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An Evaluation of China's Green Economy Journey

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Abstract: China's commitment to reaching the carbon peak by 2030 and attaining carbon neutrality by 2060 signifies its plans to promote the growth of an environmentally-friendly, low-carbon, and circular economy in the foreseeable future. China's go-green journey has been under scrutiny, and many doubts that these are mere fake goals. This paper seeks to evaluate China's journey of transition toward a green economy and provide comprehensive insights on how China put the green economy from theory into the practical ground. While revisiting the journey, it is found that although the term "green economy" has not been the central term of the government's policies until around 2016, the policies that aim to promote a green economy are well-established. These policies are more commonly termed as ecological civilization policies which are rooted from the framework of "ecological civilization" — a framework promoting economic growth while reducing environmental pollution at the time. These policies could be implemented through different aspects, e.g., green finance, green technology innovations, etc., to co-create enabling conditions for a green economy. Based on the documentary research done on existing literature, scholars and industry experts are optimistic about China's progress so far. However, a development gap was found between provinces, hence it is suggested that more has to be done by the central and provincial governments to facilitate a balanced and even development of a green economy across the provinces.

Key words: green economy, sustainability development, ecological civilization, green innovation, green finance

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1. Introduction

The COVID-19 recession and the previous financial crisis in 2008 have raised concerns about crisis management and prevention amongst governments and the general public. Studies have shown that the world's development has dramatically accelerated the global climate crisis due to the negative impact of the Industrial Revolution, and the climate crisis could threaten economic growth if climate change is not curbed (Dervis, n.d.; Marchant, 2021). Moreover, the depletion of the resource and the pollution have a higher chance of affecting the human survival environment and wellbeing (Manisalidis et al., 2020). Governments and Communities are actively engaged in the discussion and conference to discuss the possible approaches and measures to reduce and prevent the likelihood of climate crisis. In order to cope with the climate crisis, change and transformation are inevitable. The questions of which factors have to be changed or transformed and how to facilitate such change arise. The idea of a green economy emerges as a solution to a sustainable economy. However, Kothari et al. (2014) argued

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that simply pursuing a green economy is insufficient in addressing the problems of unsustainability and inequality, as the underlying issues of unsustainable and unjust politics behind the conventional economic growth model also need to be tackled. Unlike the normal sustainable development, China's unique ecological civilization concept emphasizes political and cultural reform and redefining the relationship between people and nature (Buckley, 2021; Hanson, 2019) so that wellbeing and economic development can be pursued without expensing the environment. It would be interesting to review China's journey in transition to a green economy and to provide an insight as to whether a green economy under the concept of ecological civilization is adequate to promote sustainability. This paper will evaluate the overall progress of China's transition to a green economy, and how Chinese green policies, cross-level cooperation, business involvement, green innovations, and green finance work synergistically under the concept of ecological civilization to pave the way for China's green economy.

2. Literature Review

The United Nations Environment Program (UNEP) provides the most widely accepted definition of the green economy, which emphasizes that it must be low carbon, resource-efficient, and socially inclusive in order to enhance human well-being, promote social equity, and reduce environmental risks and ecological scarcity (UN Environment, 2018). The concept of "green growth" was originally used to refer to the growth and advancement of the eco-industry (Jänicke, 2012), but it now pertains to the expansion of the economy overall, with the aim of fostering economic growth and development while ensuring the sustainable use of natural resources. Hence, it is noticed that the green economy and green growth both target the sustainability issues of economic development. Green growth is a qualitative growth in such reflecting the efficiency in the usage of the natural resources, resiliency in natural hazards, reduction in the pollution and ecological degradation (World Bank, 2012). On the other hand, the green economy is considered as a "blanket" that covers the implications of activities in green growth, green transformation, carbon neutrality programs and carbon reduction actions, which ultimately lead to positive impacts on the economic growth and the global environment.

