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Comparative Analysis of Renewable Energy Investment Strategies: India and China's Involvement in Africa

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Abstract

This study contrasts the efforts made by China and India to promote investment in renewable energy. It examines how African countries' choices and policies affect the continent. Through community assistance, education, and training, India aims to foster South-South cooperation. To increase sustainability and expand access, the plan prioritizes small-to medium-sized projects, solar systems, and micro grids that have been authorized by the International Solar Alliance. As the US concentrates on alternative energy, China uses the Belt and Road Initiative (BRI) to expand its hydropower, solar, and wind projects while building large infrastructure through state-owned enterprises. The study looks at the factors that affect these investments and the potential effects they may have on Africa's economy, ecology, and energy. Although China is making significant investments in regional energy, some people are worried about the environmental impact and the debts. India encourages participation at the local level and seeks to engage in negotiations with several stakeholders. This study aims to demonstrate how Africa may benefit from equitable cooperation between China and India by examining their rivalry. It also emphasizes how crucial it is to research the resource ties between China, India, and Africa.

Keywords: Africa's Energy Security, Belt and Road Initiative (BRI), China-Africa Relations, India-Africa

Relations, South-South cooperation, Renewable Energy.



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Introduction

Since many people in Africa lack access to power, renewable energy has played a significant role in bringing about long-lasting change in recent years. Asia aims to limit the amount of energy that goes to poor and employ green energy. China's and India's foreign investments have become more significant. Despite having very different goals, strategies, and results, both nations are engaged in African renewable energy. (Schwerhoff & Sy, 2017) It examines China's and India's renewable energy policies and investments in African nations, their motivations, and the ways in which these investments help or hurt the continent. The study examines their overall and investment strategies as well as their goals in analysing their actions in Africa. Important components of this study also include examining China's initiatives in Africa's green energy industry and looking at India's options for green energy investments. Understanding how the two nations are governed differently with an emphasis on infrastructure, technology, and community is the main goal. The study looks at how these energy investments affect the ecology, growth, and energy demands of Africa. Through South-South cooperation, the Indian government provides African nations with support and direction to promote the use of renewable energy. With the help of the ISA, India is able to use solar-powered devices to give its citizens additional electricity. The policy's primary goals are to provide technology to Africa, support local communities by educating them, and encourage initiatives that enable community members to become self-sufficient. (Steven et al., 2015).

Conversely, China integrates its investments in renewable energy into the Belt and Road project, a global project for infrastructure development and trade. Alongside solar and wind farms, Chinese state-owned enterprises (SOEs) are advancing intricate infrastructure through the construction of extensive facilities such as hydropower plants (Grimoux, 2018). Commercial loans finance projects in Africa, directly facilitating the construction of infrastructure that China employs to enhance its economic and geopolitical influence on the region.

Research enhances our comprehension of China's and India's strategies about renewable energy in Africa. The significant findings of the research regarding investor tactics, incentives, and environmental impacts direct policymakers, African nations, and stakeholders to use renewable energy investments for sustainable development. The research findings promoting fair renewable energy collaboration between African nations and their Asian counterparts are beneficial for future renewable energy policy initiatives.

Literature Review

The literature review examines prior research on the renewable energy policies of China and India, focusing on investment trends, policy frameworks, and global energy governance. Cabré et al. (2018) assert that China has significantly invested in overseas renewable energy, emphasizing the role of policy banks and state-owned enterprises in financing projects that bolster the Belt and Road Initiative (Cabré et al., 2018).

Similarly, Finamore (2005) emphasizes China's strategic initiatives that showcase leadership in clean energy, although fails to offer a comparative study with other nations (Finamore, 2022). Behuria (2020) asserts that political and economic constraints have hindered local solar production in the examination of India's National Solar Mission. The report identifies a gap in addressing the specific issues encountered by late industrializers like India (Behuria, 2020).

