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GREEN ENERGY, INNOVATION, GOVERNMENT SPENDING, SUSTAINABLE TOURISM & PRODUCTION UNDER CLIMATE CHANGE AND POLLUTION

The relevance of international tourism and natural resource rents in economic growth: Fresh evidence from MINT countries in the digital era

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Abstract

The Mexico, Indonesia, Nigeria, and Turkey (MINT) economies are recognized to be bedevilled with many obstacles hampering the economic expansion. In the meantime, many of these problems have not been comprehensively scrutinized in the context of the countries. In recent years, natural resources and tourism development have significantly increased in MINT economies. This study scrutinizes the relationship between natural resource rent, mobile use, foreign direct investment, international tourism, and economic growth in a balanced panel data of four MINT nations from 1971 to 2019. The key finding of this study shows that there is a positive and significant impact of foreign direct investment, natural resource rent, mobile use, and international tourism on MINT's economic growth. Furthermore, the tourism-led growth hypothesis is supported empirically in the case of MINT nations. Furthermore, the Granger causality analysis demonstrates that unidirectional causality is discovered from economic growth to tourism. The study recommends that MINT nations implement some practical tourism strategies to push up economic development, and in turn economic growth will positively contribute to the tourism sector.

Keywords Natural resources · Economic growth · Tourism-led growth hypothesis · Foreign direct investment · MINT countries

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Introduction

The significant role of natural resources and tourism sector development in boosting economic growth has been a hot topic of discussion in the resource-tourism-economics literature. In this regard, some researchers observed that economies concentrate on extracting natural resources are selling their skills and knowledge at low rates; however, unconsciously, resource wealth boosts the purchasing power parity and wealth (Haggard and Tiede 2011; Rahim et al. 2021). These outcomes are dichotomous in the earlier studies, mainly focusing on the resource and growth nexus. This dilemma is known as the natural resource curse paradox, more specifically, a dilemma in which economies with natural resources practice inactive or flush negative economic growth (Abdulahi et al. 2019; Khalid et al. 2021; Alam et al. 2022; Usman and Balsalobre-Lorente 2022).

Numerous motives are offered to clarify the curse connected with the abundance of natural resource rents (Saha and Ben Ali 2017; Sachs and Warner 1995). Primarily, the

extraction of natural resource processes devours economic and fiscal resources that could or else be paid to firms that are contemplating encouraging long-run growth trajectory, for instance, industrialization or services. Furthermore, global natural resource prices are unstable, undermining exporting countries. In addition, the determined scenery of various natural resource supplies assists rent to confine by non-wide-ranging central authorities of an economy, whose markets and their domestic institutions maintain the preservation of political influence more willingly than the endorsement of economic growth (Jahanger et al. 2022; Usman and Makhdum 2021; Rahim et al. 2021). This resource curse also occurs when an economy starts to spotlight all of its powers on only highlighted industries, for instance, the mining industry, and abandon other main production sectors (James 2015). Consequently, countries become over-relied on commodities prices, and gross domestic product (GDP) growth is tremendously unpredictable. Also, domestic governmental dishonesty and corruption often consequence in the resource curse at what time appropriate resource privileges, an income distribution structure is not well-known in the social order, and the rule of law (such as institutional quality), consequential in the inequitable meticulous industry regulation (Roy et al. 2013; Yang et al. 2021).

During the last decades, the linkage between economic expansion and tourism (TOUR) has been of interest to academics, researchers, and policymakers due to the deliberation over the contribution of tourism to global economic growth (GDP). According to the Global Travel and Tourism Council, in 2017, tourism development ascribed for approximately 10% of global GDP for the 15th following year. The impact of tourism on national progress/development is a widely held fact in tourism literature, known as the tourism-led growth hypothesis (TLGH) (Lee and Chen 2022). Under the Millennium Development Goals framework, Sustainable Development Goals (SDGs) are now at the core of developmental matters. Accordingly, this current study examines whether tourism is helpful to sustainable development in the case of Mexico, Indonesia, Nigeria, and Turkey (MINT) nations, offering this paper as a relevant advance in the role of tourism over economic growth in selected nations. Under this prism, the TLGH assumes that constant economic growth in any nation facilitates the progress of the tourism sector. This empirical evidence is called from the tourism-led growth hypothesis.

Furthermore, foreign direct investment (FDI) has recently become the main engine of economic growth and played a significant role in boosting economic growth worldwide (Knoerich 2017). FDI is also considered one of the most significant factors for boosting GDP growth worldwide (Usman et al. 2020a). Hypothetically, two means are explained in the course of which FDI increases domestic GDP growth. Initially, foreign investment can encourage technology transfer to the domestic economy, which sequentially boosts domestic productivity. After that, foreign investment permits the local companies to penetrate new distant markets and to bring in fewer cost inputs from the domestic nation to manufacture final commodities at lower prices and in elevated amounts. From this side, cross-edge investing companies unite foreign and domestic productivity/output to reduce expenses and to increase their efficiency overseas and domestically; as a result, the domestic output dynamic demand and production also increased. Consequently, the whole home country takes advantage of FDI in the short run and the long run because of the rising magnetism of foreign investment companies and connected spillovers for home firms (Mohammed et al. 2022; Desai et al. 2005). Based on these indicators, it is recommended that foreign investment has a muscular link with the economic growth of the domestic economy. Unexpectedly, the literature concerning the possible macro-economic influences of foreign investment on the domestic economies is scarce, as the current studies focused first and foremost on the examination using micro-level data at the industry and firm levels (Braconier et al. 2001; Kamal et al. 2021).

On the other hand, the study on the association between economic growth and FDI, particularly at the macro level, is very scarce. This study adds to the current literature by employing the cumulative dataset of income growth and foreign investment by offering indispensable policy formulation at the macro-economic level. Figure 1 presents the trend analysis of economic growth in MINT countries.