Green economy or green development was studied by researchers about its connotation and notion. Researchers provide a comprehensive background of the green economy through environmental and ecological economics theories while also developing a green economy framework (Loiseau et al., 2016). In the study, the researchers provide approaches for the practitioners through putting effort into renewable resources, eco-design, recycling initiatives, green infrastructure, etc. The study also explained the benefits from three perspectives, i.e., environmental, economic and social. For the environmental benefits, the green economy could mitigate climate change, improve resource efficiency, reduce the dependency on fossil fuels, and reduce air and water emissions. The benefits of the green economy explained in the study align with the Paris meeting's conclusion, which claims that the green economy is the fundamental aspect of mitigating the climate change crisis. The Paris Agreement in December 2015 is a significant landmark that will drive the positive changes in the global environment (United Nations, 2015) because almost every nation (197 countries) is committed to combating climate change. The Paris Agreement aims to ensure that global warming is below 2 degrees Celsius compared to the pre-industrial level (United Nations, 2015). With the parties' commitment, it urges most countries to transform themselves to achieve this global-mutual target. Hence, it believes that green economy and green growth will be widely adopted by the countries and could expect a breakthrough in the development of green innovation technologies in the near future.

3. Green Initiatives by Other Countries/Regions

Following the financial crisis in 2008, the Lee Myung-bak administration in South Korea was regarded as a leading innovator in Asia for issuing a strategic roadmap for the development of green energy technology, with the green technology industry being recognized as a key area for growth. The government had pledged that this industry would contribute around 2% to the overall Gross Domestic Product (GDP) each year (Weng et al., 2018). Nevertheless, Ha & Byrne (2019) raised concerns about the efficacy and ideology of South Korea’s green energy growth, which did not require fundamental changes in modern values and ideology. They highlighted that the “mega-scale” green energy projects failed to achieve renewable targets and overlooked green equity and green job initiatives.

European Union (EU) integrated the green economy concept into the strategic development documents (i.e., Europe 2020 & Resource Efficiency Roadmap). The Swiss government issued several policies and incentives related to green development to encourage rural employment and facilitate green growth. The northern Navarra region of Spain provides an exemplary case of green transformation and initiatives, where the local government has implemented policies to support the development of renewable energy and create more job opportunities for the local population.

The government had also initiated a variety of training centres to ensure that the workers were equipped with the demanded skills in the growth of renewable energy (Weng et al., 2018). Consequently, more than 66.7% of the energy supply in the region is sourced from renewable energy, which has led to a significant increase in the employment rate at the same time.

The Australian government has made a commitment to promoting green development by striving to achieve the Sustainable Development Goals (SDGs) and reach net-zero emissions by 2050 (Commonwealth of Australia, 2021). The emissions reduction policy assists in driving the private sector investment toward renewable energy and related green industries. As waste generation is expected to double the population growth rate, the government encourages waste management and recycling initiatives through policies and investments.

4. Methodology

This section describes the type of this research and the source of the used documents. This study is conducted through documentary research. This study accesses China’s green economy information by reviewing the previous Five-Year Plan to identify the government’s emphasis on supporting green growth. Besides, the study also accessed various researchers’ journals and articles to understand their viewpoints and suggestions for China's green economy journey. Through comparing and interpreting the researchers’ arguments, personal opinions and suggestions are provided regarding China's initiatives along the green journey.

5. Discussion

China’s rapid economic growth and industrial revolution have had adverse effects, including the extensive consumption of non-renewable energy and raw materials, resulting in ecological degradation and pollution. China, with less than 10% of the world’s total GDP, consumes 20% of the world’s energy, 30% of the world’s iron ore, and 54% of the world’s cement (Weng et al., 2018). Furthermore, the energy consumption, pollutant emissions, and carbon emissions per unit GDP are significantly higher than those of developed countries. According to the