In his analysis of China's alternative approach to global energy governance, Gao (2017) asserts that the nation's oil companies serve as a counterbalance to Western-led organizations. Gao reports in 2017 that China's state-owned oil companies represent a strategy that goes against the influence

of Western organizations. The lack of a framework for comparing renewable energy approaches in Africa by China and India is the reason for this study. Through this research, the paper explores how China and India approach renewable energy development and investments in African countries (Gao, 2017).

Conceptual and Methodological Framework

A conceptual framework contains the key concepts, variables, relationships, and ideas that affect this subject. It enables researchers to manipulate data and generate hypotheses on possible outcomes. Because a conceptual framework draws from pre-existing research and theories, it makes a subject easier to comprehend. Selecting your research topic, formulating your research questions, and deciding on your tools and techniques are the initial steps. It is quite beneficial to investigate how renewable energy works using a comprehensive model. The many facets of the study topic are brought to light when multiple concepts and investigations are combined. It helps us identify the key factors affecting investments in green energy and the relationships between them. (Zhang et al., 2010).

Investigating how Chinese and Indian investors utilize renewable energy in Africa may be planned by researchers using a methodical methodology. This enables us to investigate the ways in which these investments impact the economics, management, and sustainability of the quasi-states as they evolve. It enables professionals to assess if ideas like liberalism, realism, and dependency theory are appropriate for the problem. Experts may study how China and India help Africa use renewable energy by adopting the right approach. Therefore, it is feasible to comprehend how these investments contribute to the emergence of quasi-states by examining their implications on sustainability, economic growth, and governance. The framework enables you to assess the degree to which dependency theory, liberalism, and realism aid in comprehending the research problem. Experts may thoroughly examine the problem and provide practical remedies using this method.

A Comparative Analysis of Chinese and Indian Policies in Africa

Two of the world's expanding economies, China and India, have increased their investments in renewable energy on the African continent. Both nations understand that concentrating on green energy is essential for sustainability after tackling climate change. Building renewable energy is a priority in Africa because it allows China and India to explore innovations in developing African economies and reduce their reliance on fossil fuels. Initially, both countries presented a strategy for repaying investors in renewable energy projects in Africa. When it comes to financial resources, rules, regulations, and collaborating with local stakeholders during renewable energy initiatives in Africa, both nations face similar challenges. This discrepancy demonstrates how the two parties have different approaches to investing in Africa's renewable energy market. Chinese investments in the renewable energy sector are far more forceful with regional and strategic goals than those made in India (Annual Report on Solar Energy Initiatives in Africa, 2023).

Following the Belt and Road Initiative, China has helped fund numerous solar and wind projects in Africa. Alternatively, the Indian government is using its funds to support clean and safe sources of energy for impoverished African people living in rural and off-grid regions. Hence, the kind of investments they hold helps define each country and its economic policy. Very few Indian entrepreneurs manage to raise capital from banks locally or overseas, while China often leads the way in renewable power projects in Africa by funding them through state companies and public finances. Additionally, India places importance on supporting capacity and working both ways, in contrast to China, whose key aim with its strategy is to achieve major geopolitical and economic

interests across Africa. Similar reasons and obstacles exist for both Chinese and Indian investments in renewable energy in Africa.

China and India have demonstrated their investment frameworks by their initiatives in the renewable energy sector in Africa. The China-Africa Renewable Energy Cooperation and Development Centre creates efficient strategies for collaboration on renewable technologies between African and Chinese organizations. India established the International Solar Alliance via collaboration with several African countries. Support for solar energy technology and solar power-related initiatives is provided to members of the International Solar Alliance. Both countries and the continent confront comparable problems since China and India both have energy constraints and because renewable energy is highly valued in Africa. In order to help those in need, the organizations employ different strategies and allocate varying sums of money. The government provides them with direct support as they invest in renewable energy in Africa. They work closely together and use a variety of tactics to increase competitiveness in the industry and promote information exchange amongst their businesses involved in renewable energy operations. By examining the behaviors of China and India in Africa, we may see specific trends and experiences in certain nations. The provided figures will help disseminate important information and promote long-term collaboration in the advancement of renewable energy in Africa.

