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AI IN JAPANESE SOCIO-ECONOMIC SPHERE AND ETHICAL APPROACH

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Abstract: Technological innovations have transformed the world following the development of chips and software, substantially impacting human activities and cognitive abilities with machine assistance. The term artificial intelligence (AI) is difficult to define and has been debated for decades. AI involves the enhancement of computer-based software capable of performing tasks that typically require human intelligence. From a high-tech perspective, AI technology can be categorized into four types: Machine Learning (ML), Natural Language Processing (NLP), Image Processing (IP), and Speech Processing (SP). Recently, Deep Learning (DL), a subset of Machine Learning, has gained global attention. Japan, being a highly industrialized and technologically advanced country, has developed AI mechanisms beneficial for daily life. The ethical development and use of AI fall within regulatory framework of Japan for ethical functioning. AI holds significant potential for Japan, and the AI Strategic Council of the Japanese government has recognized the advance interest in generative AI, partly due to its cutting-edge research and technology, to address the challenges of a declining working-age population.

Index Terms: AI, Japanese Technology and Society, Machine, Ethics, Policy, NLP, IT, Government of Japan, Working Population

Introduction

In 2017, the projected population in Japan dropped approximately 264,000 people was a record and at present the lost lives are more numerous than births by an average of 1,000 people a day. The Tohoku region in northern Japan has fewer population than it was in 1950s. Birth rate in Japan has long been significantly below the two births needed to uphold the population growth, which is currently 1.4 births, and it is not enough to fill the gap. In 2015, nearly a third of Japanese population was older than sixty-five, moreover the survey from the National Institute of Population and Social Security Research (NIPSSR) situated in Tokyo suggests that number will rise to more than thirty five percent by 2050 (NIPSSR, 1997).

The declining population rate is affecting the Japanese domestic labor force which is falling faster than the overall inhabitants. With immigration questionable to rise enough to balance for this intense population drop soon, Japan meets slower prospects for productivity and income growth. Japan is continuing with constrained resources including labor and has traditionally been a leader in technological advance. Mechanization and robotics to replace and enhance human labor are sentient ideas in Japanese society. The companies in Japanese have conventionally been a vanguard in the robotic technology. Firms such as FANUC (automation and robotic system) located in Yamanashi prefecture, Kawasaki Heavy Industries, Fujitsu, Sony, and Yaskawa Electric Corporation guided the way in robotic expansion during economic rise (Maths and Sven, 2016).

Nonetheless, the integration of robotic technology and automation into industrial production have also been an intact part of postwar economic success in Japan, beside manpower.

In current days, Japan is a leader in robot manufacturing and its mechanized use. Japan exported approximately value of 1.6 billion US\$ of industrial robots in 2016, which is more than except five highest exporters—France, Germany, Italy, South Korea, United States (US). Japan is one of the greatest robot-integrated economies in the world in terms of robot density measured with the number of robots comparative to humans in manufacturing and production. Japan led the world in this measure until 2009, when South Korean industrial use robots increased (Maths and Sven, 2016).

The profit and use of labor force with robotics in Japan impacted the employment and wages beyond manufacturing in Japan and AI played a greater role. Nonetheless, the gap in production advance between the manufacturing and services sectors is tremendously extensive. Industrial production has been very much connected with enhanced use of information and communication technology (ICT) and automation. Automotive and electronics are the most beneficial manufacturing sectors in Japan are severely dependent on automation. Due to population decline, the labor shortage in Japan has affected the annual productivity growth as compared to big economies.

The stream of automation technology and AI potentials opened new prospects for augmenting labor in the nonmanufacturing sector in whole Japanese market. Family Mart, a Japanese retail convenience store chain, is hastening enactment of self-checkout registers (Nikkei Asia, 2017). Other examples flourish in health care, finance, transportation, and other services which include robot chefs and hotel staff. Converse to fears for the worst, the automation and heightened use of robotics have had a complete optimistic influence on domestic employment and profits. Progress in automation by Japan with the use of robots and integration of artificial intelligence with daily living is prospective to a faster stride than in many other advanced economies for reasons like Shrinking population and the more rapidly shrinking workforce, Elderly population, and Declining quality of services due to shortage of labors.