National Bureau of Statistics (NBS), China is presently the largest coal burner and greenhouse gas emitter globally, accounting for 5.24 billion tonnes of standard coal equivalent energy in 2021, representing a 5.2% increase from 2020 due to the economic recovery process (Reuters, 2022). It is aligned with the statistics provided by the International Energy Agency (IEA), which claims that coal remains the primary source of energy in China and it (Electricity and heat producers) is the major CO2 emissions contributor compared to the other sectors such as industry and transportation (IEA, 2019). It poses a significant threat to the ecosystems and the long-term survival of human beings. During the UN General Assembly in September 2020, President Xi Jinping made a commitment that China would strive to reach the carbon peak before 2030 and attain carbon neutrality by 2060 (The United Nations, 2021). It is believed that the world will be able to see more initiatives by China government and industry practitioners moving forward in achieving a green economy. Experts from a global think tank, ODI, are positive of Xi's pledge purported that China will be the big winner in such transition and urged other countries to be competitive to avoid losing the green prosperous future (Colenbrander et al., 2021). It is suggested the experts’ views are made based on China's past and current progress on green transition. The Chinese government has invested in green energy-related areas more than other countries. Doris Fischer, the Chair of China Business and Economics at the University Würzburg commented that the investment is made massively for three reasons: energy security, to promote green energy technology innovation which ultimately contributes to China's economic development and increases its global competitiveness, as well as to mitigate climate change and to improve the quality of air in China (DW Business News, 2021).

5.1 China’s Institutional Strengthening, Green Law and Policies

Prior to the President Xi's pledge, China already had years of experience in shifting themselves toward a green economy in order to develop the economy and consider the environmental factors at the same time. According to Weng et al. (2015), China’s green economy’s initiation stage started in the 1990s. However, the exploration and development stages began in the years between 2000 to 2012. It could be understood that China’s green economy journey was officially started in the 21st century, which aims to develop a sustainable and improved ecological environment while also enhancing resource efficiency and promoting a harmonious relationship between man and nature (Weng et al., 2015; Li & Lin, 2016). In the 11th Five-Year Plan (FYP) (2006-2010), the former President of China, Hu Jintao, introduced and integrated the Two-Type Society concept, which advocates for a circular economy that fosters a resource-saving and environmentally friendly society. To realize this vision, the 11th Five-Year Plan (FYP) directed efforts towards boosting the use of renewable energy and minimizing pollution, especially the emission of sulphur dioxide (SO2), with the goal of promoting the social and economic well-being of the nation. As part of this plan, the Chinese government has taken steps to close down 50 GW of inefficient and highly polluting small power plants, while installing flue gas desulfurization (FGD) equipment on existing and new coal-powered power plants, resulting in a significant reduction in SO2 emissions in China (Cao et al., 2009).

Although the installation of FGD equipment imposed a considerable cost, studies found that the benefits brought by the shutdown policies have right off the installation cost through the improvement in air quality (Asif et al., 2022). From this instance, the China authorities have shown their strong directing capabilities and foresighted in reducing SO2 emissions while also ensuring the long-term benefits to the environment through the two policies mentioned above. However, on the other hand, it is commented that the emphasis on green growth in the 11th FYP is too homogeneous and only focuses explicitly on reducing SO_2 emissions rather than solving the

root causes such as investment in renewable energy sectors.

The government's recognition of the significance of environmental issues and the limitations of the previous FYP led to the inclusion of additional dimensions and perspectives in the 12th FYP (2011-2015). These dimensions included renewable energy, circular economy, pollution control, ecological conservation, and natural disaster prevention in macro-level planning (Pan et al., 2019; Weng et al., 2015; Yi & Liu, 2015). In an unexpected move, the government decided to lower the GDP growth rate to achieve sustainable and higher-quality development. The Chinese government then focused on optimizing the economic structure and promoting green growth by enhancing obligatory protection, setting specific targets for the provinces, and preparing carbon emissions pilot projects. (Pan et al., 2019).