Essential Economic and Geopolitical Interests

Because their strategic objectives align, China and India undertake measures to promote the growth of renewable energy in Africa. Africa has significant economic importance for China and India, as seen by their respective pivotal roles in the global renewable energy sector. (Lema et al., 2021) Africa is now a crucial economic component of sustainable global growth, as seen by the growing energy cooperation activity between these two parties, which also benefits both sides. China and India engage in renewable energy projects in Africa in an effort to increase their influence over the continent, improve trade relations, and acquire natural resources there. Beijing and New Delhi's investments in African renewable energy platforms provide for economic gains that benefit both host regions and national objectives. China and India are now able to lead the world in renewable technology services and import resources like wind and solar electricity from Africa thanks to better renewable energy infrastructure. China and India can develop their industries and protect their main interests by lowering their reliance on foreign energy sources.

China is able to expand its commercial and political collaboration with African countries through the Belt and Road Initiative, particularly in the field of renewable energy. Furthermore, the International Solar Alliance (ISA) has started a global campaign to promote solar energy and is helping a number of African nations join. These actions have given China and India more soft power and allowed them to work together on regional issues that benefit both countries. Funding Africa's renewable energy sector is part of global efforts to grow responsibly. China and India are now leaders in renewable energy technologies as a result of their attempts to improve their international status and promote a new energy paradigm.

Harmonizing National Interests: Energy Security and Sustainable Development as Shared Strategic Objectives

As two of the world's most powerful countries, China and India support African countries with energy projects and environmental initiatives. Both sides concur that equitable and efficient energy access is essential to African nations' prosperity and sustainable development in order to prevent future shortages. Both environmental activities contribute to the accomplishment of shared goals, such as reducing oil consumption, promoting the use of renewable energy sources,

and ensuring that everyone has access to electricity. China and India want to see more energy security in Africa. In order to reduce reliance on fossil fuels and increase the availability of diverse energy sources, they advocate for the utilization of solar and wind energy. They strive to promote sustainable development initiatives for this area and lessen the effects of climate change (Brautigam & Brautigam, 2009). Through trade diplomacy, African countries are able to achieve sustainable development goals. China and India aspire for Africa to serve as a platform for establishing international partnerships that would facilitate bilateral commerce and investment in renewable energy. The collaboration promotes employment growth, economic change, and energy stability. On June 20, 2019, China and India concurred that collaboration will yield superior outcomes, expediting Africa's transition to sustainable energy systems.

Differential Incentives and Strategic Approaches

Although China and India share analogous objectives of enhancing energy security and fostering socioeconomic growth in Africa, their methodologies and motivations diverge (Dadwal, n.d.). The initial phase of India's Africa energy initiative is the elimination of racial distinctions. India can employ off-grid and decentralized technologies to comprehend the diverse energy requirements of rural inhabitants across the continent. Most projects in the EU are executed by the private sector, local authorities, and occasionally regional governments, however in China, governments and states have declared the construction of dams for water and energy purposes.

In India, community leaders are adopting a more holistic approach to combating energy poverty, which involves empowering local elected authorities with greater responsibility. To tackle the root causes of poverty within the population, they seek energy solutions. Conversely, China engages in the Bretton Woods System's decision-making process by overseeing state-owned firms to advance its interests as a global entity and as a nation (Finamore, 2022). Their unconventional financial practices and expenditure patterns are inherently influenced by this. Conversely, India has exclusively collaborated with domestic institutions and provided low-cost credit, primarily focusing on skill and knowledge development. Conversely, substantial credits and, crucially, a declaration of financial backing for its industrial sector define China as a supply-side risk management strategy for energy security.