The primary objective of this current study is to determine whether the TLGH is valid for MINT nations. Individual countries are mainly based on economic, geographic, and specific demographic factors. These four economies were selected in 2011 as they were expected to have strong GDP and high stakeholder revenues over the following decades. The idea is that MINT nations have favorable demographics for the next 20 years, and their economic scenarios are encouraging. One of the core elements of classifying the MINT nations as potential economic power regions is the teen population of these nations, which is assumed to be an asset both at the current and in the future. Also, their legal setup is business-friendly, and their governments promote pro-growth strategies. According to the study by Osinubi et al. (2022) on sustainable development in MINT nations, governments should focus on developing economic strategies to enhance the role of tourism in these nations. Hence, if governments in MINT nations focus on sustainably developing tourism, this will translate into sustainable development. Even though numerous papers explore that tourism inflow, information technology, natural resource rent, and foreign investment add to GDP growth, at rest, the academic literature is soundless concerning this nexus

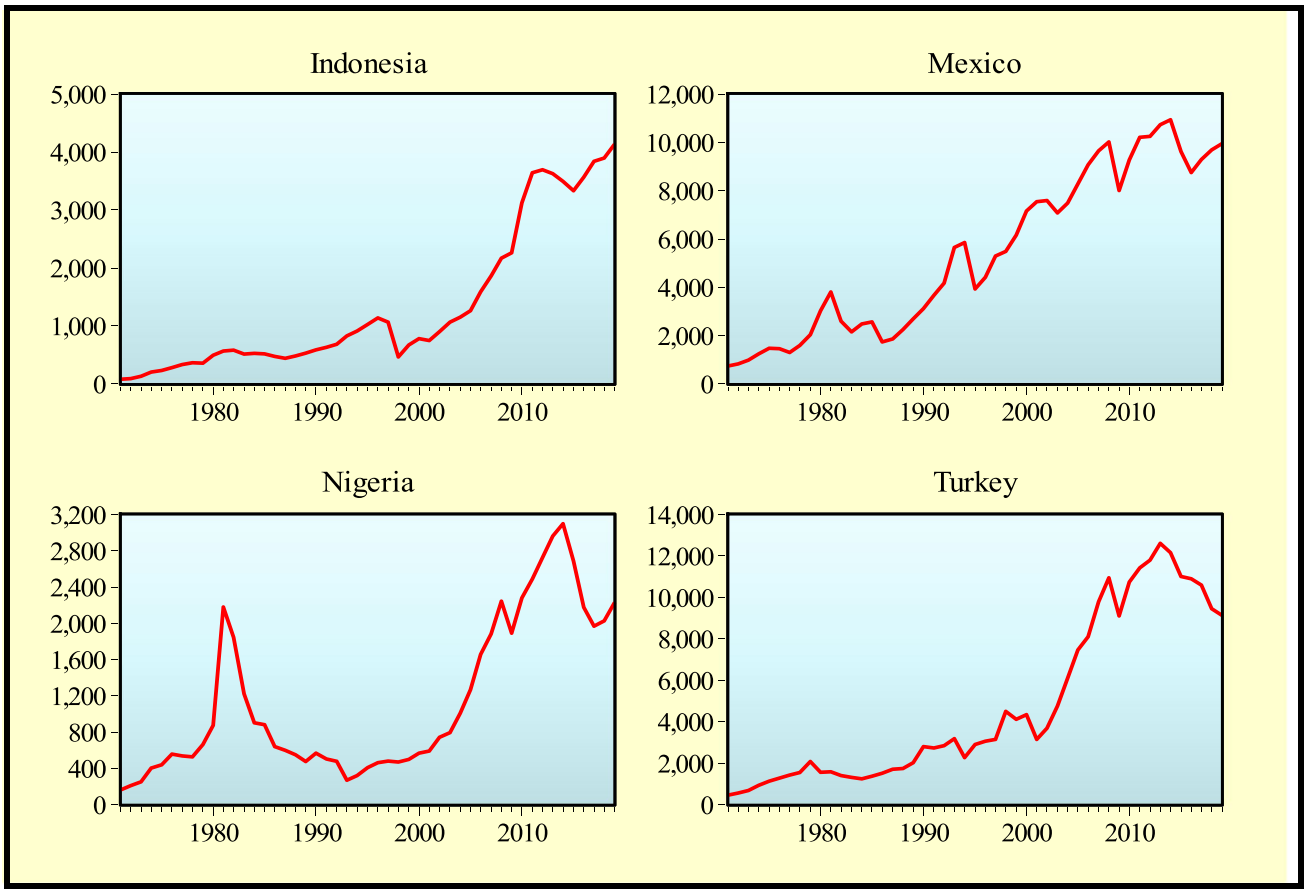

Fig. 1 Trend analysis of economic growth in MINT countries

in MINT countries and requires empirical examination. As a result, the empirical findings advantage researchers and policymakers, and scholars. Finally, most earlier studies wrap financial risk, economic policy uncertainty, and geopolitical risk balanced to real income development and ecological eminence. To the best of the author's information, none of the current literature believes the examination of tourism development, foreign investment, and economic development, which is a real gap existing in the academic literature. In this course, the current research efforts offer empirical support to present suitable policy suggestions for sustainable real income growth to plug this research gap.

This paper is structured as follows: the section "Literature review" reviews the literature review, and section "Data presentation, model specification, and methodology" reports the data, model construction, and methodological process. Section "Results and discussion" consists of results and discussion; finally, section "Conclusion and policy suggestions" concludes the study and policy implications.

Literature review

The impact of the tourism sector on the development of a country is a fact that is extensively present in the tourism literature and is known as the tourism-led growth hypothesis (TLGH). Numerous studies have analyzed the relationship between the TOUR industry and GDP growth. Other some studies assume a positive linkage between GDP, political stability, and the tourism industry (Payne and Mervar 2010). Otherwise, foreign direct investment is a crucial channel for transforming technologies between nations. Foreign direct investment can become an essential carrier of economic expansion (Fakher et al. 2022). Caves (1996) showed that GDP brings high-profit opportunities, attracting foreign direct investment, where foreign direct investment produces positive growth in the host economy through its spillover effects. The findings suggest that better trade strategy modifications, implementation aimed at boosting foreign investment and national investment, and reestablishing global competitiveness to diversify/enlarge the country's

exports have the potential to accelerate economic development in the future. Several studies have explored the linkage between tourism and economic development in different world areas. For instance, Fayissa et al. (2008) showed that international tourism revenues contribute to economic growth in sub-Saharan African countries. The study of Pablo-Romero and Molina (2013) concluded that the relationship between international tourism and growth depends on numerous aspects, including the country's degree of specialization in international tourism. Gökovali and Bahar (2006) evidenced that tourism benefits real income growth in selected Mediterranean countries, while Gokovali (2010) found a direct linkage between international tourism development and economic growth, where the role of tourism-related policies must be carefully designed, especially in developing countries.