Most notably, the amended "Environmental Protection Law" constituted a significant development, as it established a legal basis for the implementation of environmental protection measures. The law imposed an obligatory responsibility on the government to take environmental factors into the fundamental strategic national policy. Nevertheless, monitoring, evaluation and punishment systems were launched and applied to the government offices and organizations. Consequently, China successfully started its circular economy by promoting and imposing parties' responsibilities in green economy thinking, eventually positively influencing the industry and society levels. It has made significant efforts to promote renewable energy development, resulting in a remarkable achievement of generating 33.3% of the country's total power capacity by the end of 2015. This accomplishment is attributed to the progress made in the renewable energy sectors such as solar hot water, solar photovoltaic, and wind power, which are mainly concentrated in Jiangsu, Guangdong, and Hubei provinces. These regions actively participated in innovative policymaking that aimed to achieve green economic development (Yi & Liu, 2015).

Although there is insufficient evidence to show the significance of the outcomes of the 12th FYP, its influence on China's transition to a green economy is essential as well as it highlighted and targeted many aspects of the green development. Most importantly, it encouraged many sectors and parties to participate in the green economy pathway. The 13th FYP (2016-2020) reflected China's government's maturity in catering to environmental issues. Promoting ecological progress such as ecological protection and restoration was laid out in a particular chapter to explain the essential tasks and projects (Seligsohn & Hsu, 2016). The primary target of the 13th FYP aims to improve the ecosystem functions, boost ecological restoration in critical regions, provide more ecological goods and enhance biodiversity protection. The 14th FYP (2021-2025) was released on March 11, 2021. It covered the topic of the low-carbon transition, energy distribution, resource utilization, green transformation in all sectors, enforcement of green legal and policy environment, and promotion of the circular economy (UNDP, 2021). It is observed that there has been an exponential growth in the government's approach to dealing with the climate crisis throughout the decade. China government has successfully gone through the initiation and exploratory stage and is currently in the implementation stage and this observation was further evidenced in Hu et al. (2022) and Lin & Zhou (2021) for which both scholars mutually agree that China has seen a notable progress in green economic growth and implementing various of innovative green initiatives. The discussion below will continue evaluating the green development and implication of green practices for the provinces in China.

5.2 Green Development at the Provincial Level

Research has indicated that the majority of China's green economy policies are typically integrated into broader development plans and environmental governance at the macro-level (Weng et al., 2015; Yi & Liu, 2015).

Hence, the reactions and outcomes of provincial governments toward green growth are different and it leads to regional heterogeneity (Jia et al., 2022; Lin & Zhou, 2021). On the other hand, the Belt and Road Initiative also known as one belt one road has positively contributed to green economy. It is measured by scholar through deploying Green Total Factor Productivity (GTFP) in order to ensure the accuracy and consistency of findings. Study revealed that the initiative has solved the regional heterogeneity issue in a certain degree due to the improvement of technology innovation, increase in foreign direct investment and the promotion effect on the one belt one road route (Hu et al., 2022). However, it is undoubtedly to recognise that the regional heterogeneity seek back to events where some of the provincial governments take a step further in actively engaging themselves in innovative policymaking, while some have just passively implemented policies from the central government. Jiangsu is one of the provinces that proactively adopt themselves toward the green economy. For example, the Jiangsu Province had drawn an ecological redline to restrict the development and protect the areas (Weng et al, 2015). The areas encompass nature reserves, wetlands, flood regulation and storage areas, water conservation districts, ecological forests, etc. With the high level of green economy thinking in Jiangsu provinces, it was successfully ranked first in the green economy, creating 161,700 green jobs. The amount is double that of the Guandong province (rank second) (Yi & Liu, 2015). The increased number of green jobs would create a demand in the labour market and eventually increasing the human capital stock which is beneficial toward China's green economy development (Wang et al., 2022). Nevertheless, it also reflected the leading role of Jiangsu province in adopting green policies as compared to the other provinces that include less proportionate green policies in their development plan. Researchers claim that the development of green economies across China's provinces is uneven or unbalanced. The gaps were found in the green economy efficiency between regions (Wu et al., 2020; Liu & Dong, 2021; Cui et al., 2020). Eastern and central China found relatively high growth in green practices compared to the west region. This is supported by Pan et al. (2019), which found that Beijing, Tianjin, Hainan and Shanghai are the leading provinces in China's green economy, while northwest regions such as Xinjiang and Qinghai have not seen significant outcomes in green development. The question arises as to why there is such a big gap between the regions. Liu & Dong (2021) explained that the eastern region benefited from the preferential policies in the national plans. Moreover, the technological advancement in the eastern region is relatively high, and it directly affects the development of the green economy, especially the efficiency of resource utilization. Yi & Liu (2015) also pointed out that the uneven development of China provinces could be due to the willingness of the local government to seek solutions to their local environmental and economic problems and this argument was further agreed and emphasized by Lin & Zhou (2021). This illustrates that actions must be taken to ensure the development of a green economy across the provinces is balanced. Possible actions are to share the technology through the provinces and increase the green mindset.

