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How is Japan progressing towards achieving the United Nations Sustainable Development Goals by 2030?

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1.0 INTRODUCTION

In 2015, the United Nations adopted the 2030 Agenda for Sustainable Development, which introduced 17 Sustainable Development Goals (SDGs). These goals emphasize the interconnections between social, economic, and environmental issues, aiming to address a wide range of global challenges such as inequality, climate change, health, education, clean water, and more. Ultimately, the SDGs seek to enhance the quality of life for all. However, each country faces unique challenges in achieving these goals, as variations in living standards and social protection systems exist. Environmental conservation is a key element in achieving several SDGs while promoting sustainability's broader benefits. By enhancing resource efficiency, sustainability can drive long-term economic growth, foster job creation, lower costs, and build more resilient economies that are less vulnerable to resource scarcity and environmental threats.

Japan's education system has long been recognized by other countries for its discipline and high level of education. The country views education as a cornerstone for sustainable development, economic growth, and social equity. Japan's emphasis on lifelong learning is critical for addressing challenges like its aging population and the need to continually upskill its workforce in a rapidly evolving global economy. Additionally, the digital transformation of education, through initiatives like the Global and Innovation Gateway for All (GIGA) School Program, aims to ensure equitable access to modern learning tools for all students, bridging gaps between urban and rural regions. Addressing educational inequalities, particularly for disadvantaged groups, aligns with SDG 4's focus on inclusivity, ensuring that all students, regardless of their background, can access high-quality education to contribute to Japan's long-term sustainability.

Consequently, as one of the world's largest and most advanced economies, Japan is recognized as a highly developed nation with a strong focus on technology, manufacturing, and innovation. The country has made significant progress towards achieving the United Nations Sustainable Development Goals (SDGs) by 2030, driven by both corporate initiatives and government policies. Japan's approach to sustainable development uniquely combines tradition with innovation, reflecting its historical values alongside cutting-edge technological advancements. Understanding how Japan leverages its strengths in technology and policymaking to meet the SDGs can offer valuable insights for other nations. In October 2020, Japan announced its long-term goal to achieve net-zero greenhouse gas (GHG) emissions by

2050 and set a new mid-term target in April 2021 to reduce GHG emissions by 46% by 2030 (Ozawa et al., 2022). This commitment is supported by Japan's investments in sustainable energy, waste management, and smart city technologies, all aimed at achieving carbon neutrality by 2050.

In addition, due to its geographical location, Japan is highly susceptible to natural disasters such as earthquakes and typhoons, along with environmental challenges like marine pollution and wildlife loss. According to the Japan Meteorological Agency (2019), Typhoon Hagibis was one of the most powerful typhoons to strike Japan in recent years, causing widespread flooding, landslides, and significant destruction, with at least 98 fatalities. It was also reported to be one of the strongest typhoons to make landfall in decades. The Sustainable Development Report of Japan indicates that progress on SDG 13 (climate action) has been stagnant, with substantial challenges remaining. However, regarding SDG 7 (affordable and clean energy), Japan has made moderate progress in ensuring access to reliable and affordable clean energy. In contrast, SDG 4 (quality education) shows significant achievement, particularly in the participation rate for pre-primary organized learning for children aged 4 to 6, which has already met its target.

Therefore, further exploration of how Japan integrates disaster risk management and climate resilience into its pursuit of the SDGs may inspire similar approaches in other countries. While numerous aspects of the SDGs require attention, this essay will specifically focus on quality education (SDG 4), affordable and clean energy (SDG 7), and climate action (SDG 13), with a strong emphasis on embedding sustainability into policies and practices. Other SDGs will also be indirectly addressed, particularly those aligning with Japan's commitment to international collaboration in areas such as development aid, disaster risk reduction, and promoting sustainable practices, highlighting Japan's global leadership in advancing the SDGs. The essay will outline Japan's progress towards achieving the United Nations Sustainable Development Goals by 2030.