China's infrastructure-centric approach differs from India's dependence on technology transfer

Although China and India both strive to fulfil their energy requirements and promote socioeconomic development in Africa, their divergent strategies and goals distinguish them from one another. De-racialization constitutes the initial phase of India's energy policy in Africa. India can acquire understanding of the varied energy needs of rural communities around the continent by adopting decentralized and off-grid solutions. Most projects in the EU are executed by the private sector, local authorities, and occasionally regional governments, however in China, government entities and states have declared the construction of dams for water and energy purposes.

In India, community leaders must adopt a more holistic strategy to address energy poverty, which entails granting local elected authorities' greater authority. Their objective is to identify energy alternatives for individuals residing in poverty. Conversely, China seeks to engage in the decision-making processes of the Bretton Woods System by operating state-owned enterprises to enhance the national economy and influence international organizations (Munjal et al., 2022). Their unconventional financial practices and expenditure patterns are inherently influenced by this. Conversely, India has exclusively collaborated with local institutions and provided affordable

finance, primarily focusing on enhancing knowledge and skills. Conversely, China is characterized as a risk management mechanism for energy security from a supply standpoint, owing to its substantial credits and, notably, a proclamation of financial support for its industrial sector.

Community-Driven Initiatives Vs Government-Funded, Large-Scale Projects

India has maintained a focus on localized projects, as per its economic model that incorporates community solutions into the decentralized energy policy. India aims to alleviate energy poverty locally by augmenting the proportion of renewable energy in villages and equipping residents with the necessary resources to manage their own energy challenges. The study emphasizes that boosting local renewable energy abilities requires sufficient knowledge transfer together with skill development and capacity building (Saez, 1998).

However, in the agricultural sector, India prefers small projects that involve partnerships. Contrarily, China focuses on extensive sponsored programs aimed at helping Africa develop its infrastructure. One method China aims to fulfil its economic goals, which include resource security and energy safety, is by building hydroelectric dams and power facilities. Local and international organizations oversee community programs and initiatives, which are often backed by a variety of funding sources. In India, the strategy calls for forming alliances with regional organizations and providing small enterprises with cheap loans. Conflicts would be settled and more individuals would have improved abilities thanks to the strategy. To meet major financial commitments and obtain the resources required for security, the Chinese government depends on a well-thought-out plan.

Assessing the Impact of Divergent Strategies on Investment Efficacy

The way that funds are allocated depends greatly on how China and India plan their energy resource efforts and focus on sustainable development in Africa. The model in India aims to improve villagers' skills by giving them technology for creating energy sources. All nations in Africa are set to see benefits from this process that support their independence and development. Because China relies on the government to develop infrastructure, the nation must make broad investments in hydroelectric plants and power generation which are not in line with modern technology, adapting to the climate or the changing composition of its people. China's investments are intended to preserve natural resources and improve energy security. China and India have employed parallel approaches in their training endeavors since the start. To emphasize their differences, India provided concessional loans and partnered with local cooperatives, but China depended on extensive financial packages and acquired numerous resources.

Comparative Assessment of Long-Term Viability and Efficacy

The outcomes of frameworks designed to enhance energy security and sustainable development in Africa are profoundly influenced by the policies and viewpoints of China and India. India and China have very different ambitions in terms of technology and community development because of their different approaches.

The nation's efforts to encourage technological collaboration and sharing give the local populace access to knowledge and skills that help them become energy independent. Their goal is to help African nations use more renewable energy so that all citizens may have access to electricity and the nations can produce energy sustainably. It does this by adhering to values that benefit and include both people and the environment. Conversely, China's main policy focuses on infrastructure, involving government in many large ventures which would produce different outcomes. Constructing dams and power plants for generating energy is mainly used, but these

systems can only last for years if they are well maintained and the environment around them is looked after. The thoughts behind the policy do not always focus on keeping energy systems in use years down the line and protecting the environment (Addis & Zuping, 2019).