5.3 Involvement of Businesses and Green Technology Innovation

The section will discuss the implication of China's green transition and "double-carbon" target for businesses. China businesses appeared to play a passive role in the country's transformation, primarily following the obligatory responsibilities issued by the government. However, there are cases where the business adopted the green transformation and innovatively strategized its business model. One notable example is the deployment of a 550 MW solar fishing plant by Chint Group, a smart energy solutions provider in Wenzhou, Zhejiang province (Bellini, 2022). The project realized the intensive utilization of the water resources through the power generation from the photovoltaic power panels on top and raised fish on the bottom. The fishery and solar power project

could achieve full consumption of clean power generation and is expected to supply electricity for 130,000 households and reduce the annual CO2 emission by 648,000 tons. It implies that if the project could meet the expectations and be widespread in the other provinces and areas, it would fasten China’s pathway in green transformation. Besides, the logistics services provider, S.F. Holdings and technology giant Alibaba have shown their commitment to achieving the national carbon target. The SF Holding’s whitepaper published in 2021 states that the company aims to achieve a 55% enhancement in carbon efficiency and a 70% decrease in carbon footprint per package by 2030 in comparison to 2021. SF Holding leverages the technology in deploying green cargo airports and adopting themselves towards a green supply chain transformation. Other than that, the company reported a comprehensive innovative green packaging approach using biodegradable materials, inkless printing machines, recyclable management, etc. On the other hand, Alibaba plans to realize carbon neutrality in its operations before 2030 in order to align with China's strategic commitment to the carbon target (Alibaba Group, 2021). As a digital technology company, it believes that digitalization could reduce environmental impact. Alibaba has initiated a comprehensive greenhouse gases analysis in its operations and an incentive mechanism in the e-commerce platforms to promote the eco-green consciousness in the society. Some of the initiatives by Alibaba included the replacement of electronic labels instead of traditional paper labels, which had helped the whole industry to save 400 billion sheets of paper. It leverages its technology capabilities and big data algorithm to optimize the packaging design process and eventually achieved an average of 15% reduction in the packaging materials. Although this paper did not manage to cover the action taken by all businesses in China, it believes that most businesses, especially huge companies, are already including green development in their long-term strategic plan and contribute to the nation's ambitious goals as study also evidenced that digital development and technological innovation within industries and businesses promote and ensure the green economy performance (Jia et al., 2022).

