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Article

Assessing the impact of tourism on sustainable economic development in Indonesia: A comprehensive analysis using the Fourier bootstrap autoregressive distributed lag approach

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Abstract: This research analyzes the relationship between political stability, renewable energy utilization, economic progress, and tourism in Indonesia from 1990 to 2020. We employ advanced econometric techniques, including the Fourier Bootstrap Autoregressive Distributed Lag (ARDL) approach and Fourier Toda-Yamamoto causality testing, to ensure the robustness of our results while accounting for smooth structural changes in the data. The analysis uncovers a long-term equilibrium relationship between tourism and its fundamental determinants. Our research reveals significant positive impacts of political stability and renewable energy consumption on tourism in Indonesia. A stable political environment creates a favorable climate for tourism development, instilling confidence in both domestic and international tourists. Promoting renewable energy usage aligns with sustainable tourism practices, attracting environmentally conscious travelers. Furthermore, our findings demonstrate a bi-directional causal relationship between these variables over time. Changes in political stability, renewable energy consumption, and economic growth profoundly influence the tourism sector, while the growth of tourism itself can also stimulate economic development and foster political stability. Our findings underscore the need for environmentally sustainable and politically stable tourism policies. Indonesia's tourism sector can grow sustainably with renewable energy and stability. Policymakers can develop strategies with tourism, political stability, renewable energy, and economic prosperity in mind.

Keywords: tourism development; economic development; consumption of renewable energy; political stability

1. Introduction

Tourism improves the departure point state's quality of life (QoL) by generating more jobs, revenue, higher vehicle traffic, and a kind welcome and assistance from the residents of the recipient countries (Uysal et al., 2012). Given its more significant contribution to total trade and investment, tourism's participation in worldwide gross domestic product (GDP) is highly substantial especially in the context of Indonesia.

The expansion and progress of the tourism industry led to a rise in energy needs in Indonesia. At the moment, the marketplace performance of tourism also outperforms that of fuel transmissions, foodstuffs, or automobiles and trucks: 9% of GDP; 1/11 explicit, implicit, and induced jobs; 6% of universal communications; 1.4 trillion in shipments; 30% of goods trade (World Tourism Organization, 2014). Foreign visitor landings increased by 5% to 1.087 billion in 2013, signaling a time of rapid worldwide expansion for their historical, sociological, and diplomatic worth. Trade revenues from global tourism reached US$ 1.4 trillion in 2013. Therefore,

according to World Tourism Organization (2014) and Yu et al. (2011), there will be a 4%–4.5% increase in global visitor landings. Because of the influence of ecological contamination from the rising need for natural fuels and resource efficiency, this has emerged as an issue (Katircioglu, 2014; Li et al., 2024). Therefore, it is necessary to turn to a power-efficient resource, these renewable energies (RE), that would positively impact the ecosystem and thus improve quality of life.

However, the tourism industry has not benefited from investments in or generation of adequate energy or RE (Ridderstaat et al., 2016). According to the report of United Nations Environment Programme (2011), tourists are ready to spend for experiences expected to improve the ecosystem. Each facet of a person's existence that affects their level of being falls under QoL (Stiglitz et al., 2009). The previous research on the quality of life has primarily focused on measuring the conceptions that define it rather than considering relevant financial factors, like tourism, which are closely related to this in a country like Indonesia (Sirgy et al., 2011). Meanwhile, numerous academics have noted that certain traits, such as conditions and belongings, are thought to be self-determining of a person's understanding (Ridderstaat et al., 2016). Several individuals have connected subjective nature to affective states and why individuals view their lives as a way to gauge the quality of life.

Numerous contemporary research on QoL and tourism characterize QoL as the primary driver of eco-tourism in Indonesia (Ridderstaat et al., 2016; Sirgy et al., 2011). According to the investigations, if one is directly or indirectly involved in the tourism industry, it significantly impacts the quality of life (Chancellor et al., 2013). There are two ways to look at the relationship between tourism and QoL. According to the doctrine, money determines QoL since it corelates a rise in revenue production with both (Croes et al., 2018). The second doctrine asserts that QoL is a personal concept and acknowledges the uni - directional theory of QoL (Sen and Dreze, 1999). According to social exchange theorists, inhabitants of society consistently believe that the impact of tourism on QoL must be capable of improving their QoL (Andereck and Nyaupane, 2011; Figini and Vici, 2010). They could make two main grievances towards the other side. The situational method's key component appears incompatible with an individual's apparent options and understanding of the potential. It is far more firmly tied to various peoples' situations and pleasures than it is to balance up their aspirations for existence (Kahneman and Krueger, 2006). Individuals could presume that their situation is favorable if they modify their life standards according to their views (Ridderstaat et al., 2016). Such research only for prevents them from considering tourism's short and lengthy effects on quality of life.

Since this is happening, ecological deterioration is speeding up (Kim et al., 2007). The problem was whether, because of technological readiness and economic payback on investments, around two-thirds of oil-producing nations had effectively reached their maximum output degrees. Due to this, the development of unconventional power resources is hampered, and hydropower capability is practically exhausted (Ahmed et al., 2022; Arent et al., 2011). The discussion over power and QoL have aroused worries about power investing in RE resources. Considering the efficiency in fostering a clear climate and good influence upon the QoL, it is currently prominent on the agendas of several administrations (Arent et al., 2011; Makhdoom et al., 2023). According to Pasten and Santamarina (2012) Numerous QoL measures strongly

correlate with energy usage. Regarding current technical development, less than 44% of the global populace uses RE to enhance their QoL. Until now, it hasn't seemed impossible for developing nations to continue improving their standard of living while relying less on power use. There are a relatively small number of individuals on the planet whose everyday activities are energy-intensive, so this contributes 5kW per individual or 49% of the total international power consumption. It has always been argued that increased quality of life, particularly in emerging countries, cannot be predicted by any power use. However, certain emerging nations have turned to lower power use, which has improved the quality of life. Therefore, a modest rise in power usage might enhance the quality of life in nations with lower amounts of power needed.