Moreover, Wang et al. (2022) concluded that the TLGH is unstable in the case of Hong Kong. Xia et al. (2021) confirm a positive association between tourism and economic development, insinuating the occurrence of TLGH in 34 European nations. Additionally, Ekeocha et al. (2021) results are contrary to the TLGH in the case of 41 African nations. Gričar et al. (2021) empirical outcomes approve the research hypothesis of the uni-causal relationship of TLGH in Montenegro. Kyara et al. (2021) conclusions confirm a unidirectional causality from international tourism development to GDP. Lolos et al. (2021) result supports the TLGH in the case of Greece nation. Razzaq et al. (2021) verified the TLGH in the case of the top ten GDP nations.

Furthermore, Lee et al. (2021) investigated the impact of geopolitical risks and tourism demand in 16 nations from 2005M1 to 2017M12. The evidence provided by AMG and CCEMG explores that geopolitical risk adversely influences international tourism demand. Furthermore, causality analysis findings confirm that geopolitical menace is a noteworthy analyst of tourism demand. In addition, the dynamic features of global and local political environments considerably affect the utilization choice of economic performance and tourists of tourist intentions.

The linkage between foreign investment and economic growth is not new in the published empirical literature. The seminal work of Stoneman (1975) examined the impact of foreign investment on economic development in developing nations and found that FDI increased productivity due to an increase in capital stock while improving the balance of payments. In this sense, foreign investment positively influences income growth, but its impact is limited to host nations implementing export-promoting strategies (Balasubramanyam et al. 1996). The positive influence on the import substitution economy is weaker. Similarly, Borensztein et al. (1998) found that foreign investment enhances economic development, but the scale of this association depends on the quality of the host country's human capital. Olofsodotter (1998) found that foreign investment stock positively affects economic growth due to technology spillovers. In addition, host countries with higher levels of institutional capacity, as measured by the host country's degree of property rights protection and bureaucratic efficiency, have more potent effects.

Moreover, Yeboua's (2021) outcomes demonstrate that foreign investment promotes economic growth in African nations where the setup of institutional quality is above the threshold point. Furthermore, Anwar and Nguyen (2010) suggest that the impact of foreign investment on economic growth in the case of Vietnam nation will be more significant if more potential resources are devoted to financial market expansion and education in promoting the technology gap between the international and national firms. Alvarado et al. (2017) found that foreign investment positively influences economic growth in the case of 19 Latin American nations.

According to the connection between mobile usage and economic development, some studies assume that mobile phone growth contributes significantly to income growth in emerging nations (Andrianaivo and Kpodar 2012), where the role of financial inclusion is essential. Ward and Zheng (2016) found substantial effects on economic growth from mobile phone usage but more minor effects from fixed-line usage in the case of China. Bahrini and Qaffas (2019) estimated the influence of ICT on the economic development of selected developing nations in the Middle East and North Africa (MENA) alliances and Sub-Saharan Africa (SSA), where empirical evidence revealed that all proxies of ICT are the main drivers of economic development in selected nations. Ramzan et al. (2021) found a similar finding in the case of Pakistan.

The connection between natural resources rent and economic development is mainly based on the so-called natural resource curse (Sachs and Warner 1995). Brunnschweiler (2008) scrutinized the effects of natural resources on income growth using a new proxy of resource endowment and considering the role of institutional quality. According to the results of Usman et al. (2021a), there is a positive direct empirical association between natural resource abundance and economic development in the case of eight Arctic nations. Wu et al. (2022) result revealed that natural resource significantly enhances economic development in the BRICS nations. Moreover, Ma et al. (2022) also found that total natural resources promote economic development in the case of 30 Chinese provinces. Besides, Inuwa et al. (2022) result from the long-run estimation exposed those natural resources rent negatively

affects economic development in the case of Nigeria. Using a non-linear method, Alvarado et al. (2022) examined the dynamic linkages between natural resources and economic growth in Latin America. The authors explored the positive influence of natural resources on GDP growth in the long run.

The possible input of this paper to the above studies is that the interrelationship between tourism development, GDP growth, and natural resources was observed comprehensively by using longitudinal stationarity tests, cointegration, and panel estimators in forecasting long-run association and other economic development variables like foreign investment and ICT were included into the main models. Even though all economies are developing economic powerhouses, this association is investigated for a world individual of economies and for panel nations correspondingly. However, none of the single studies has espoused this model to examine the MINT countries to acquire more precise and reliable inference for model restrictions, uncover dynamic relationships, and manage the influence of omitted variables. On the other hand, a restriction for this paper is that possible data structural breaks were unobserved, for instance, the global financial crises in 2008 and country-specific shocks that were influenced by the high oil prices.

Data presentation, model specification, and methodology

Data demonstration and descriptive statistics

The core objective of this current study is to discover the long-run elasticity between natural resource rent, mobile use, foreign direct investment, international tourism, and economic growth by engaging the longitudinal data from 1971 to 2019 for Mexico, Indonesia, Nigeria, and Turkey (MINT) counties. The data of economic growth per capita (GDP) is calculated in current US dollars. International tourism (TOUR) is calculated in international tourism, number of arrivals; total natural resource rent (NR) is measured in percent of GDP; foreign direct investment (FDI) is measured in net inflows (% of GDP); and mobile use (MB) is measure in mobile cellular subscriptions. The series' data are used from the World Bank portal (World Development Indicators) (WDI 2021). Table 1 reports more detailed information about the data sources of each variable.