In any event, examining the costs and financial implications of these strategies should be part of assessing the viability and effectiveness of a program. Therefore, India's strategy of offering reduced loans and sharing information locally is consistent with equality and sustainability, since Asia-Pacific nations may secure fuel and benefit the environment in the future. However, having to pay off a lot of debt might make the countries who get these loans less independent. The repercussions can cause the governments concerned to incur more expenses, which could result in the projects' failure. We must examine the distinctions between China's and India's assistance to Africa in order to evaluate the efficacy and sustainability of these energy projects. Infrastructure upgrades and technology transfer can help communities in Africa prepare for increased energy security and sustainable development. Cooperation and teamwork are necessary to make sure that their energy-related activities don't negatively impact the environment and continue to benefit the area.

The Development of Africa: Implications for Local Communities and Sustainable Progress

The methods of cooperation both countries use in Africa influence the region's economy and welfare. Misguided strategy in a country can greatly influence different areas such as roads, generators, environmental care and natural resource provision. In India, there is a choice to develop all regions equally by granting equal access to power for each rural area. African nations could develop sustainably by learning from India, upgrading technology and improving skills. So, local people can benefit by gaining self-sufficiency in their energy, a move that improves the area's social and economic status (Bassetti, 2023).

The progress African states make is impacted largely by their infrastructure and help from the Chinese government. Environmental results of building infrastructure, mining resources and making regulations may be different depending on the length of the operations and the resources that are available politically and economically. These projects may support Africa's development or could cause unnecessary resource use, increased pollution and more links to foreign countries. Both those working on African development and the local community find it very crucial to understand these weaknesses. For energy-related activities in the region to help promote sustainable development, China's and India's unique approaches to using energy sources and constructing new projects should be analyzed and shared with others. Both models must find ways to communicate so that the development of robust and lasting strategies for local areas and growth of Africa is achieved.

Rationale for Investment

India's policies in renewable energy are consistent with its South-South cooperation which strives to solve energy problems among developing countries and considers sustainability. To show leadership in solar energy, India relies on organizations like the ISA, also known as the International Solar Alliance. Another approach is that China blends green investments with the Belt and Road Initiative to get essential resources for building its economy and increasing its global status in energy, especially with hydropower and solar energy (Behuria, 2020).

Most of India' investments are allocated to micro grids, off-grid solar systems and supporting rural electrification to assist with technology distribution, raise local capacity and make the projects more people-focused. Many of these projects are financed at affordable rates or through grants and

are developed with the support of multilateral organizations and African nations. Alternatively, China mainly invests in huge industrial projects such as wind farms, hydro-powered plants and installations of solar energy. They are primarily carried out by state-run companies, are funded by commercial loans and investments and relate to the overall plan for building infrastructure within the BRI. Thanks to what it has learned through the ISA, India is well-equipped when it comes to off-grid systems and solar PV technology. Using its abilities in manufacturing and project completion, China has achieved results in hydropower, solar photovoltaic and wind turbines.

Scope

India seeks to expand its influence through ISA projects targeting solar-rich nations, primarily collaborating with East and Southern African countries like Kenya, Tanzania, and Mozambique, using historical ties and the Indian diaspora (Schwerhoff & Sy, 2017). The majority of China's investments in Africa are concentrated in resource-rich nations like Zambia, Ethiopia, and Angola, particularly those along the Belt and Road routes. India is well-versed in solar energy, mostly for roofs and off-grid homes, and it actively encourages community-beneficial small hydro and biomass systems. The Chinese government makes significant investments in wind, hydropower, and solar farms; these energy projects are typically accompanied by new infrastructure. While China is criticized for having few local workers, causing pollution, and pushing other nations to rely on its loans, India places more emphasis on teaching new skills, providing employment, and distributing energy fairly.