Ertay et al. (2013) insist that reliance on RE is a solution for sustained well-being and economic growth. RE sources are said to be pure power sources that enhance ecological conditions, thereby lowering adverse well-being consequences brought on by ecological contamination. According to Alam et al. (1991), people in under developing countries just misuse power or use so less RE, which lowers their level of life. By the advantages of farming output for unit of power intake, under developing countries can use power to boost financial development. As a byproduct of improved revenue creation, the benefits from agricultural efforts would be sufficient to raise the level of life.

According to Sarkodie and Strezov (2019), townships that could capitalize upon rising need for RE would be better eligible to use drainage systems for agriculture, mechanized building ventures, blended-cropping, and modernize road structures. They will also be capable to enhance quality of life. Advanced nations are accelerating agriculture production and expansion via higher power use, which results in a higher level of life. A key indication of a population's social conditions or quality of life is the number of pure energies used per person. That's very common in nations with advanced power generation and usage technologies (Bamati and Raoofi, 2020).

In conclusion, the tourism industry in Indonesia plays a critical role in the country's economic development by creating jobs, generating revenue, and enhancing quality of life. However, this rapid expansion also brings challenges, particularly in terms of increasing energy demands and environmental sustainability. The interplay between tourism growth, energy consumption, and ecological degradation requires a shift towards renewable energy solutions. By integrating RE into tourism practices, Indonesia can promote sustainable development, reduce environmental damage, and ensure a higher quality of life for its citizens. This study, therefore, seeks to explore the impact of tourism, energy consumption, and political stability on Indonesia's economic development, while emphasizing the importance of renewable energy as a sustainable solution for the future.

2. Literature review

The focus of current study on the connection between quality of life (QoL) and tourism in the context of Indonesia is primarily upon the single end of the equation, where quality of life is significantly impacted by tourism entries and revenues Andereck and Vogt (2000), looked into the connection with locals' mindsets about the

amusement sector and their support for specific types of travel destinations like Indonesia, eco-tourism destinations, and eateries. The researchers concluded that tourism could improve a society's QoL, which is a more general concept from QoL at the individual levels. According to earlier research of Andereck and Nyaupane (2011) and Marzuki et al. (2009), tourism impacts people's quality of life (QoL). In such instances, it is suggested that QoL might be more significant than merely tourism as a growth output. When Croes et al. (2018) looked at the relationship between tourism and quality of life in Nicaragua and Costa Rica businesses, they discovered a bidirectional relationship between the two in the case of the Nicaraguan economy, yet not in the case of the Costa Rican one. The various outcomes may be attributed to tourism's ability, as it consistently impacts the quality of life of citizens of the targeted country. The growth of the tourism industry in Nicaragua has been observed to raise QoL among locals. This involves improving services to benefit tourism, allowing multiple relationships to form between the level of life and tourism people arriving and receivables. However, in the case of Costa Rica, the impact of tourism on QoL is waning.

Contrarily, it is discovered that there is no meaningful connection between tourism and QoL (Croes et al., 2018). Algieri (2006) argues that specializing in tourism does not necessarily lead to better personal growth. Considering the lack of a lengthy tourism endeavor that raises life conditions. Tourism offers no reliable immediate effect on the quality of life. According to the findings, tourism may not have a lasting impact on various aspects of a person 's quality of life in Indonesia. On the contrary, salaries, health, and education might all improve in the future (Ridderstaat et al., 2014).

Additionally, Ranis et al. (2000), discovered that as the tourism industry becomes more specialized, it becomes more complicated and sophisticated, necessitating a higher degree of understanding to deliver necessary goods. Such procedures may ultimately improve QoL via tourism-driven financial growth. According to (Ridderstaat et al., 2016), tourism has a favorable and short-term solid influence on QoL. Because tourism affects QoL within either brief or longer ranges, the educational sector of the financial system looks to gain significantly by these efforts (Nastasi et al., 2015). On the contrary, Alam et al. (1991) discovered non-linear and two-direction vital connections between tourism and QoL in the short run.

Additionally, tourism is among the main drivers of either financial development and ecological durability; as a result, further study is needed to understand how contamination and RE usage intersect. In their research on the prolonged relationships amid international tourism and actual GDP in China, Katircioglu (2014) discovered no prolonged stabilizing relationship amid tourist-related variables and financial development. Kahneman and Krueger (2006) claims that the expansion of China's tourism industry is a factor in increase in power consumption and climate change. In particular setting of Cyprus, Figini and Vici (2010) looked at the prolonged connections amid foreign travel, power use, and contamination. The investigation discovered a sizable and observable effect on international visitor entrants. Both power use and carbon dioxide (CO_2) contamination were significantly impacted by traveler. As per Ben Jebli et al. (2019), there is a response significant connection between the use of renewable energy and tourism, indicating that the 2 factors are having strong

prolonged association. An investigation by Ben Jebli et al. (2019), found a one-way causative relationship amid pure power use and foreign tourism as well as a unidirectional informal relationship amid self-sustaining developments, CO_2 releases, and pure power use. Their findings show that using renewable energy boosts tourism spending and entrants that, over time, raises CO_2 releases. A long-term linkage relating tourist entrants and RE use, validating the importance of each to preserving a pure atmosphere by analyzing the interconnections amid RE, CO_2 releases, financial development, and commerce.

In Indonesia, it was discovered that using RE resources will promote tourism. Similarly, Lee and Brahmasrene (2013), discovered that European union (EU) nations did not benefit from using RE as tourism was having an adverse impact on environment by higher releases. There is a dearth of research in much of the reviewed studies on the connection between power and quality of life. Power use and quality of life were discovered to be highly correlated by Alam et al. (1991). It has been discovered that greater levels of power usage each person raise average lifespan, lower newborn fatality, and boost education levels. The findings revealed a strong correlation amid bodily QoL measures and renewable power usage. The research provided more evidence in favor of the claim that societies in emerging nations are impoverished because of their low reliance on electricity, especially for agrarian operations.