Table 2 discovers the descriptive statistics of candidate variables for MINT nations. The mean value of GDP growth in the table is 7.961551, the lowest value is 4.371741, and the highest value is 9.442601 over the given period. Another critical variable, tourism, has a mean value of 16.26285; its bottom value is 12.30682, and its peak value is 18.56561. Furthermore, the mean

Table 1 Variables explanation

Variables	Description	Measurement unit	Data sources
GDP	Economic growth	GDP per capita (current US$)	WDI (2021)
TOUR	International tourism	Number of arrivals	WDI (2021)
FDI	Foreign direct investment	Net inflows (% of GDP)	WDI (2021)
MB	Mobile use	Mobile cellular subscriptions	WDI (2021)
NR	Natural resource rent	Total natural resources rents (% of GDP)	WDI (2021)

Table 2 Descriptive statistics

Series	LGDP	LTOUR	LFDI	LNR	LMB
Mean	7.961551	16.26285	0.273706	1.104650	15.32110
Median	8.049632	16.49025	0.468063	1.578686	17.22391
Maximum	9.442601	18.56561	1.756279	3.459202	19.89130
Minimum	4.371741	12.30682	−3.937343	−1.967458	5.899897
Std. Dev	1.028978	1.517609	0.797429	1.473555	3.815218
Skewness	−0.426598	−0.692199	−0.923139	−0.577438	−0.711449
Kurtosis	2.159924	2.998400	3.662397	2.032762	2.061950
Jarque–Bera	7.407303	9.902219	19.87879	11.72465	15.00699
Probability	0.024633	0.007076	0.000048	0.002845	0.000551
Sum	987.2324	2016.593	33.93951	136.9766	1899.817
Sum Sq. Dev	130.2318	283.2859	78.21490	267.0777	1790.374
Observations	124	124	124	124	124

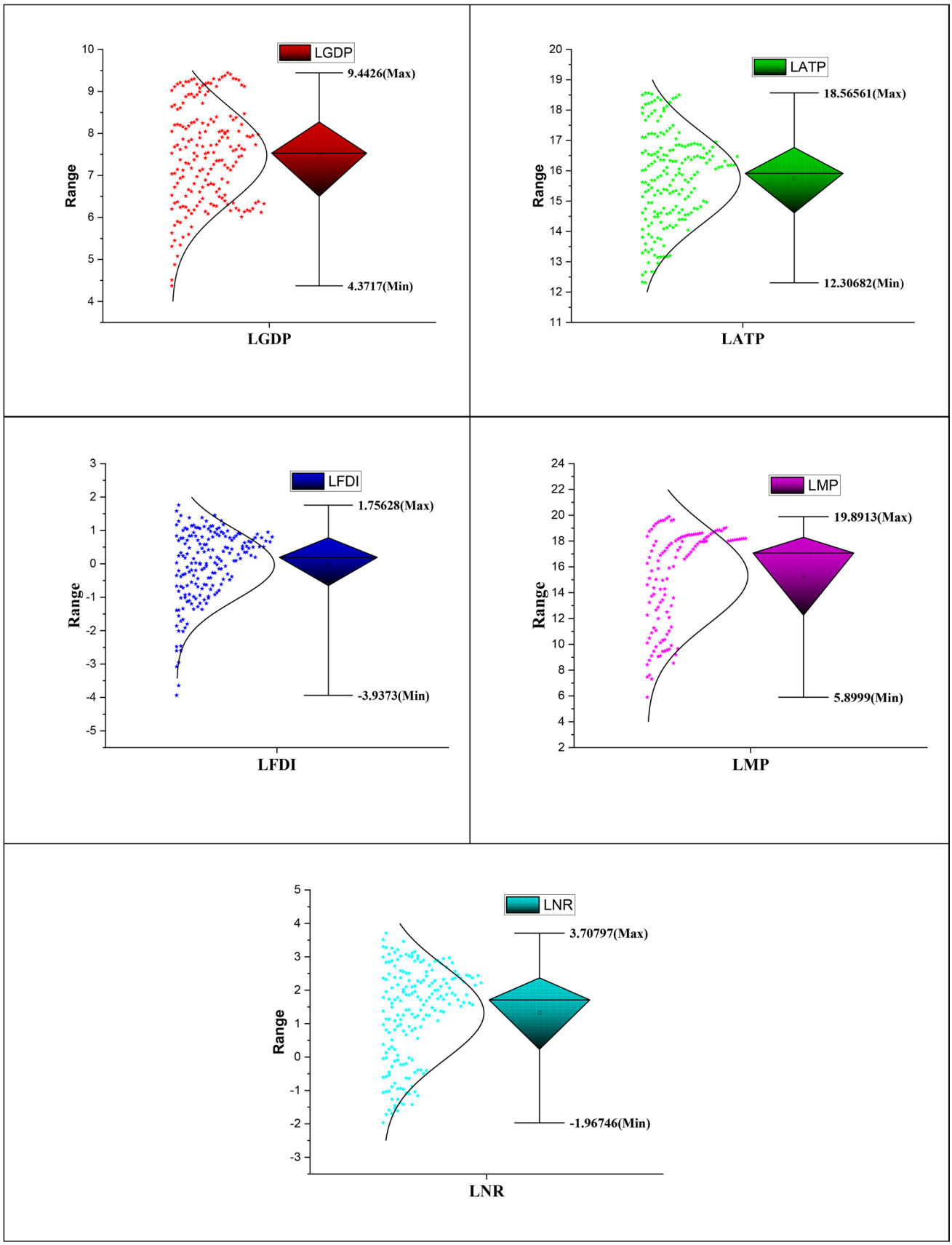

Fig. 2 Box plot summary for the investigated variables

value of foreign investment is 0.273706; the deepest value is − 3.937343, and the uppermost value is 1.756279. The mean of natural resources by 1.104650, the lowermost value is − 1.967458, and the maximum value is 3.459202. Finally, the mean value of mobile use is 15.32110, the deepest value is 5.899897, and the uppermost value is 19.89130. The summary statistics of our considered variables from 1971 to 2019 through plots-boxes (see Fig. 2).

