skills and also those with further expertise in business and monetization.

(2) It will be important to promote educational reform from elementary to high school level (educational content, the nature of the workplace, outstanding AI teachers) while communicating the attractions of acquiring skills in this area. In the short term, it will be necessary to (a) improve AI skills of human resources with on-site operations in user industries; (b) shift ICT human resources to user corporations and improve their AI skills; and (c) consider measures such as accepting overseas human resources with advanced AI skills and the use outsourcing.

(3) It is also necessary to improve technology management skills so that executives can consider technology and enterprise as a whole when they make decisions.

(4) From this viewpoint, it is necessary to restructure employment and HR training systems at corporations.

(4) Research and Development Concerning AI/ICT Usage

(1) In Japan, links between basic research/ applied research and development based on business are important, but the designer perspective, which connects science and engineering with industrial challenges, is lacking.

(2) Studies show that compared to SMEs, holders of PhDs have little impact on productivity at large companies. Employment practices and the treatment of highly skilled researchers must become more diverse and flexible at large corporations. In the future, it will also be important for startups to focus on research and development.

(3) Therefore, research and development at startups should be promoted, and other corporations, including big companies, should replace their “self-sufficiency” principle for an approach focused on implementation through open innovation with startups.

(4) It is also important for user corporations (not ICT corporations) to advance their own development.

(5) It is important to permit trial/error in Proof of Concept (PoC) demonstrations※ and agile development.

※ Proof of concept. Demonstration to verify new business models or ideas for projects.

The Committee on AI Economy Report Outline: Chapter 4

Chapter 4: AI Use and the International Competitiveness of Japanese Corporations

(1) Data occupies an important position in the industrial ecosystem. Overseas corporations store and use large volumes of online data, but at Japanese corporations the following issues are interlinked:
A. The volume of online data is insufficient
B. Lack of data processing ability
C. No human resources with the ability to use the data
(2) Regarding point A, there are, to start with, many cases of insufficient understanding of the kind and extent of data collected in-house, or the collectability of data. At the management level, it is of prime importance to understand data and to build effective data strategies.
(3) The following are some options.
(a) Use IoT to collect and use as much real data as possible about on-site operations.
(b) Supplement the volume through collaboration and open data development based on data accessibility and strategies at each company.
(c) Focus on reinforcement learning and learning without instructors (where direct instructor data is not necessary).
(4) Regarding point B, the following is important for situations where data exists, but cannot be used for learning.
(d) Where possible, collect new data in a format that requires no processing.
(5) Regarding point B, it is important to promote the measures listed in Chapter 3-3 (HR development) with regard to situations where staff do not know how to process data, and to respond to point C.
(6) The following measures are primarily for user corporations
(e) After accumulating on-site expertise in all industries, it is important that ICT corporations (SIers) strengthen their role as consultants, and the role of supplementing shortage of ICT staff at user corporations.
(7) (f) After improving social acceptance of data usage and ensuring trust in privacy and security, it is also important to ensure the establishment of “Data Free Flow with Trust (DFFT)”.

The Committee on AI Economy Report Outline: Chapter 5 (1/2)

Chapter 5: Basic Policies and Strategies for the AI Economy

(1) Amid the ongoing digital transformation, we should regard the rebuilding of industry structures as an opportunity for Japan.

(2) It is important for the government to promote policies that encourage and focus on the following points.

(a) In-house production by user corporations
(b) Open innovation with startups undertaking R&D
(c) Agile development
(d) Secure real data by promoting IoT
(e) Supplement data volumes
(f) Improve AI skills at user corporations (internal staff, external experts from home and abroad)
(g) Retraining to respond to the impact of AI on employment
(h) Improve ability to support user corporations at ICT corporations

(3) When examining policies and strategies, comparisons with the U.S., China, and other countries are important, but simply aiming to catch up with foreign models (e.g. platform business, horizontal division of labor) in a field where Japan has already been largely left behind has its limitations. We need to plan specific policies that will work on the global market while focusing on incorporating AI and putting Japan's advantages to use. For example, if AI, IoT, 3D printing, etc. can be effectively incorporated into a foundation of meticulous service provision and manufacturing processes based on human skills and experience, seen as Japan's strength, it will be difficult for foreign corporations without such a foundation to catch up. It is also expected that Japan will be able to build comprehensive high-mix low-volume production and supply systems to compete in the largest segment of the global B2C market. Generally speaking, the Japanese model is hardly compatible with AI/ICT progress at present; rather, it hinges on technological progress in the short-to-long term, changes in attitudes on the demand side (commitment to other factors than price), and other trends.

(4) In step with advances in AI, it is important to have perspectives on how to integrate AI by encouraging SMEs to take voluntary measures aimed at development.

※ One of the principal aims of Germany's Industry 4.0 is to skillfully integrate SMEs, which have an important role in the manufacturing industry.

The Committee on AI Economy Report Outline: Chapter 5(2/2)

Chapter 5: Basic Policies and Strategies for the AI Economy (cont.)

(5) It is important to review the systems and structures that impede the use of AI as well as adopting agile development in government procurement, while recognizing the challenges of government digitization. It is important to prepare individuals, corporations, the government, and other entities, as well as the industrial infrastructure (labor, R&D) for the use of AI, and to aim for a state of AI-readiness across society.

(6) Japan should use international venues for discussion, such as the G20, to stimulate international debate and to disseminate the approaches to AI investment statistics in Chapter 2-4 (measure impact of data as a new asset etc.), and policies to effectively utilize data from the aspect of contributions to AI utilization promotion (data trust structures: Personal data trust bank etc.).

(7) It is important that the Ministry of Internal Affairs and Communications monitors the progress of these initiatives, the utilization of AI, and its impact on the economy. The ministry should also pay attention to indicators for corporate value such as market cap, not only GDP and other macroeconomic indicators.

※ Corporate value may broadly assess future expectations and investment in intangible assets not captured by microeconomic indicators. According to some views, it should be used as an indicator to measure future increases in added value.