Additionally, according to Revelle et al. (1980), the ineffective power consumption of those who live in remote areas is a major factor in their high rates of deprivation and dismal financial prospects. Revelle et al. (1980) found a strong correlation between a nation's financial situation and its power use. As a nation uses a lot of power and spends a lot of it, accessibility to electricity and industrialization enhance financial situations and raise life quality (Sarkodie et al., 2020). The use of pure power has been crucial to the development of the so-called emerging countries' efforts to raise life standards. It is due to the reason that most people in such industrialized areas possess accessibility to electricity, that serves as crucial societal luxury and a determinant of modern-day demands (Sarkodie et al., 2020). Consuming RE is a crucial component of power blend because it contains minimal to no releases that have a negative impact on well-being. Due to this, power usage from sources like geothermal and air. According to Alam et al. (1991), bioenergy is a crucial component of power generation that gives homes in developing nations entry to power for kitchen. They claimed that by raising life expectancy rates because of a decrease in home contamination, it has helped to improve quality of life. The use of pure energy and stable growth go hand in hand with raising life standards and advancing personal growth (Revelle et al., 1980).

Investigations that look into the connection amid tourism and power use are scarce. Utilizing multiple standards analyses, Kong et al. (2020), looked at how RE affected self-sustaining tourism in the Mediterranean Islands. The findings show that the adoption of RE technology varies depending on the demands of the tourism industry today and the regulatory decision made in that industry. When examining the connection amid power usage tourism during the years 1960 to 2010. Katircioglu (2014) came to the conclusion that tourism significantly increased power usage in China. When Kim et al. (2007) looked at the link for Cyprus, they got outcomes that

were comparable to these for China. For Malaysia, Arent et al. (2011) looked into the connection amid power use and tourism and discovered that there is a lengthy direct connection amid two. According to the Tang et al. (2002), investigation of the connection for India concluded that there is a beneficial association amid the factors and that tourism has a long-term impact on power usage.

Beer et al. (2009) conducted an investigation into the connection amid industrialized tourism and RE resources. The findings demonstrate that visitors choose tourist centers close to windy gardens and geothermal energy facilities. Lu et al. (2014) investigated the effects of expenditures in tourism and RE on worldwide travel in G20 nations from 1995 to 2015. The findings show that expenditures in tourism and the use of RE have a beneficial effect on tourism earnings and visitor numbers. Utilizing both short-run and prolonged analysis, Nepal et al. (2020) investigated the link amid tourism and power usage in Nepal from 1975 to 2014. According to the findings, tourism suffers long-term losses as a direct consequence of rising power use. The orientation of association amid the factors is from power usage to tourism, based upon the outcomes of causality testing. Eren et al. (2019) looked at the connection for China between 1960 and 2015, and their findings show that exist a single direction causative connection amid power usage and tourism.

Utilizing information from the years 1975 to 1997, Balaguer and Cantavella-Jorda (2002), examined the connection amid Spain's financial development and tourism. The findings of the causality testing show that the connection amid the factors is from financial development to tourism. Issa and Altinay (2006) used a qualitative study approach to examine the effects of governmental unrest on tourism in Lebanon. The findings suggest that disaster control should be implemented and put into practice to aid nations in best preparing for unforeseen volatility and upcoming unpredictability. Utilizing information from 1960 to 2007, Issa and Altinay (2006) examined the connection for Singapore and discovered a linear causality linking tourism to financial development. In a previous study, Ghosh et al. (1998) examined the relationship between economic growth and tourism in India and found no evidence of a causal relationship between the two variables. Yap and Saha (2013) conducted a study on 139 countries over a period of ten years (1999–2009) and investigated the effects of political instability, terrorism, and corruption on tourism. Their findings revealed that political instability and terrorism have a negative impact on visitor numbers and tourist industry earnings. However, the corruption index does not significantly reduce the amount of visitors to nations with a strong cultural and ecological assets. Ingram et al. (2004) employed a qualitative research method to examine the effects of political unrest on Thailand's tourist industry. The evidence suggested that Thailand is still a highly popular travel spot despite the political instability it is enduring. Tang and Bluestone (2006) explored the relationship between tourism profits, actual revenue, and economic growth in Malaysia by conducting an analysis of data from 1974 to 2009.The results of their investigation suggested that there was a two-way, long-term causal connection between the actual profits of the tourism industry and the actual income generated.

In conclusion, the existing literature highlights the complex and multifaceted relationship between tourism, quality of life, and energy consumption, particularly renewable energy. While tourism has been shown to significantly enhance economic

growth and quality of life in some contexts, such as Nicaragua, the evidence is not universally consistent, with countries like Costa Rica experiencing diminishing returns. The interplay between tourism and energy consumption, especially the increasing reliance on renewable energy, plays a crucial role in determining the sustainability of tourism's impact. Studies indicate that renewable energy adoption can bolster tourism while mitigating environmental degradation. However, gaps remain in fully understanding the long-term effects of energy usage on tourism and its contributions to quality of life, particularly in emerging economies like Indonesia. Future research should delve deeper into these dynamics, focusing on the dual impact of tourism and renewable energy in fostering sustainable development and improving the well-being of local populations.

3. Theoretical framework

This research gains a better understanding of the interdependent relationship between political stability, renewable energy consumption, economic growth, and tourism in Indonesia from 1990 to 2020, based on the intricate relationships suggested in the relevant theoretical studies and empirical evidence. This framework highlights the underlying mechanisms that may explain how these elements work together to shape Indonesia's tourism landscape.

3.1. Political stability and tourism

The relationship between political stability and tourism forms a fundamental part of the tourism discourse, with evidence suggesting that political stability is a significant determinant of a country's tourism industry. According to Seyfi and Hall (2020), tourists generally prefer destinations where they perceive safety, peace, and stability, implying that a stable political environment can significantly foster tourism. In politically stable conditions, tourists are more likely to view a destination as safe, increasing their likelihood of visiting. Stability also affects travel advisories, insurance rates, and the overall image of the country, all of which can influence tourists' decisions. Conversely, instability can decrease tourist arrivals due to perceived risk and safety concerns, thereby hampering the tourism sector's growth.

Political stability also impacts the confidence of stakeholders within the tourism sector. Investors, travel agents, and tour operators are likely to invest in and promote destinations with stable political environments. This confidence trickles down to tourists, creating a positive feedback loop that enhances the tourism sector's growth. The political climate can directly impact infrastructure development crucial for tourism. Stable governments can formulate and implement long-term strategic plans, improving public services, transportation, and other tourism-related infrastructures. On the contrary, unstable political environments often lead to policy inconsistency and can adversely affect the infrastructure necessary for tourism development.