Economic modelling

The present study examines the influence of international tourism and foreign direct investment on economic growth while including mobile use and natural resource rent as additional regressors (control variables) in a multivariable production function. In this regard, Romer (1994) recommended that those technological innovations (mobile use subscription) add to income growth during innovations, thus pointing to total factor productivity. Likewise, technological development in the industrial sector significantly influences energy demand, which also impacts the level of domestic production and, for this reason, economic growth (Usman et al. 2020b). Natural resources also influence industrial sector development through energy deployment and economic growth in scale, technique, comparative advantage, and composition effects (Gozgor 2017). Likewise, it is observed that tourism sector development affects economic growth through technique effect that will increase the production level of the particular economy. This process depicts the importance of digitalization (mobile use) and foreign direct investment in the amplified growth function. This amplified growth function can be presented as follows:

$$\mathrm{GDP}_{\mathrm{it}} = f\left(\mathrm{TOUR}_{\mathrm{it}}, \mathrm{FDI}_{\mathrm{it}}, \mathrm{MB}_{\mathrm{it}}, \mathrm{NR}_{\mathrm{it}}\right) \tag{1}$$

The above function shows the tourism-induced growth function for MINT countries. All the series are converted into natural logarithmic algorithm form to scale equivalence and reduce the data sharpness, which will ultimately help to interpret the coefficient in terms of point elasticity. The log-linear specification of the amplified growth function can be written as follows:

$$\begin{aligned}\ln(\mathrm{GDP}_{\mathrm{it}}) =& \beta_0 + \beta_1 \ln\left(\mathrm{TOUR}_{\mathrm{it}}\right) + \beta_2 \ln\left(\mathrm{FDI}_{\mathrm{it}}\right) \\ &+ \beta_3 \ln\left(\mathrm{MB}_{\mathrm{it}}\right) + \beta_4 \ln\left(\mathrm{NR}_{\mathrm{it}}\right) + \mu_{\mathrm{it}}\end{aligned} \tag{2}$$

Which shows the logarithmic transformation, $\beta_1 \rightarrow \beta_4$ presents the slope elasticity of tourism, foreign direct investment, mobile use, and natural resources, t denotes the time dimension, i explores the individual cross-Sects. (1, 2, 3, …, N), and μ indicates the stochastic random error term.

Methodological frameworks

Unit root tests

In this study, we implement the three major panel stationary tests developed by (Maddala and Wu 1999; Levin et al. 2002; Im et al. 2003) to identify the component of stochastic trends in all-time series. The Levin, Lin, and Chu (LLC) panel stationary test for common root applies the mathematical expression as:

$$\Delta y_{it} = \beta y_{it-1} + \sum_{j=1}^{\rho_i} \theta_{ij} \Delta y_{it-j} + Z_{\mathrm{it}}^{'} \delta + \mu_{it} \tag{3}$$

where β shows the coefficient of autoregressive, δ denotes the regression coefficient vector, and ρ_i, Δ, and μ_{it} indicate the max-lag length, first-difference I(1) operator, and the white noise error term, respectively. Levin et al. (2002) suggested the pooled t-statistics calculation derived from approximating Eq. 3 for all individual cross-sections. The Im, Pesaran, and Shin (IPS) panel stationary test trails a similar process with the intention of the LLC unit root test. In the LLC panel stationary test, the term β is homogenous for all cross-sections, while Im et al. (2003) recommend another stationary test allowing β to fluctuate across each cross-section. The t-statistics average for the coefficient of autoregressive (AR) from Eq. (4) is reformulated as:

$$\Delta y_{it} = \beta_i y_{it-1} + \sum_{j=1}^{\rho_i} \theta_{ij} \Delta y_{it-j} + Z_{\mathrm{it}}^{'} \delta + \mu_{it} \tag{4}$$

whereas the null hypothesis (H_0) is $H_0 : \beta = 0$ for each cross-section, against the alternative hypothesis (H_1), $H_1 : \beta < 0$ for minimum at one cross-section. The H_0 rejection depicts no problem with the unit root process. The Fisher Augmented Dickey-Fuller (Fisher-ADF) panel stationary test, proposed by Maddala and Wu (1999), authorizes non-stationary processes in order for the coefficient of AR parameter β may diverge for all i. This test combines the probability values from stationary tests for all individual cross-sections. The Fisher-ADF test is non-parametric, and it has a $\chi^2_{2n(d.f.)}$. This panel unit root test stipulates a particular ADF ordinary least square regression for all individual cross-sections specified as follows:

$$\lambda = -2 \sum_{i=1}^{n} log_e(\rho_i) \sim \chi^2_{2n(d.f.)} \tag{5}$$

The null (H_0) hypothesis of the panel stationary test for all individual cross-sections (N) is expressed as follows:

$$H_0 : \beta = 0 \; for \; \forall i \; (i.e., \; 1, \; 2, \; 3, \; 4 \; \ldots \; \ldots \; \ldots \; \ldots \; \ldots \; ..N) \tag{6}$$

Against H_0, the alternative hypothesis (H_1) is that a few individual cross-sections have the problem of unit root, which is formulated as follows:

$$H_1 : \begin{cases} \beta = 0\, f\ or\ some\ individual\ cross-section\ (i) \\ \beta < 0\, f\ or\ other\ individual\ cross-section\ (i) \end{cases} \quad (7)$$

Panel cointegration test

After verifying all selected series' trend components and integration order, we continued our empirical analysis by detecting the long-run cointegration between the selected variables. Recognizing the panel's long-run association develops among policymakers and scholars owing to its high power (Usman and Radulescu 2022). Moreover, to scrutinize the bidirectional long-run association between non-stationary series, the process of panel cointegration analysis is essential. We apply two-panel cointegration methods from Pedroni and Kao cointegration tests developed by Pedroni (1999, 2004) and Kao (1999). Pedroni cointegration test conceded eleven test statistics that tolerate the coefficients of heterogeneous intercepts and trends across all individuals. The functional form of the Pedroni cointegration test is expressed as:

$$y_{it} = \theta_i + \beta_i m + \delta_{1i} z_{1i,t} + \delta_{2i} z_{2i,t} + \delta_{3i} z_{3i,t} \ldots\ldots\ldots\ldots + \delta_{qi} z_{qi,t} + \mu_{i,t} \quad (8)$$

where θ_i denotes the intercept term, which can fluctuate across cross-sections, m shows the time dimension, and the slope parameters are denoted by $\delta_{1i}, \ldots\ldots\ldots, \delta_{qi}$. The estimated error term $\mu_{i,t}$ should be stationary at the first-order integration for H_0 of no cointegration process. In order to explore and check whether the error term is stationary at $I(1)$, it is imperative to estimate the subsequent ordinary regression for all individual i:

$$\mu_{i,t} = \pi_i \mu_{i,t-1} + \mu_{i,t} \quad (9)$$

Or

$$\mu_{i,t} = \pi_i \mu_{i,t-1} + \sum_{j=1}^{\pi_i} \lambda_{i,j} \Delta \mu_{i,t-j} + \varepsilon_{i,t} \quad (10)$$