Prospects and Challenges for China and India

The study findings describe how and why China and India support renewable energy in Africa and the results achieved. China is building infrastructure and upgrading its strength which involves placing renewable investments in all aspects of its strategy, as well as attempting to acquire resources and grow its influence by following the Belt and Road Initiative (BRI). The construction of renewable energy projects and increased connections between China and African nations are usually the outcomes of Chinese investments. In other words, India gives importance to ecofriendly technology, teaching useful skills and improving infrastructure, with teamwork, career development and shared technology being main foci. India is pursuing policies that support maintaining economic growth and increasing its shared energy options. Varied rules and too much bureaucracy from different countries are challenges that both governments encounter when starting projects in Africa. Ensuring the necessary money is important, since keeping the company running smoothly over the years relies on clever financial procedures to both attract and pay back investors. Involving local stakeholders is another matter, since it requires efforts that bring community advantages such as better infrastructure and more work opportunities. Long-term investments in Africa are subject to uncertainty due to political and economic changes in different countries. Moreover, it takes significant funds and work to provide enough training and adaptation to local organizations, regardless of the programs for training and strengthening local capabilities carried out by both countries.

Significant Outcomes

The study points out the approaches and efforts, the factors and considerations and the results of Chinese and Indian renewable energy investments in Africa. Through projects such as the International Solar Alliance (ISA), India seeks to cooperate with other nations by relying on their shared histories and cultures, mainly those located in East and Southern Africa. Through the provision of subsidized loans and other advantages, it promotes technological advancement and advances knowledge. The transfer of established skills and technology to the private sector for

solar energy is facilitated by soft loans and subsidies. In contrast to the other nations, China focused on developing wind, solar, and hydropower for the Belt and Road Initiative in the 2010s, using government-backed businesses to help achieve this.

It is well known that China may become less autonomous if credit is used for large-scale projects. While India stresses creating jobs and fostering indigenous ideas for community development, Chinese initiatives are allegedly largely focused on efficiency. They face difficulties with numerous regulations, a lot of paperwork, and the high cost of renewable energy projects. While India struggles to pay bills and implement changes swiftly, China seems unable to handle the burden of handling international affairs and repaying its debts. In contrast to Indian cooperation, which benefits small countries equally, Chinese investment helps African countries develop in significant ways, although occasionally there are worries about their influence and the economy.

Recommendation

It is recommended that those in control in India concentrate on loans that are cheap, think about opening up the private sector, and work with the International Solar Alliance (ISA) to share data. Faster adoption of renewable energy in Africa may result from more collaboration between public and commercial sectors and less regulations in the political structure. There may be fewer Chinese workers abroad if education programs are expanded, the amount owing to China is made clear, and local community projects are supported. African countries must cooperate with other nations, make sure their laws are upheld, and advocate for improved terms in international accords. When three or more areas work together on energy initiatives, information may be shared and efforts can be improved. By collaborating with Chinese and Indian partners, studies should also aim to offer solutions that are simple to use and widely available.

Conclusion

Two well-known Asian nations employ opposing strategies to influence Africa's renewable energy landscape. Collaboration with India facilitates the transmission of new technologies, ensuring long-term environmental sustainability for enterprises. Concerns about protecting the environment are also present. Because of the government's infrastructure development agenda, which impacts both the debt position and the communities, Africa is developing quickly. These approaches give a more comprehensive picture than just financial decisions and explain how China and India interact diplomatically with African nations. India participates in South-South cooperation initiatives, whereas the Chinese government prioritises diplomatic infrastructure measures. They both provide original but useful concepts that facilitate knowledge sharing. Sharing the positive features of Indian and Chinese methods might assist African organisations and foreign partners in creating investment frameworks that are appropriate for the circumstances. Through the merger, India would be able to benefit from China's vast infrastructure experience, which will help its people progress more. When assessing investments, consider how well they strengthen institutions, safeguard the environment, and promote more sustainable energy usage in Africa. In order for the world to recognise and encourage Africa's energy transition, cooperation between citizens and governments is crucial on the continent.

Conflict of Interest

The authors showed no conflict of interest.

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