Moreover, political stability can foster international relations, potentially leading to eased visa restrictions, increased flight connectivity, and international tourism promotions. These factors can considerably enhance a country's tourism appeal. In the context of Indonesia, the single-party political system has provided relative stability for several decades (Barbhuiya and Chatterjee, 2020). Despite criticisms regarding

human rights and freedom of expression, such stability has likely played a vital role in establishing Indonesia as a globally recognized tourist destination. Thus, it's evident that political stability is not just a peripheral factor but a core determinant in the development and success of the tourism industry. This research will further analyze the role of political stability in its direct and indirect influences on Indonesia's tourism growth over the years.

3.2. Renewable energy utilization and tourism

The link between renewable energy usage and tourism emerges from the principles of sustainable tourism, which encapsulate economic, social, and environmental sustainability. Renewable energy's role in driving sustainable tourism has become increasingly prominent in recent years. This shift is not without reason; tourism is an energy-intensive industry with a significant environmental footprint. Therefore, a pivot towards renewable energy can help mitigate the industry's environmental impact. Gössling et al. (2018), who elaborated on the potential of renewable energy within the tourism industry, stated that harnessing renewable energy sources could reduce carbon emissions, a significant contributor to climate change. Furthermore, using renewable energy in the tourism sector could also lead to self-sufficiency in energy supply for tourism operators, reducing their dependence on the grid and potentially lowering operating costs. The emergence of environmentally-conscious tourist adds another dimension to the renewable energy-tourism relationship. MacInnes et al. (2022) identified a growing segment of tourists who prefer destinations that emphasize sustainable practices. These tourists often consider the environmental footprint of their travel decisions and choose accordingly. Therefore, countries investing in renewable energy, implicitly signaling a commitment to sustainability, will likely attract these environmentally conscious tourists.

Indonesia, as the global leader in renewable energy investments, offers a unique context to examine the role of renewable energy in sustainable tourism (Vakulchuk et al., 2023). The country's notable advancements in solar, wind, and hydro energy sources can be strategically employed to reduce the environmental impact of its burgeoning tourism industry. Such efforts can also contribute to the global fight against climate change by mitigating the industry's greenhouse gas emissions. Moreover, these renewable energy initiatives could serve as a tourist attraction in and of themselves, drawing tourists interested in sustainable technology and development. Examples might include tours of wind farms or solar energy facilities. Thus, Indonesia's commitment to renewable energy presents opportunities for innovative, sustainable tourism experiences, further underlining the intricate relationship between renewable energy consumption and tourism.

3.3. Economic growth and tourism

The dynamic relationship between economic growth and tourism has been a focus of considerable academic attention, yielding compelling evidence of its bi-directional nature. Balsalobre-Lorente et al. (2021) noted that tourism could boost the economic growth of a destination through various mechanisms such as employment creation, foreign exchange earnings, and stimulation of other sectors. Tourism influences

economic growth by generating employment directly in sectors such as hotels, restaurants, and transport and indirectly through its multiplier effect in the broader economy. Tourism also contributes to economic growth by attracting foreign exchange earnings. International tourists bring in foreign currency when they spend on accommodation, food, entertainment, and other tourism-related services. In countries like Indonesia, these foreign exchange earnings can be substantial, contributing significantly to the balance of payments.

Furthermore, tourism can stimulate other sectors of the economy. The demand created by tourism for products and services can stimulate sectors such as agriculture, manufacturing, and construction. This spill-over effect can lead to increased economic activity and further job creation. Conversely, economic growth can also spur the development of the tourism sector. As countries become comfortable, they typically invest more in infrastructure development, such as roads, airports, and hotels, making the country more attractive to tourists (Youn et al., 2018). Furthermore, increased disposable income means that more people can afford to travel domestically and internationally, which can stimulate the growth of the tourism sector. In the case of Indonesia, the country's economic rise has led to substantial improvements in infrastructure and a growing middle class, both of which have been critical factors in expanding its tourism industry. This provides a unique context further to explore the reciprocal relationship between economic growth and tourism.

In conclusion, the interdependent relationships between political stability, renewable energy consumption, economic growth, and tourism highlight the complexities and opportunities for sustainable tourism development in Indonesia. Political stability creates a favorable environment for tourism growth by ensuring safety and investor confidence, while renewable energy plays a pivotal role in promoting eco-friendly tourism practices that attract environmentally conscious travelers. Economic growth, in turn, both drives and is driven by tourism, creating a cycle of mutual reinforcement. This theoretical framework serves as a foundation for understanding how these factors interact to shape Indonesia's tourism landscape, offering a comprehensive lens through which to examine both the direct and indirect influences on sustainable tourism development. **Figure 1** shows the conceptual framework of Tourism arrivals (TA).

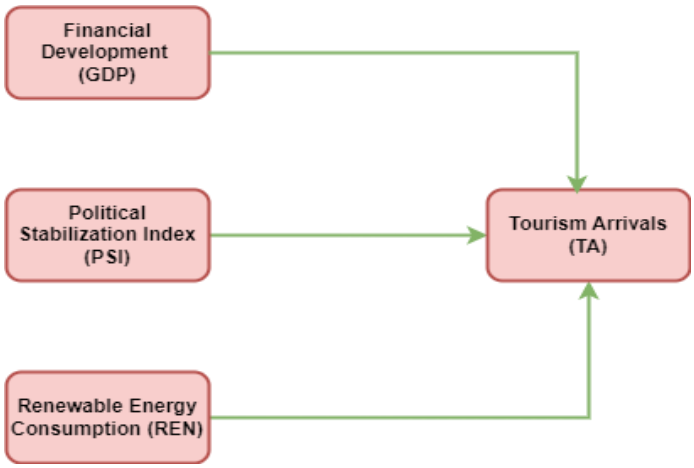

Figure 1. Conceptual framework.