Pedroni cointegration test considers two kinds of H_1: the heterogeneous alternative hypothesis (group statistics tests or between-dimension) and the homogeneous alternative hypothesis (panel statistics test or within-dimension). All the Pedroni cointegration test statistics are constructed from the estimated error term, though only one test of long-run relationship may not present an accurate picture of reality and also not provide complete information about long-run cointegration association among the variables. In order to overcome this issue, this study applied another cointegration test named the Kao test, developed by Kao (1999). This test is also a residual-based $\mu_{i,t}$ test. In order to estimate these residuals, the Kao cointegration test adjusts the Augmented Dickey-Fuller (ADF) test in the panel version. Both (Pedroni and Kao) cointegration tests consider the null hypothesis of no long-run cointegration relationship between analyzed time series. In the case of bivariate relationships, the Kao cointegration test expressed the method (Çetin and Ecevit 2015) as:

$$X_{i,t} = \Psi_i + \theta Z_{i,t} + \varepsilon_{i,t}, i = 1, 2, 3, \ldots\ldots\ldots\ldots, N; and\ t = 1, 2, 3, \ldots\ldots\ldots\ldots, T \quad (11)$$

$$X_{i,t} = X_{i,t-1} + \nu_{i,t} \quad (12)$$

$$Z_{i,t} = Z_{i,t-1} + \mu_{i,t} \quad (13)$$

where Ψ_i denotes the fixed effect that fluctuates between the individuals, the slope coefficient is represented by Ψ, $X_{i,t}$, and $Z_{i,t}$ are self-sufficient random strides across all cross-sections. With H_0 of no long-run cointegration, as a result, the ADF test statistic is expressed as follows:

$$ADF = \frac{t_{ADF} + \sqrt{6N\hat{\sigma}_v}/2\hat{\sigma}_{0v}^2}{\sqrt{\frac{\hat{\sigma}_{0v}^2}{2\hat{\sigma}_v^2} + \frac{3\hat{\sigma}_v^2}{10\hat{\sigma}_{0v}^2}}} \quad (14)$$

Panel long-run estimators (FMOLS and DOLS)

After establishing long-term cointegration relationships amid variables, an appropriate procedure was necessary to examine the long-run coefficients. Therefore, the FMOLS estimator (Mamingi 1997) was used. This approach not only corrects for endogeneity and serial correlation but also estimates the sample bias asymptotically. The mathematical expression of this approach given by Pedroni (1996, 2001) can be described as given below:

$$\hat{\beta}_{GFMOLS} = N^{-1} \sum_{n=1}^{N} \hat{\beta}_{FMOLS,n} \quad (15)$$

where $\hat{\beta}_{FMOLS,n}$ represents the FMOLS estimator applied to country n and the concerned t-statistic that can be written as follows:

$$t_{GFMOLS} = N^{-1/2} \sum_{n=1}^{N} t_{FMOLS,n} \quad (16)$$

To attain the panel DOLS estimator, the initial phase of the process can be drawn as follows:

$$\begin{aligned}\ln(\mathrm{GDP}_{it}) =& \beta_{0i} + \beta_{1i}\ln(\mathrm{TOUR}_{it}) + \beta_{2i}\ln(\mathrm{FDI}_{it}) \\ &+ \beta_{3i}\ln(\mathrm{MB}_{it}) + \beta_{4i}\ln(\mathrm{NR}_{it}) \\ &+ \sum_{k=-\mathrm{K_i}}^{Kn} \pi_{ik}\Delta\ln(\mathrm{TOUR}_{it-k}) \\ &+ \sum_{k=-\mathrm{K_i}}^{Kn} \lambda_{ik}\Delta\ln(\mathrm{FDI}_{it-k}) \\ &+ \sum_{k=-\mathrm{K_i}}^{Kn} \Psi_{ik}\Delta\ln(\mathrm{MB}_{it-k}) \\ &+ \sum_{k=-\mathrm{K_i}}^{Kn} \xi_{ik}\Delta\ln(\mathrm{NR}_{it-k}) + \mu_{it}\end{aligned} \tag{17}$$

where, Kn and $-\mathrm{K_i}$ denote the lags and leads, respectively. Similar to the panel FMOLS estimator, the DOLS estimation process can be developed as follows:

$$\hat{\beta}_{GDOLS} = N^{-1}\sum_{n=1}^{N}\hat{\beta}_{DOLS,n} \tag{18}$$

where $\hat{\beta}_{DOLS,n}$ shows the panel DOLS estimator practically implemented to cross-sections i. however, the connected t-statistic can be acquired as:

$$t_{\hat{\beta}_{GDOLS}} = N^{-1/2}\sum_{n=1}^{N} t_{\beta_{GDOLS,n}} \tag{19}$$

Panel Dumitrescu and Hurlin causality test

DUMITRESCU and Hurlin (2012) established a panel causality test based on the individual Wald test statistic of Granger non-causality mean across the cross-section units. The panel Dumitrescu and Hurlin (D-H) testing process believed the heterogeneity of fundamental causal association and the regression heterogeneity in the model applied for Granger causality testing. The linear regression model followed by Dumitrescu and Hurlin (2012) can be drawn as follows:

$$Y_{it} = \theta_i + \sum_{j=1}^{J}\pi_i^j Y_{i(t-j)} + \sum_{j=1}^{J}\delta_i^j x_{i(t-j)} + \mu_{it} \tag{20}$$

where y shows the dependent variable (GDP) and x denotes the regressors (tourism, FDI, mobile use, and natural resources).