Objective of the Study

The main aim of the study is to relate the impact of AI advancement within the society, on economic growth and labor force which would drastically affect Japan in future. The impact of AI and its ethical use is one of the main concerns. The regularization of Japanese AI technology would pave the way for future, where mechanics and human work force try to manage the crisis being faced combined with reduced work force and declining population. The study intends to analyze the ability of Japanese businesses to handle the global ecosystem and competition much associated with AI and mechanization of labor shortage in Japan.

Review of Literature

There are few though significant literatures is available which relates the topic to explore the work, few of them has been reviewed below:

1. Leslie Cousineau, Leslie and Nobuyasu, Miura in their book, '*Construction Robots the Search for New Building Technology in Japan*' (1998) mention that Japanese have progressive far afar the US in the new technologies, which are already having a pioneering impact on Japanese architecture. This book is a case study of various types of construction robots. In this book the author writes that the impact of robotics has already begun to show measured upgrades in quality, productivity, and safety in construction. Japan have Research and Development capability as Shimizu developed first construction robot SSR-1 in 1983.
2. In an edited volume '*Advances in Artificial Intelligence*' (2020), the editors Abe, Akinori, Sato-Shimokawara, Eri, and Mori, Junichiro says that knowledge engineering, agents, education and culture natural language processing, machine learning and data mining, and cyber physics are part of Japanese mechanization. Book is divided into six sections, (I) knowledge engineering, (II) agents, (III) education and culture, (IV) natural language processing, (V) machine learning and data mining, and (VI) cyber physics, provided the scope and reference material for specialists, learners engaged in technologies and to AI. The contributors too discussed technologies, or philosophies relevant to AI,

e.g., computer-data science, robotics, linguistics, and physics, introducing them to recent advances in this area and discussing the human society of tomorrow in Japan and outside.

3. Markowitz, Judith (ed.) in the book titled '*Robots that Talk and Listen: Technology and Social Impact*' (2014), contributors point out forward-looking examination of speech and language in robots from technical, functional, and social perspectives. Contributors tackle the cultural foundations as well as the linguistic skills and technologies that robots need to function compellingly in real-world settings. The most complicated and complex is the ability to understand and use language. Speech-enabled automata are already serving as interactive toys, teacher's aides, and research assistants, which are visible in Japan. These robots will soon be joined by personal companions, industrial co-workers, and military support automata. The social impact of these and other robots extends well beyond the specific tasks they perform in Japanese market.
4. A computer scientist Prof. Nishida, Toyooki in his book, '*Human-Harmonized Information Technology, Vol. I*' (2016), mentions that the Japan's current technical challenges in the field of human and computer communication is the real space. The next information era will be one in which info is used to foster human and social potential. The book examines determining elementary technologies for realizing harmony between human beings and the information surroundings through incorporating element technologies containing real-space communication, human interfaces, and media processing. Vacillating from the neuro-cognitive level to the field trial, the research activities in Japan in highly advance robotic system incorporated novel perceptual technologies that even exceed human ability to sense. He finds in his project that extending from the aspect of neuro-cognitive level to the field experiment, the research performances integrated innovative perceptual technologies that even outdo human ability to sense and affect the everyday life.
5. Robertson, Jeniffer, in her book '*Robo Sapiens Japonicus: Robots, Gender, Family, and the Japanese Nation*' (2018), asserts that Japan is questionably the first postindustrial society to accept the prospect of human-robot coexistence. Japan is arguably the first post-industrial society to embrace the prospect of human-robot coexistence. Since 1970s, Japanese humanoid robots intended for future use in homes, schools, health, and offices, have been evolved to solve problem. Robo sapiens Japonicus throws an idea for actual robots as being as adaptable and active as the science narrative exist. Over the past decade, Japanese humanoid robots designed for use in homes, hospitals, offices, and schools have become celebrated in mass and social media throughout the world. A descriptive anthropology and sociocultural history of governmental and academic address of human-robot relations in Japan, the book discovers that how actual robots-humanoids, androids, and animaloids are "imagineered" in ways that reinforce the predictable gender system and political-economic status quo. In her assumption, Robertson finds a base for readers to be optimistic without cossetting in unpredictable robot dreams.