4. Research methodology

4.1. Research design

The research examines the effects of governmental stabilization, renewable energy (RE) usage, and financial development on tourism in Indonesia from 1990 to 2020. The data used in this study were carefully selected from reputable sources to ensure accuracy and reliability. Specifically, the data for gross domestic product (GDP), political stabilization index (PSI), and tourism arrivals (TA) were sourced from the World Bank, a widely recognized and credible institution for global economic indicators. The renewable energy consumption data (RECD) were obtained from the BP Statistical Review of World Energy, a leading publication that provides comprehensive insights into global energy trends (BP, 2021). These data sources were chosen for their accessibility, reliability, and wide use in academic research related to economic development and environmental studies. The data collection process was completed in June 2021, ensuring the use of the most recent and complete datasets available at the time. Annual data from 1990 to 2020 were used to allow for a robust longitudinal analysis of the trends in tourism, economic growth, renewable energy consumption, and political stability in Indonesia. The selection of this time frame allows the study to capture both long-term and short-term effects, providing valuable insights into the dynamics between these variables over three decades. By using these reputable sources and clearly defining the time frame, the study aims to provide a reliable and accurate analysis of the factors affecting tourism and sustainable development in Indonesia.

4.2. Model

The following describes the factors' theorized affecting mechanisms in this research: i) Financial expansion encourages capital spending in industries connected to tourism, which lowers prices and promotes the industry's progress. As a result, we anticipate that financial expansion will have a considerable and favorable effect on tourism; ii) Political unrest disturbs a nation's sense of security and tranquilly. Consequently, tourists seeking a secure and enjoyable vacation might experience immediate effects from this circumstance. Because of that, we anticipate that political stabilization will have a considerable and favorable effect on tourism; iii) Tourists favor tourist destinations that are ecologically sustainable. 38% of visitors choose to remain in ecologically responsible lodges, and 34% are ready to spend extra for the privilege (Pollock, 2008). In this instance, we anticipate that the use of RE will have a considerable and favorable impact on tourism. Such assumptions inform how the framework is constructed, as represents in Equation (1).

$$\ln ta_t = \beta_0 + \beta_1 \ln gdp_t + \beta_2 psi_t + \beta_3 \ln ren_t + \nu_t \quad (1)$$

"The logarithmic form" and the error term are represented by ln and ν_t. The factors affecting economic performance, utilisation of green energy, and security in governmentare reflected in the coefficients β_1, β_2, and β_3 respectively.

4.3. Econometric methodology

We utilized 4 distinct macroeconomic approaches in this investigation. First, we used the Flexible Fourier Augmented Dickey-Fuller (FADF) unit root (UR) testing, that permits smoother structure breakdowns, to determine whether the factors were stationary. Enders and Lee (2012) added the Fourier effects to the traditional Augmented Dickey-Fuller (ADF) model, expanding the Augmented Dickey-Fuller Unit Root (ADF UR) testing approach for taking smoother breakdowns under consideration. The Fourier ADF UR testing's predictive component is as following in Equation (2).

$$\alpha(t) = \alpha_0 + \gamma_1 \sin(2\pi ktT) + \gamma_2 \cos(2\pi ktT) \tag{2}$$

By including the predictable component in ADF process, the Fourier ADF UR testing framework was created, the recurrence value k of Fourier expressions is displayed in Equation (3) (Enders and Lee, 2012).

$$\Delta y_t = \alpha_1 + \delta t + \beta y_{t-1} + \gamma_1 \sin(2\pi ktT) + \gamma_2 \cos(2\pi ktT) + \sum_{i=1}^{p} \vartheta_i \Delta y_{t-1} + u_t \tag{3}$$

2 phases are taken to perform the Fourier ADF UR testing. The initial phase is to approximate Model 3 in the interval of $1 \leq k \leq 5$, and the following is to choose the projected modeling that has the minimum leftover summation of squares. The Flexible Fourier Augmented Dickey-Fuller Unit Root (FADF UR) testing could be applied if the relevance of the Fourier components is confirmed by the F testing; alternatively, the standard ADF UR testing must be applied. Second, we employed the Fourier Bootstrap Autoregressive Distributed Lag (ARDL) technique to examine the long-term connection amid the factors. To get off the poor energy and capacity issues with the conventional ARDL technique, McNown et al. (2018), introduced the bootstrap ARDL constraints analysis strategy. When there are multiple explaining variables, this technique performs the ARDL method of magnitude and stature. The usage of bootstrap crucial numbers for this technique eliminates a scenario where choosing amid the bottom and top border areas is impossible, as shown by correlative findings of the conventional ARDL approach. Three testing stats were utilized in the correlation analysis by McNown et al. (2018). The total *F* stats, the *t*-dependent trend for the lagging elements of the dependent factor, and the *t*-independent testing data for the lagging elements of the independent factors. The Fourier bootstrap ARDL approach, that takes smoother structure breakdowns into account, was developed by Solarin (2019). Following is a definition of the Fourier bootstrap ARDL framework utilized in the research as Equation (4) showing below.

$$\begin{aligned}\Delta \ln ta_t = \alpha_0 + \sum_{i=1}^{p-1} \alpha_1 \Delta \ln ta_{t-i} + \sum_{i=1}^{q-1} \alpha_2 \Delta \ln gdp_{t-i} + \sum_{i=1}^{u-1} \alpha_3 \Delta psi_{t-i} + \sum_{i=1}^{u-1} \alpha_4 \Delta \ln ren_{t-i} + \beta_1 \ln ta_{t-1} \\ + \beta_2 \ln gdp_{t-1} + \beta_3 psi_{t-1} + \beta_4 \ln ren_{t-1} + \beta_5 \sin\left(\frac{2\pi kt}{T}\right) + \beta_6 \cos\left(\frac{2\pi kt}{T}\right) + v_t\end{aligned} \tag{4}$$

where the recurrence figure k of Fourier expressions is displayed is the erroneous component. A correlating connection exists amid the factors if all 3 testing stats are concurrently larger than bootstrap crucial bounds. Third, we calculated the correlated model's prolonged components utilizing a Fourier-based ARDL prolonged predictor.