Dumitrescu and Hurlin's (2012) position denotes that "a homogeneous specification of the relation between the variables x and y does not allow to interpret causality relations if any individual from the sample has an economic behaviour different from that of the others." Therefore, this test recommends a mean of the Wald test statistic. The null hypothesis (H_0) of the absence of causal association for any of the cross-sections, $H_0 : \theta_i = 0, i(1,2,3,4,\ldots\ldots N)$ against the alternative hypothesis (H_1) that causal relations take place for at least one-panel subgroup, $H_1 : \theta_i = 0, i(1,2,3,4,\ldots\ldots N); \theta_i \neq 0, i(N_1+1, N_1+2, N_1+3,\ldots\ldots N)$. Under this situation, the mean of the individual Wald test statistic developed by Dumitrescu and Hurlin (2012) supposes the following regression:

$$W_{N.T}^{HNC} = N^{-1}\sum_{i=1}^{N} W_{i,T} \tag{21}$$

where $W_{i,T}$ denotes the individual Wald test statistic for the i_{th} individual unit of the cross-section.

Results and discussion

The first segment of the empirical inquiry is to check the stationarity level (integration order) of all candidate variables. To do this, four different stationary tests for the

Table 3 Findings of panel stationarity tests

Series	At level I(0)		At first difference I(1)	
	Statistic	p-value	Statistic	p-value
Levin, Lin and Chu (LLC) test				
LGDP	2.56645	0.7351	−6.59492*	0.0000
LTOUR	0.73968	0.7703	−7.23547*	0.0000
LFDI	−1.2401***	0.0975	−7.23714*	0.0000
LMB	3.96560	0.9931	−3.89261*	0.0000
LNR	2.05361	0.7005	−10.5949*	0.0000
Im, Pesaran, and Shin (IPS) test				
LGDP	−0.71490	0.2373	−7.13686*	0.0000
LTOUR	2.13088	0.9835	−7.06839*	0.0000
LFDI	−0.88778	0.1873	−11.0187*	0.0000
LMB	−1.81984**	0.0344	−3.54350*	0.0002
LNR	2.99661	0.9714	−9.41741*	0.0000
Fisher Augmented Dickey-Fuller (F-ADF) Chi-square test				
LGDP	8.26363	0.4082	63.2953*	0.0000
LTOUR	2.20266	0.9742	61.9467*	0.0000
LFDI	10.2892	0.2453	103.554*	0.0000
LMB	15.8888**	0.0440	32.2159*	0.0001
LNR	10.9173	0.2708	88.1580*	0.0000
Fisher Philip Perron (PP) Chi-square test				
LGDP	10.8149	0.2124	91.8942*	0.0000
LTOUR	3.21479	0.9202	123.101*	0.0000
LFDI	18.5212*	0.0176	179.580*	0.0000
LMB	4.99122	0.8726	42.2149*	0.0000
LNR	17.9468**	0.0217	111.112*	0.0000

*, **, and *** denote the significance level at 1%, 5%, and 10% levels respectively

Table 4 Long-run cointegration test findings

Pedroni residual based cointegration approach				
Series: LGDP, LTOUR, LFDI, LNR, LMB				
Alternative hypothesis (H_1): common AR Coeff. (within-dimension)				
	Statistic	Prob	Weighted Statistic	Prob
Panel v base Statistic	0.614761	0.2694	0.47440	0.3176
Panel rho base Statistic	0.825074	0.7953	0.92684	0.8230
Panel PP base Statistic	−3.409980*	0.0095	−4.72462*	0.0035
Panel ADF base Statistic	−1.802392**	0.0357	−2.88927*	0.0019
Alternative hypothesis (H_1): individual AR Coeff. (between-dimension)				
	Statistic	Prob		
Group rho base Statistic	1.830239	0.9664		
Group PP base Statistic	−1.973913**	0.0242		
Group ADF base Statistic	−2.719808*	0.0033		
Kao Residual Cointegration approach				
	t-Statistic	Prob		
ADF	−5.377968*	0.0000		
Residual variance	0.014374			
HAC variance	0.015806			

* and ** signify the significance level at 1% and 5% levels correspondingly

Table 5 Johansen Fisher panel cointegration test findings

Hypothesized	Trace test statistics		Max-eigen test statistics	
No. of CE(s)	Fisher Stat.*	Prob	Fisher Stat.*	Prob
None	85.92*	0.0000	54.39*	0.0000
At most 1	43.45*	0.0000	34.60*	0.0000
At most 2	17.12**	0.0289	19.442**	0.0115
At most 3	13.78***	0.0877	12.47***	0.0714
At most 4	13.56***	0.0941	13.56***	0.0941

*, **, and *** denote the significance level at 1%, 5%, and 10% levels, respectively

estimation of panel data investigation, such as the LLC, IPS, ADF, and PP unit root tests, are lately receiving more reputation in the panel estimation literature. Table 3 shows the results of these tests on the dataset. The H_0 of these stationarity tests is that the variables follow the unit root process, meaning that their data has non-stationarity. All the series were non-stationarity at level I(0); however, all the variables became stationary at their first integration order I(1), indicating no unit root problem among the variables.

Furthermore, to check the long-run elasticity/cointegration among series, whether it is applicable or not, among concern variables. Table 4 reports the findings of the four different cointegration approaches. Table 4 displays the outcomes of first-generation panel cointegration approaches. Consistent with the conclusions of the Pedroni cointegration test, this test refuses the null hypothesis (H_0) of no long-run cointegration at a 1% significance level in both functions due to four tests of within-dimension (Panel PP, Panel ADF, Weighted panel PP, and Weighted panel ADF test statistics) and two statistics from between-dimensions like (Grouped PP and Grouped PP tests statistics) hold them accepted the alternative hypothesis of cointegration exist. Therefore, six statistics out of a total of eleven test statistics explore that the series contains a long-run association. Likewise, Kao's (1999) ADF-based approach statistics (5.377968) demonstrate the rejection of H_0 of no cointegration among examined variables. Furthermore, Table 5 below displays the Johansen Fisher panel cointegration test outcomes from mutually traced and maximum eight tests. According to this conclusion, we refuse the H_0 of no cointegration displays that all underexamined variables hold a long-run cointegration over the specific period from 1971 to 2019.

To further discover the long-run association among income growth, tourism sector development, mobile use, foreign investment, and natural resources variables in the cointegration relation using FMOLS and the panel DOLS estimators. The findings of both estimators are provided in Table 6. The empirical outcomes revealed that a 1% enhancement in international tourism was estimated to enhance economic growth by 0.1554% and 0.1546%, respectively, by FMOLS and DOLS estimates. From this outcome, it seems that international tourism has the most significant impact on economic growth in MINT countries. These countries should focus more on tourism infrastructures, such as viable hostels, alluring destinations, appropriate tax incentives, proper security arrangements, and convenient transportation to attract potential tourists.