2.0 JAPAN'S EFFORTS IN UPHELDING SDG

Before delving into SDG 4 on quality education, it's crucial to acknowledge that education plays a vital role in empowering individuals with the knowledge, skills, and values necessary to enhance their quality of life and make meaningful contributions to society. Education also lays the foundation for personal growth, economic development, and social progress, helping individuals overcome challenges. In Japan, education is highly valued, and the country has made notable progress toward achieving SDG 4. The primary objective is to ensure inclusive and equitable quality education while promoting lifelong learning opportunities for all. Japan actively supports UNESCO's "Education for Sustainable Development: Towards the Achievement of the SDGs (ESD for 2030)" framework, which posits that Education for Sustainable Development (ESD) contributes to achieving all 17 SDGs. This framework encourages educational institutions to participate in sustainable development initiatives at both national and international levels. In line with the Revised National Curriculum Standards, schools in Japan are encouraged to offer SDG-related courses and create

learning environments that foster respect for human rights and diversity. This approach equips students with the skills, attitudes, and knowledge necessary for sustainable development and fostering a peaceful global community. Osanai and Yu 2023 note that research on SDG education has only been ongoing for approximately six years, making it difficult to generalize its characteristics across different nations. Consequently, it is challenging to assess Japan's standing in SDG education compared to other countries. Nonetheless, Japan has begun incorporating SDGs into school curricula as part of its efforts to ensure sustainability awareness among students.

For instance, Miyagi Prefectural Shiroishi High School in the Tohoku region exemplifies the practical implementation of SDG education. The Tohoku region faces significant challenges, such as declining birth rates, an aging population, and depopulation, all of which threaten its sustainability. Given the Japanese government's emphasis on regional revitalization, the sustainability of the Tohoku area is particularly at risk. This makes SDG education in the region essential for both human resource development and regional sustainability. In addition to primary and secondary education, higher education plays a crucial role in Japan's SDG implementation. Japanese universities are developing courses and initiatives designed to equip students with the skills needed to address global challenges, including those related to the SDGs. The country's mid-term review of its "Basic Plan for the Promotion of Education," conducted every five years to adapt to changing societal needs, also highlights the impact of the COVID-19 pandemic. This plan focuses on cultivating innovators for a sustainable society and enhancing well-being through Japanese cultural values, while promoting continuity across all levels of education and considering cross-sectional perspectives on common themes. The pandemic led to a global economic slowdown and reduced opportunities for experiential learning. The temporary closure of schools underscored the importance of these institutions in providing students with a sense of belonging and security. During this period, the limited use of information and communication technology (ICT) delayed Japan's digital transformation, but it also spurred the creation of online education and a shift in learning methods.

Japan is also working toward fostering a sustainable society beyond 2040 through digital transformation (DX) education initiatives. These efforts include human resource development for DX, such as the GIGA School Program, which focuses on cultivating information literacy, reforming work styles in education, and improving teachers' ICT competencies. Japan's lower labour productivity, in part due to the low proportion of adults pursuing higher education or engaging in lifelong learning, presents a challenge. To support sustainable development, it is essential to develop highly specialized human resources capable of addressing complex corporate and industrial needs through continuous education and reskilling. This is a critical aspect of Japan's strategy to achieve SDG 4, as an educated population is better equipped to drive meaningful societal change. Beyond the learning process itself, Japan has made strides in digitization, providing students and individuals with the basic skills needed to adapt to the modern world. However, rural schools still require improved funding, resources, and teacher training to ensure equitable access to quality education across

the country. Enhancing infrastructure and adopting more inclusive educational practices are particularly beneficial for students with disabilities. Lastly, given Japan's high cost of living, the government could consider offering affordable extracurricular activities to ensure that students from low-income families can participate in education and thrive. Such efforts would help Japan create a holistic and inclusive education system that aligns with the goals of SDG 4.