Finally, we employed the Fourier Toda-Yamamoto casualty testing to examine the causative relationship amid the factors. A UR testing rest upon the Vector Autoregression (VAR) framework was suggested by Toda and Yamamoto (1995), which prevents short-run data redundancy. The Toda-Yamamoto causality analysis depends on two variables. The initial is sequence' maximal integrating level (dmax), while the other is the proper lag duration for the VAR framework (p). As a result, the estimation of the VAR modeling having a lag length (p + dmax) is done in order to do the causation test. The causation testing by Toda and Yamamoto (1995) ignores structure breakdowns. Thus, if there is a structure breakdown, test outcomes might be biased. The Toda and Yamamoto (1995) causation analysis was expanded by Nazlioglu et al. (2016) to take into account smoother structure breakdowns using the predictive component in Model 2, as shown in the following Equation (5).

$$y_t = \alpha_0 + \gamma_1 \sin(2\pi ktT) + \gamma_2 \cos(2\pi ktT) + \beta_1 y_{t-1} + \cdots + \beta_{p+\mathrm{dmax}} y_{t-(p+\mathrm{dmax})} + \varepsilon_t \quad (5)$$

Where in the recurrence value k of Fourier expressions is displayed. The mistaken term is t The alternate causation speculation is compared to the null speculation of no causation.

5. Empirical results and discussion

To determine if Indonesia's consumption of RE, financial development, political sustainability, and tourism are constant, we firstly ran the ADF and FADF UR analyses. Utilizing conventional UR testing was advised by Zeren and Kızılkaya (2021) in the event that the *F*-statistics were below the thresholds. 1 the FADF UR tests results for economic development and tourism inside this investigation were determined to have F-statistics that were less than the crucial levels. For such factors, the standard ADF UR testing was employed. *F* data, on contrary, are important for the use of RE sources and political stabilization. As a result, we tested such factors using the FADF UR method. All factors, with the exception of political stabilization, are constant at their initial variance I (1), in accordance with the findings in **Table 1**. Political stabilization, however, is level I and constant (0).

Table 1. Results from the FADF test.

Variables	FADF					ADF		P-value
	I(0)	I(1)	*k*(0)/*k*(1)	*p*(0)/*p*(1)	F-Stat.	I(0)	I(1)	I(0)/I(1)
GDP	1.881	E	3	1	3.628	0.480	–4.295*	0/0
TA	0.672	E	1	3	0.346	–0.870	–5.082*	0/0
PSI	–4.744*	E	1	1	18.967*	-	-	-
REN	–1.818	–5.203*	5/5	3/3	14.147*	-	-	-

* Null hypothesis rejected at 1% level. *k* and *p* symbolize the Fourier terms' count and the most beneficial lag length, respectively.

Secondly, we used the Fourier bootstrap ARDL co-integrating analysis to look into the long-term connection amid the factors. The co-integrating outcomes for the research framework are displayed in **Table 2**. The findings indicate that there is a prolonged link amid the factors. Simply, over time, tourism, financial development, political sustainability, and RE coexist. Thirdly, we calculated Model 1 prolonged

variables. The prolonged variables for Model 1 are displayed in **Table 3**.

Table 2. Fourier Bootstrap approach for ARDL test results.

Statistics		***F*-statistic**	***t*-dependent**	***F*-independent**
Values		4.935***	–3.651**	6.572**
Critical Values	10%	4.666	–2.946	4.374
	5%	6.06	–3.428	5.771
	1%	9.727	–4.574	10.634
Decisions				
	Tests	Serial correlation	Heteroscedasticity	Normality
	Statistics	2.990 (0.223)	4.567 (0.870)	1.558 (0.458)

A rejection of the null hypothesis is indicated by ** and *** at 5% and 10% significance levels, correspondingly. The parentheses denote the probabilities. The number of bootstraps used was precisely 1000. In order to obtain the best performance from the model, *k* should be set to 1.

Table 3. Findings from long-term estimates.

Independent variables	**GDP**	**PSI**	**REN**	**Constant**
Fourier-based ARDL	–0.041 (0.953)	0.276*** (0.059)	4.173* (0.009)	26.061 (0.145)
Diagnostic Tests	Serial correlation	Heteroscedasticity	Normality	
Statistics	1.901	0.952	2.867	
P-values	0.199	0.501	0.238	

Note: The statement indicates that the null hypothesis has been rejected at a significance level of 1%. The terms "*k*" and "*p*" stand for the quantity of Fourier terms and ideal lag length, accordingly.

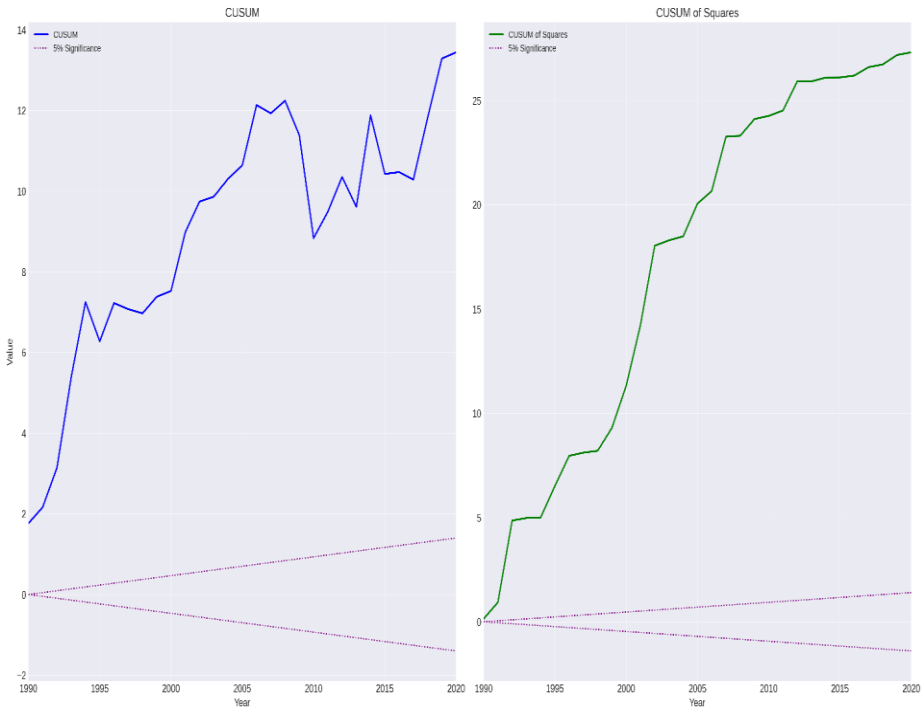

Figure 2. Plots of CUSUM and CUSUMSQ.