AI in Japanese Society and Economic Perspective

It might be important to note that technology and AI is affecting the economy and social order of Japan. Nevertheless, there is no perfect prevision with regard that such technologies would be adapted to substitute for human labor exceptionally in sectors outside of manufacturing. Besides technological challenges, there are a scale of obstacles concerned with accompanying infrastructure involving the authorized outline for use of such technologies combined with the general population. Significant problems include consumer shield, data protection, intellectual property rights and commercial contracting (AIRC, 2023). Technological change is unavoidable and would surely impact virtually all the professions. Japan is a comparatively exclusive existing instance assuming population and labor force related changing aspects, the clear profits from amplified automation have been high and such technology might offer a fractional solution to the challenge of subsidiary long-term production and economic growth.

Operative regulations for domestic artificial intelligence benefactors are still under development. Prime Minister Fumio Kishida said, "it is important to establish international governance that promotes the benefits of AI while appropriately addressing the risks" (Kuriyama and Sakai, 2023). In line with such international guidelines, the government outlined its guidelines for domestic AI providers in November 2023, which encompasses a discussion about the enactment of a third-party accreditation system. The Japanese government plans to advance with the layout of a complete regulatory procedure. As it is uncertain whether the system

would serve as a restriction to AI operators those try the production without safety, the government is disinclined to establish penalizations for desecration.

The focus for Copyright Law, which presently enables AI to learn without the permission of copyright holders in Japan. AI research, which commenced in the 1950s, has constantly amazed people by exhibiting innovative computer intelligence. Though it collapsed due to adequate competence to solve the complicated problems people face in real life and at societal level. The assessment and management of massive data by AI are helping the companies to promote digital conversion, enhance the effectiveness of production, distribution, services, and increase production through business growth and creation (ICCJ, 2023).

Ahead, the self-directed driving and mobility services based on AI-technologies will lead to the construction of an ecological friendly society. In health centers, the rapid detection of diseases through analytic imaging and the enhancement of new pharmaceuticals using AI are also being promoted. In the field of education, the development of educational materials and programs made-to-order to the aptitude of everyone is increasing. AI has been incorporated into various aspects of people's lives, becoming the foundation that supports relaxed, secure, and secure living.

Although AI continues to foster its capability to enrich people's lives, one must not miss the threat of its misuse as an armament for unlawful conduct. It is significantly critical to build a harmony on what AI should and should not do, not only among researchers nevertheless through dialogue with society. Machine learning technology frequently makes the process of arriving at a solution in a black box. Occasionally, AI might demonstrate behavior that is not desired by humans. It is required to establish an arrangement where humans and AI must share a common direction.

The role of Tokyo based Artificial Intelligence Research Center (AIRC) is to encourage large-scale research that enables collaboration among industry, academia, government, and to support the social completion of AI technologies. Simultaneously with collaborative partners, the center handles research aiming to consolidate industrial effectiveness and for prosperous society. Aiming to become a global AI center of excellence, Japan have established strategic partnerships with key research institutions within country and abroad, lengthening view through AI research networks. Focusing on new opportunities in AI and strengthening the progressed international collaboration while sharing a vision of the future with AI (AIRC, 2023).

Nonetheless, like any troublesome technology, however, AI carries some risk and presents policy challenges along several dimensions including jobs, safety, and regulatory questions. On the software side, there would be more experienced AI-based stage in coming years. Application of deep learning would require large funds in computing power that many companies fail to afford. Hence, open proposals are expected to impact the market positively. Government of Japan is having a bet on AI as the key to amend blueprint for the future. In March 2017, Prime Minister Shinzo Abe called for immense use of AI and robotics including Internet of Things (IoT) as part of the Japanese economic growth strategy, insisting industries to invest more into investigating new technologies (Lewis, 2017).

Many Japanese companies are reasonably slow on the uptake of chances that AI produces. Some Japanese businesses have sought external affiliates to further their objectives. Moreover, Japan has an inadequate branding strategy as compared to its rivals such as IBM which has sponsored its AI-based Watson platform for a variety of services. Interminably, Japanese companies have developed their technology domestically to protect their intellectual property. Nowadays, AI has become a significant enterprise factor, Japanese corporations have to be more open inclined and should be integrated into the corporate strategy. Innovations in AI are bringing about challenges for the Japanese society. Nomura Research Institute, for instance, in a recent report predicts that nearly half of all jobs in Japan could be performed by AI-enabled robots by 2035 (South China Morning Post, 2016).