Hence, understandably, Japan's efforts to achieve SDG 4 highlight the country's commitment to fostering an inclusive and equitable education system that equips individuals with the skills and values necessary for personal growth, social progress, and sustainable development. Through initiatives like the GIGA School Program and its focus on digital transformation, Japan is addressing the challenges posed by its aging population and evolving global demands. However, there are still areas requiring improvement, particularly in rural regions, where funding, resources, and inclusive educational practices need further support. By continuing to invest in education and providing opportunities for lifelong learning, Japan is well-positioned to meet the objectives of SDG 4 while driving broader societal and economic advancements.

Next, the primary objective of SDG 7 affordable and clean energy is to ensure universal access to affordable, reliable, and modern energy services by 2030, which is well followed by Japan. Currently, 660 million people worldwide still lack access to electricity, and approximately 1.8 billion do not have access to clean cooking solutions. Chapman et al. (2023) emphasize that Japan has initiated an energy transition aimed at maximizing renewable energy generation to reduce its reliance on foreign energy imports. This transition not only enhances Japan's energy security but also improves the living standards of its population. Understanding public awareness and their expectations for the future is crucial to evaluating Japan's energy transition. In addition to energy issues, the problem of plastic waste production and disposal must also be addressed. Millions of tons of plastic waste are generated annually across the globe, and since most plastics are non-biodegradable and improperly disposed of, they pose significant sanitary and environmental threats. Waste plastics are often dumped into drainage systems and water bodies, leading to pollution of the environment, contamination of aquatic ecosystems, and risks to marine life. Achieving SDG 7 will require the application of advanced technologies such as machine learning, artificial intelligence, statistical modelling, and optimization tools to increase productivity, optimize process parameters, and ensure sustainable production from waste plastics (Awogbemi & Von Kallon, 2022).

In terms of environmental quality, Japan is a leader in energy-related R&D investments, although it faces an ecological deficit, which is problematic for both Japan and global environmental sustainability. Decarbonization efforts are centred on the development of clean energy sources to supply electricity to the grid, significantly increasing Japan's electricity capacity without the need for fossil fuels. These clean energy sources primarily consist of solar and wind-based renewable energy (RE), supplemented by small contributions from nuclear and natural gas plants. Clean energy, defined as energy generated from resources that do not emit

direct carbon dioxide (CO2), includes solar, wind, hydropower, biomass, geothermal, hydrogen, and nuclear sources. Clean energy has the potential to reduce CO2 emissions from the electricity sector by up to 90% (Shiraishi et al., 2023). In a renewable energy scenario based on base fuel prices, Japan's renewable energy generation is expected to increase from 24% of total generation in 2020 to 59% by 2030, with the goal of achieving a renewable energy share of 90% by 2035. As Japan continues its progress towards meeting the United Nations Sustainable Development Goals by 2030, its government remains focused on the rapid expansion of renewable energy, carbon capture and utilization, the revival of nuclear power, and the development of low-carbon hydrogen technologies to decarbonize the power sector. These national policies align with the objectives of SDG 7, emphasizing affordable and clean energy. Transitioning to a renewable-based energy system involves not only replacing fossil fuels with carbon-neutral sources but also significantly improving energy efficiency, driven by increased electrification and a reduction in primary energy demand (Bogdanov et al., 2023).

Japan is fortunate in that it does not face significant issues with electricity supply; however, there are several strategies to ensure a stable energy supply while also safeguarding the environment. Renewable energy is environmentally friendly, but its dependence on weather conditions necessitates the use of storage batteries and interconnected electrical systems between cities. For instance, wind energy is a renewable source that produces no CO2 emissions and is safe for the environment, yet its availability is inconsistent due to reliance on wind conditions. The same is true for solar energy. Mitsubishi Heavy Industries, based in Japan, has proposed using advanced gas turbines to reduce CO2 emissions and improve energy efficiency until a fully sustainable renewable energy infrastructure is established. Energy consumers those who generate their own electricity through renewable sources like solar panels or wind turbines can play a vital role in achieving net-zero emissions. They do so by implementing real-time energy demand management, which significantly reduces carbon emissions, and by expanding energy generation and storage capacity. However, the initial cost of deploying distributed energy resources remains a challenge, as well as the potential for increased costs for non-prosumers (Hu & Chuang, 2023).