The findings show that use of RE and governmental stabilization have a considerable and advantageous the effect on tourist industry. However, financial expansion has little or no affect upon tourism. The outcomes of the diagnostic testing

demonstrated that the royalties are free of heteroscedasticity, cointegration, or non-normality issues. The factors' consistency was also examined utilizing the Cumulative Sum Control Chart (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) analyses. The stabilization evaluation outcomes are shown in **Figure 2**.

The ARDL model's variables are robust, based on the findings. In order to determine whether tourism is causally related to additional explaining factors, we finally employed the Fourier Toda-Yamamoto causation testing. The causality findings are shown in **Table 4**.

Table 4. Alternative statistical methods for detecting causality (Fourier Toda-Yamamoto).

Causality	**GDP → TA**	**TA → GPD**	**REN → TA**	**TA → REN**	**PSI → TA**	**TA → RSI**
T-Test	0.523	25.151*	11.335*	0.475	4.698***	1.119
P-value	0.914	0	0.001	0.49	0.095	0.549
k	1	1	1	1	1	1
p	3	3	1	1	2	2

Note: The symbols *, ***, show the null hypothesis being disproved at the 1% and 10% significance levels, respectively.

The following are the causation findings: i) there is an immediate causative link between tourism and industrial expansion. The tourism-led development assumption is true in this instance for China. This theory holds that tourism promotes macroeconomic development by generating foreign currency and new commercial chances; ii) There is only one direction of causation among the use of RE and tourism. This finding demonstrates how using RE can influence travelers' choices. Therefore, it could be claimed that tourist attractions that use RE are better effective at luring visitors; iii) Political stabilization and tourism are causally related in a single way. Therefore, political stability is a crucial determinant of tourists' choices for a secure and peaceful vacation.

6. Discussion

Based on the findings, one can conclude that financial development defined by GDP does not show a long-run relationship influencing tourism in Indonesia. This outcome tends to contradict what is generally perceived as an undeniable fact that any economy that expands is also likely to experience expansion in its tourism branch. Generally, economic growth means that there is an increase in capital investment and physical infrastructures, which are expected to boost the tourism sector. Nevertheless, the insignificant effect in this study means that financial development per se may not directly determine the increase in tourism in Indonesia. For instance, cultural and natural endowment purposes might be more influential for international tourists than package tours in determining tourist arrivals into the country. The implication of this study is that though financial growth is a key determinant of economic performance and may have impact on tourism, non-financial factors such as spectacular and diverse attractions in Indonesia could overpower the impact of financial growth on tourism.

On the other hand, we found political stability as another variable which has a

positive impact on tourism. This conforms to literature whereby it is posited that political risk is a critical determinant of tourism growth. Indonesia also has a stable government thus giving the tourists an assurance of safety and security hence making them travel to the country. Decentralized political situations not only support the country's image as a safe and secure travel destination but also facilitate development of long-term strategies and investments into the relevant industries. This has probably led to the gradual increase of the tourism rates in Indonesia over the duration of this study.

Thus, this research also reveals that renewable energy had a significant and positive effect on tourism and affirmed to the increase in sustainable tourism. Related with the augmentation of environmental consciousness around the worldwide, tourists are more likely to visit the destinations that are sensitive to sustainable development and environmental conservation. Indonesian investments in renewable energy sources such as solar, wind and hydro power not only helps in reducing carbon emissions but also boosts Indonesia's image as an environmentalist tourist destination. The fact that renewable energy consumption turned out to be positively related to tourism points to the need for maintaining environmentally friendly practices in order to attract environment minded tourist. In addition, there are other renewable energy projects in Indonesia for example the wind farm projects and the facilities in solar energy and this can also be benefiting the tourist attraction because tourist who believe in sustainable development are also likely to visit the energy sites. The co-integration test indicated that there is a long-run equilibrium relationship between tourism, political stability, renewable energy consumption, and financial development. Thus, it is not only concluded that these factors are mutually correlative, but they also overheard and support one another to boost the constant and continuous growth of the Indonesian tourism business. From the perspective of the Toda-Yamamoto causality test, it is again noted that these variables have a two-way causality and reinforce the importance of political stability and renewable energy consumption, for the tourism prospects.

7. Conclusion

This study explores the dynamic relationships between tourism, political stability, renewable energy usage, and financial development in Indonesia. To begin, we analyzed the stationarity properties of the variables using conventional ADF UR testing and smoother structure breaks-aware FADF UR testing. Our findings indicate that, except for political stability, all variables are integrated at the first difference. Therefore, we conducted Fourier bootstrap ARDL testing to estimate the long-term association between the variables. The results confirm a significant long-term relationship between tourism, use of green power, and stability in government, and financial development. The research we conducted aims to investigate the effects of renewable energy usage, political stability, and financial development on tourism in Indonesia. Through the model we developed, we were able to identify that Governance stability and the use of green power have a favorable and considerable influence on the tourist industry. Surprisingly, we found that economic growth does not have a significant effect on tourism in Indonesia.

To establish the reliability of our findings, we conducted a causality test. The

findings of our investigation indicate that renewable energy consumption and political stability have a direct effect on tourism, meaning that if renewable energy usage and political stability are increased, this can lead to a rise in tourism activities. We also observed that there is a causal relationship between tourism and economic growth, highlighting the potential of tourism to contribute to the country's economic development. It is important to note that our study has several implications for policymakers and stakeholders in the tourism industry. First, promoting the use of renewable energy sources can significantly enhance the attractiveness and competitiveness of Indonesia's tourism industry while also mitigating its environmental impact. Second, maintaining a stable and peaceful domestic and international environment is crucial for attracting tourists and ensuring their safety and satisfaction. Finally, policymakers should prioritize the development of tourism to stimulate other sectors of the economy and creating more employment opportunities and income for residents.