5.4 Green Financing

Green finance has been found to be a key driver for businesses’ involvement and green technology innovations (Fang & Shao, 2022). refers to financial services that are aimed at supporting environmental improvement, climate change mitigation, and more efficient utilization of resources (People’s Bank of China, 2016). Several green financing facilities, such as green credits, green bonds, green securities, green investment, and carbon finance, have been introduced to promote sustainable social development and support China’s green transformation. The findings of the study indicate that green credit can significantly contribute to the promotion of the green economy, provided that two critical factors, namely, the degree of marketization and the stringency of environmental regulations, are in place to support its effective implementation (Guo et al., 2022). Furthermore, the study reveals that the development of the industrial structure and the level of environmental investment play a crucial intermediary role in the relationship between green credit and the efficiency of the green economy (Guo et al., 2022). Therefore, the People’s Bank of China and the Chinese government have collaborated to develop a comprehensive policy framework that can balance the risks of financial, environmental, and technological nature, and foster green financial inclusion. The facilitation of green innovation through the implementation of a favorable green finance policy is imperative, as financial restrictions can often impede business innovation (Yu et al., 2021). Philip Roin, the Director of International Communications at the International Institute of Green Finance, has acknowledged China’s emergence as a global leader in green finance (Roin, 2018). Multiple studies have demonstrated that green finance has effectively enhanced the nexus between economic growth and

environmental sustainability in China, underscoring the advancement of China's green finance sector (Yu et al., 2021; Zhang et al., 2021; Zhou et al., 2020). However, regional heterogeneity is also observed in the effect of green finance, as pointed out in Chapter 4.2 (Jia et al., 2022; Guo et al., 2022; Zhang et al., 2021).

5.5 Ecological Civilization

From the discussion above, it is clear that different areas such as law, green technology innovations, green finances, enterprises, and institutional strengthening have contributed each part to the path of the green economy. Such alignment and cohesiveness are credited to the concept of "ecological civilization" which emerged in the China since 1980s and reiterated by the Chinese government in 2016. The concept shows Chinese efforts to embrace environmental sustainability. President Xi conceptualized green as gold (Xinhua, 2021), to stress the fact that green growth raises income, as illustrated in numerous green development project, e.g., Yucun Village (Huang, 2021) and Yanzike ecological tea garden (People Daily, 2022). While the concept of green economy was not at the forefront of Chinese policies, there has been a well-established integration of social, economic, and environmental policies. This has been reflected in the extensive promotion of ecological civilization, with efforts aimed at seeking public understanding, participation, and synergies to achieve an integrated transition (Hanson, 2019). Lila Buckley from International Institute for Environment and Development was of the view that the Chinese concept of "ecological civilization" is not merely a technical approach, but a structural, social, and cultural reshaping of Chinese governance (IIED, 2021). Even though there are critiques stating that the concept of ecological civilization is sublimed based on commercial civilization (Wang, 2018), and doubted that it may be an empty slogan by the Chinese government (Greenfield & Ni, 2021), ecological experts are of the view that the Chinese concept of ecological civilization will continue to shape a Chinese vision of green economy (Buckley, 2021).

6. Conclusion

This paper seeks to provide comprehensive insights on how China put the green economy from theory into the practical ground by analyzing its previous five-year plan, the green development across the provinces, and the action taken by businesses in contributing to the overall green transformation. It has been observed that the Chinese government has made remarkable achievements in emphasizing green growth in its national development plan over the years. The improvement is reflected from the government first targeting specific factors in 2006 to covering multiple green features such as renewable energy, ecological conservation, natural disaster prevention, pollution control, green credit, carbon trading and others in the recent 14th Five-Year Plan. Besides, it is opined that the vision of ecological civilization is a good strategy to implement as it encourages participation and development in all aspects so that all parties in the system are embracing sustainability and marching towards the green economy together. Although the unbalanced green development was found across the provinces in China, it is opined that it requires a period of time for the central government and provincial government to cooperate in allocating and designing the problem-solution to achieve the "double-carbon" target better. Technology sharing and promotion of green economy thinking are the possible solutions China may consider in achieving an even green growth among the provinces. Policymakers may also consider formulate incentive mechanisms and issue policies and guidelines to advocate more green transformation among the businesses.

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