To further improve access to affordable and clean energy, Japan must aggressively increase its adoption of renewable energy sources. The country should invest more in renewable infrastructure, particularly in solar, wind, and geothermal energy. Offshore wind energy, which has significant untapped potential, should be further developed to diversify Japan's energy portfolio. Given that renewable energy sources can be intermittent, it is critical to enhance energy storage technology such as batteries and modernize the power grid to ensure a steady energy supply. Additionally, government policies and regulations should actively support the transition to affordable and clean energy, making it a top priority by 2030. Promoting awareness and adoption of smart grids and smart meters will help households and businesses manage their energy consumption more efficiently. Through these efforts, Japan can make significant progress towards SDG 13 (climate action), which will be further discussed in the next section.

As previously mentioned, Japan is prone to natural disasters such as earthquakes, tsunamis, typhoons, floods, and volcanic eruptions. While some of these disasters, like earthquakes and volcanic eruptions, are not directly linked to climate change, others, such as typhoons, floods, and landslides, are becoming increasingly severe and frequent due to the impacts of a changing climate. Japan is among the BRICS countries that are major greenhouse gas (GHG) emitters, and its power sector remains heavily reliant on fossil fuels. Ge (2023) noted that around half of Japan's electricity currently comes from renewable sources. However, by 2050, Japan's domestic electricity demand is expected to increase by 30-50%, driven by rising consumption in industry, transportation, and households. Approximately 30-40% of this demand will be met by nuclear and coal-fired power plants using carbon capture technologies, while another 10% will be supplied by hydrogen and ammonia. Japan is in need of solutions to lower CO2 emissions, which will have both positive and negative effects on the global economy. As anticipated, Japan can fully leverage hydrogen power generation, reducing the cost of hydrogen energy and utilizing ammonia combustion to create a CO2-free fuel for electricity generation. This represents a significant step towards achieving the SDGs. Additionally, the Japanese government will work to develop a multi-tiered energy system to minimize the use of traditional carbon-intensive energy sources.

Japan began revising its Plan of Global Warming Countermeasures in 2020, with the aim of significantly reducing greenhouse gas (GHG) emissions. This plan emphasizes regional decarbonization efforts to enhance the resilience of local economies and promote economic circulation. As part of these initiatives, Japan is planning to incentivize electric vehicle (EV) adoption by offering perks such as free parking and charging stations in national parks. Ohta and Barrett 2023 projected that renewable energy will meet 50-60% of Japan’s electricity demand by 2050. By 2040, offshore wind power capacity is expected to reach 30-45 GW, equivalent to 30-40 nuclear power reactors. Nuclear and coal-fired power plants equipped with carbon capture and storage (CCS) technology will provide 30-40% of the energy demand, while hydrogen and ammonia will supply the remaining 10%. Additionally, by the mid-2030s, all new vehicles will either be electric, hybrid/plug-in hybrid, or fuel cell-powered. The commercialization of bio-jet fuels is also targeted by 2030, alongside the development of hydrogen fuel technology for airplanes in collaboration with the EU and the United States. However, there are social challenges to renewable energy adoption (Onodera et al. 2024) reported that some towns oppose renewable energy installations, as seen in Fukushima City’s 2023 "no more mega solar" statement, which cited concerns over landscape degradation and sediment disasters. A similar resistance led to the cancellation of a 600 MW wind farm project in Aomori Prefecture. Therefore, societal acceptance may become a significant barrier to the decarbonization process.