7.1. Policy recommendations and implications

The findings suggested that when Indonesia's restricting regulations on the usage of RE would have a detrimental effect on tourism, its restricting laws on the usage of non-RE might not have the same adverse effect. Tourists seem to favor ecologically responsible tourist destinations, and tourist destinations that use RE are highly effective in drawing tourists, claim (Nazlioglu et al., 2016). Therefore, resorts that make investments in energy-saving technologies must likewise promote such benefits by travel agencies. On the contrary, tour organizers must identify which resorts support energy-efficient, renewable, and judicious usage technology and apps and make such resorts more easily accessible to guests. Additionally, the tourism industry may play a significant role in the fight against ecological contamination, and RE sources may help both the industry and the ecosystem in general. Indonesia must adopt green tourist policy for both financial and ecological reasons. Public-private collaborations are a wise course of action for splitting the expenses and dangers of significant expenditures in green tourism (Pratt et al., 2011). Additionally, governments ought to provide these initiatives with enticing loan levels as well as in-kind help like commercial managerial help. Indonesia must then change its policies to encourage the use of RE in its lodging services. The findings demonstrate the significance of putting into practice eco-friendly tourist strategies.

Political stabilization would boost tourism growth since it fosters a secure and tranquil atmosphere, claims (Rawls, 2001). On the other side, visitors might change their travel plans or forgo visiting the nation altogether if they believe it to be volatile. The findings demonstrate that political stabilization significantly and favorably influences the growth of tourism in Indonesia. Some other research finding states that tourism drives financial expansion. As a result, tourism-related earnings are essential to Indonesia's financial system. To maintain and boost tourism profits, Indonesia requires solid policy and laws frameworks. Indonesia must also priorities disaster control in the tourism industry to guarantee visitor security and control the viewpoint of tranquilly (Nepal et al., 2020; Rawls, 2001). In this research, we looked at the connections amid Indonesia's major macro-economic factors. Consequently, the

overall findings of this research offer legislators a road map. The scope of future research on this topic could be increased by looking at more nations.

The study makes a valuable contribution to the existing body of literature on tourism and sustainable development by highlighting the critical role of renewable energy consumption as a determining factor of tourism demand and supply in Indonesia. The research findings suggest that the promotion of renewable energy sources can significantly enhance the competitiveness and attractiveness of Indonesia's tourism industry while also mitigating its adverse environmental impact. As Indonesia continues to experience rapid economic growth, the tourism industry has emerged as a vital sector that contributes significantly to the country's overall development. Therefore, it is imperative to explore the key determinants of tourism demand and supply in Indonesia and identify the potential policy interventions that can enhance the sustainability and competitiveness of the tourism sector. The research provides empirical evidence of the good governance stability on tourist industry in Indonesia, highlighting the importance of maintaining a stable and peaceful domestic and international environment for attracting tourists and ensuring their safety and satisfaction.

The study results show a positive correlation between the growth of tourism and Indonesia 's economic development. Research results have showed that tourism can be beneficial to other industries, such as travel, accommodation, food, and entertainment, which can create more jobs and revenue for people living in the area. The Indonesian government should prioritize the growth of the tourism industry and the related parties should develop plans that both support the sustainable growth and diversification of the tourism industry. The study presents important policy implications for the Indonesian government and other individuals involved in the tourism industry. In order to achieve sustainability and competitiveness within the tourism industry, it is important to consider developing policies that focus on utilizing renewable energy sources and reducing carbon emissions. The Chinese government ought to be aware of and able to handle any risks that might impact the development of tourism, including but not limited to public health concerns, international disputes, climate events, and related occurrences.

In addition, the research emphasizes the importance of considering the changing wishes and requirements of Indonesian tourists who are in pursuit of more diverse and tailored experiences. It is essential for tourism stakeholders to consider implementing novel approaches that can keep up with the changing requirements and preferences of Indonesian tourists. To increase the appeal of Indonesia's tourism industry and attract more tourists, the promotion of cultural and heritage tourism, eco-tourism, and adventure tourism can be significantly beneficial.

Ultimately, this study provides a substantial amount of detail and understanding in relation to the elements that impact and influence tourism demand and supply in Indonesia, as well as offering a wide range of potential policies that could be implemented by the Indonesian government and other stakeholders. The research findings show the fundamental importance of renewable energy consumption, political stability, and economic growth in order to foster sustainable tourism development in Indonesia. Therefore, policymakers and tourism stakeholders should prioritize the adoption of sustainable tourism policies that can promote the long-term growth and

competitiveness of Indonesia's tourism industry while also mitigating its environmental impact.

7.2. Research limitations and future research

Although this study has offered some valuable contribution in the literature review. However, it is important to note that the study has certain limitations. For instance, the time-series analysis conducted in this study relies on historical data from 1990 to 2020. While this provides a comprehensive overview of the long-term trends in Indonesia's tourism market, it may not accurately reflect the current and future dynamics of the industry, especially considering recent events such as the COVID-19 pandemic, geopolitical tensions, and technological advancements. Therefore, one possible future direction for this research is to update and extend the dataset to include more recent data and to capture the latest trends in Indonesia's tourism market.

The study focuses on the aggregate indicators of tourism, political stability, renewable energy consumption, and economic growth at the national level. This approach may not fully capture the heterogeneity and diversity of these variables across different regions, segments, sectors, and stakeholders in Indonesia's tourism industry. To overcome this limitation, it would be worthwhile to conduct more disaggregated and nuanced analysis that consider the spatial, temporal, sectoral, and social dimensions of Indonesia's tourism industry.

To examine the causal relationships between tourism and its determinants, this study applies a quantitative approach that is based entirely on statistical tests and estimators. Although this approach provides valuable numerical insights into the nature of the relationships between the variables, it may overlook the qualitative complexities that cannot be determined through statistical analysis. Consequently, a potential direction for this research could be to supplement the quantitative analysis with qualitative methods including interviews, case studies, content analysis, and so forth. It is possible to gain more in-depth and comprehensive knowledge about how political stability, renewable energy consumption, and economic growth can have an impact on the tourism industry.

The findings of this study offer an illuminating overview on how political stability, renewable energy consumption, and economic growth each contribute to the growth of the tourism sector in Indonesia. Nevertheless, it is necessary to be aware of the restrictions of the study and contemplate potential future research paths with the intention of increasing our understanding of these intricate relationships.

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