The AI market in Japan is probable to grow from JPY 388.4 billion in 2022 to JPY 90 trillion by 2030 (Marcus and Kojima, 2023). In 2030, the transportation sector is presumed to grow to JPY 30.48 trillion. Additionally, utilization of deep-rooted learning in AI has not reached well in Japan. Constructive opinion on an investigation of the association between labor and production in the economy of Japan, it is projected that use of generative AI as compared to the common AI is to supplement work activities that could reveal JPY150 trillion of industrious capacity across the economy, equivalent to 25% of GDP in 2024. However, Japanese economy recently experienced the recession and ranked fourth in standing of GPD in the world (The Asahi Shimbun, 2024). The Manufacturing industry is the largest contributor to this capability, largely because it

involves a large share of the workforce and accounts for high labor productivity (Artificial Intelligence-Japan, 2024).

AI and Ethics in Japan

Japanese citizens have an apparent preference for human skills, specifically in sectors like customer service and healthcare. Several believe that while AI might aid in specific tasks, it cannot replace human judgment and social understanding. Both business and consumers are progressively worried about data privacy as Japanese culture values personal and informational privacy, making the extensive data collection in AI a significant concern. There is an ominous fear that AI could replace jobs, remarkably in manufacturing sectors where Japan has conventionally excelled. The government is working on skill programs; however, the threat remains substantial. Japan finds itself at a drawback compared to countries like the United States of America (US) and China, where there is substantial government backing on investment in AI research and development (Kenichi, 2021).

Individuals as common citizens feel the swift development of technology repeatedly outdoes of social structures that obliquely guide and regulate it, such as law or ethics. AI demonstrates this as it has become much more widespread in everyday life for many, apparently overnight. This increase, coupled with the relative involvedness of AI compared to other familiar technology, could trigger fear and concern as key components of modern living (Kenichi, 2021). In 2021, METI of Japan issued a set of AI Governance Guidelines in July to support practical enactment of the AI principles required to encourage the wider acceptance of the technology. AI is increasingly important as a source of innovation. Image recognition AI is used in the development of self-directed driving and in the interpretation of X-rays (Lidar).

The history of work on AI authority is to enjoy the benefits that AI brings while dealing with its negative consequences as well. Japanese Cabinet Office published a set of high-level guidelines entitled 'Principles of Human-centric AI Society' in March 2019. These guidelines outlined seven principles, including privacy, security, fairness, accountability, and transparency. The government's high-level guidelines began in June 2020, allowing AI related discussion in Japan. AI related ethics are in line to control the misuse of mechanization of mind and emotions. Major annual electronics show held in Chiba, Japan in October 2023 and AI took the attention (Yamaguchi, 2023).

In a budget committee meeting in the House of Representatives held on 30 October 2023, Japanese Prime Minister Fumio Kishida stressed on curtail the risk of copyright breach regarding utilization of AI (The Yomiuri Shimbun, 2023) and accentuation the need for both companies developing AI and operators to exercise accountability. Even though numerous calls for caution from the government, the AI train in Japan is running fast and shows no signs of slowing down. Instituting a clear regulation for AI use would be essential in ensuring the accountable and ethical incorporation of AI associated technology into Japanese society.

Conclusion

A crucial crossroads ahead for Japan in the period of AI. As businesses and consumers anticipate the technology advantageously, they also exercise caution due to ethical concern and perceived threats for society. The fundamentalist nature of AI adoption in Japan, united with its trail in investment and research, this positions a challenge to international competitiveness. In 2016, Japan determined AI as a key component in the foundation for creating a highly intelligent society, normally known in Japan as 'Society 5.0'. To aid in the advancement of AI research and development, former Prime Minister Abe directed the establishment of the Artificial Intelligence Technology Strategy Council to enhance the role of AI. This council enables cooperation among industry, academia, and the government in the areas of research and development. Spanning the skill gap, fostering large scale of research, and establishing a strategic pathway are essential steps, if Japan wishes to enhance itself as global leader in AI. Japan might find itself in advance market-oriented achievement when it would open the doors of AI through proper regulations deals with ethics. In the coming years, the AI would be a decisive factor in revive the economy of Japan that has recently underwent with nominal setback both domestically and internationally. Moreover, the Japanese Society for Artificial Intelligence (JSAI) of Japan is working as well to limit the use of smart technology which would be harmful in nature for humans. The balance between AI and human society is required for Japan to save its cultural identity and assist the declining workforce as well, which is 'aged' now.

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