As Japan focuses on decarbonization and a shift toward renewable energy, public acceptance becomes crucial for the success of its 2050 carbon neutrality goal. This will require heightened public awareness, fostered through government initiatives, educational programs, and media campaigns, to emphasize the importance of sustainable behaviours and climate action. Building a sustainable community is a collective responsibility that involves

governments, corporations, organizations, and individuals working together to reduce carbon emissions, develop sustainable practices, and minimize waste. Climate change is also expected to have significant impacts on Japan's energy consumption, particularly in buildings, where rising temperatures and humidity levels will increase the need for cooling and ventilation systems, leading to higher energy usage. Japan's highly urbanized and energy-intensive economy is particularly vulnerable to these changes. Yuan et al. (2024) highlighted those higher temperatures, especially in cities like Tokyo, will increase cooling demands in both residential and commercial buildings, straining local power resources. The urban heat island (UHI) effect, where metropolitan areas experience significantly higher temperatures, may exacerbate this problem, increasing the risk of heat-related health issues. This underscores the need for UHI mitigation strategies, such as incorporating more green spaces and using reflective roofing materials in urban planning.

Hence, while Japan has made notable progress toward climate action goals, further improvements are needed to achieve carbon neutrality by 2050. The country should increase investments in renewable energy sources, such as wind, solar, and hydrogen, to reduce reliance on coal-fired power plants and phase out fossil fuels, particularly coal. Expanding renewable energy infrastructure and enhancing incentives can accelerate this transition. Encouraging the adoption of electric vehicles and developing EV charging infrastructure will further reduce pollution. Financial incentives, such as subsidies and tax reductions, can hasten EV adoption, while increasing the use of electric public transportation will help cut carbon emissions. Energy efficiency improvements are also essential across all sectors. These include the implementation of energy-saving technologies, promoting energy-efficient home renovations, and adjusting industrial operations to significantly lower emissions. Additionally, Japan must strengthen its climate adaptation strategies, particularly in response to natural disasters like typhoons and floods, by investing in robust infrastructure, enhancing early warning systems, and integrating climate adaptation measures into urban planning. In the long term, increasing public awareness and participation is crucial for setting clearer, more ambitious climate goals. Mechanisms such as carbon pricing and transparent reporting systems can offer stronger incentives for companies and individuals to adopt more sustainable behaviours.

3.0 CONCLUSION

In conclusion, it is helpful to review the key points of the discussion step by step. Beginning with SDG 4, Japan is making significant efforts to provide quality education through inclusive practices, digital transformation, and regional sustainability initiatives. Despite notable progress, challenges remain, such as addressing educational disparities in rural areas, improving support for children with disabilities, and ensuring equitable access to education for low-income families. In pursuit of SDG 7, Japan is transitioning to renewable energy sources such as solar, wind, and hydrogen to reduce its dependence on fossil fuels. While challenges such as inconsistent energy supply and high initial costs exist, investments in energy storage technology, grid modernization, and government support can enhance energy stability and efficiency. Smart grids and energy management strategies will further promote the availability

of affordable, renewable energy. Japan is committed to becoming carbon-neutral by 2050, but additional efforts are needed in its climate change strategies. Increasing energy efficiency across all sectors and raising public awareness about sustainable practices are essential steps. Moreover, investing in resilient infrastructure and implementing effective climate adaptation measures is crucial to mitigate the impact of natural disasters. Through these initiatives, Japan can foster a knowledgeable society capable of driving sustainable growth and social progress, meeting its 2030 targets while contributing to a sustainable, low-carbon future.

Japan also faces a range of broader challenges, including an aging population, which results in a shrinking workforce and rising healthcare costs. Economic disparities, particularly in rural areas, contribute to unequal access to resources. The country is currently facing environmental sustainability issues, as it remains reliant on fossil fuels for energy and must improve disaster preparedness strategies to cope with frequent natural catastrophes. In addition, urban congestion calls for upgrades to public transportation networks to enhance efficiency and accessibility. Hence, to address these challenges, Japan should implement targeted legislation, increase investments in renewable energy, and promote social equity initiatives.

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