Table 6 Findings of panel long-run elasticity estimates

Variable	Panel fully modified least squares (FMOLS)				Panel dynamic least squares (DOLS)			
	Coeff	Std. Err	*t*-Stats	Prob	Coeff	Std. Err	*t*-Stats	Prob
LTOUR	0.1554***	0.0889	1.7483	0.0833	0.1546***	0.0859	1.7991	0.0754
LFDI	0.1177**	0.0498	2.3647	0.0199	0.0969***	0.0489	1.9821	0.0505
LMB	0.0895*	0.0208	4.2595	0.0000	0.0908*	0.0176	5.1439	0.0000
LNR	0.1084***	0.0572	1.8937	0.0610	0.1229*	0.0443	2.7692	0.0068
R-squared		0.9723			*R*-squared		0.9789	
Adjusted *R*-squared		0.9694			Adjusted *R*-squared		0.9725	
S.E. of regression		0.1761			S.E. of regression		0.1668	
Long-run variance		0.0484			Long-run variance		0.0216	
Mean dependent var		8.0210			Mean dependent var		8.0212	
S.D. dependent var		1.0072			S.D. dependent var		1.0074	
Sum squared resid		3.2865			Sum squared resid		2.5048	

*, **, and *** denote the significance level at 1%, 5%, and 10% levels respectively

Moreover, they require reliable support from all segments of authorities, private and allied industries, and non-government organizations (NGOs) to accomplish sustainable tourism growth (OECD 2020). Our outcomes regarding the influence of international tourism on economic growth are in line with many existing published studies (Fayissa et al. 2008; Croes et al. 2021; Haller et al. 2021; Lee and Chen 2021). Foreign investment also amplified economic growth in MINT economies. We noted that a 1% surge in foreign investment upsurges the economic growth by 0.1177% and 0.0969%, correspondingly, by both FMOLS and DOLS. A similar effect of foreign investment on economic growth was found by Yeboua (2021) and Sahu (2021). According to the World Bank (WDI 2021), net FDI inflow (% of GDP) to the MINT countries increased from 124.94 to 390.99 between 1990 and 2019 (three times more increased as compared to 1990). Foreign investment improves infrastructures (through technological innovation) and human capital by providing better training for local workers; as a result, it enhances economic growth in the case of MINT economies.

Furthermore, mobile use is significantly and positively associated with real income growth, where a 1% rise in mobile use was found to augment real income growth by 0.0895% and 0.0908%, individually, as shown by FMOLS and DOLS estimates. This positive influence of mobile use on economic growth is reliable according to numerous empirical published studies, such as Pradhan et al. (2014). According to the study's clarification, improved access/use of mobile-based technology may improve the agriculture output, which frequently covers a significant share of the economic growth of MINT nations. For instance, mobile use could minimize farmers/agriculturalists find accurate costs as they have easy access to different product price knowledge in several markets (national and international), which, in turn, permits farmers to sell their goods with the maximum prices net of transportation costs (Pradhan et al. 2014).

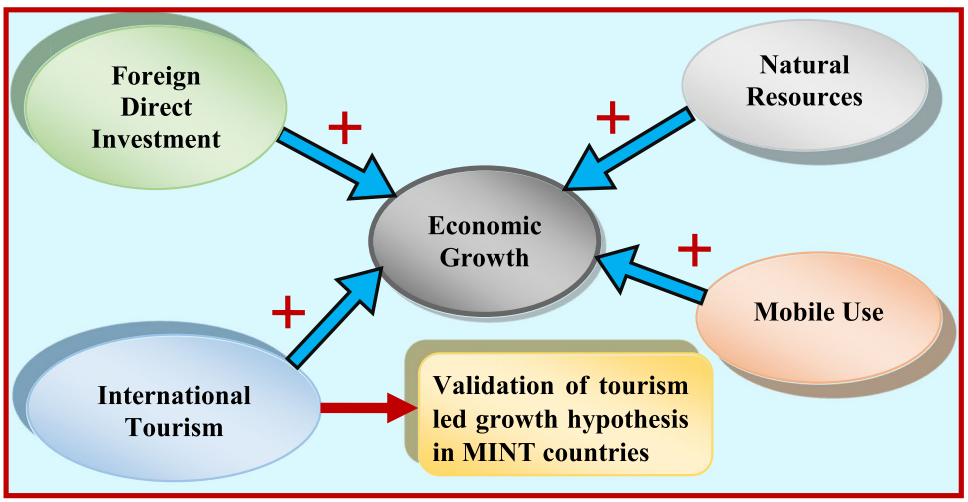

Fig. 3 Graphical presentation of empirical findings

Likewise, mobile use may allow the farmers to arrange sales using mobile phone technology, which minimizes reservations about selling in a distant market (Pradhan et al. 2021). Natural resource rent is also amplified in MINT economies. We noted that a 1% surge in natural resources increases the real income growth by 0.1084% and 0.1229%, separately, by both FMOLS and DOLS. Natural resource rent plays a significant role in MINT countries' development, boosting the industrial layout and labor division (Marchand and Weber 2018). Social labor productivity (Wu et al. 2018) spurs technological development (Makhdum et al. 2022; Khan et al. 2020). A similar relationship between natural resource rent and economic growth has been found by Usman et al. (2021b). Additionally, the graphical arrangements of empirical conclusions are presented in Fig. 3.

Table 7 Findings of pairwise Dumitrescu and Hurlin causality test

Null hypothesis	W-Stat	Zbar-Stat	Prob	Remarks
LTOUR ⇏LGDP	3.45928	1.23137	0.2182	GDP → TOUR
LGDP ⇏LTOUR	6.59658	4.07343	0.0000	
LFDI ⇏LGDP	5.30824	2.89051	0.0038	GDP ↔ FDI
LGDP ⇏LFDI	5.71324	3.25587	0.0011	
LNR ⇏LGDP	2.75198	0.59062	0.5548	GDP → NR
LGDP ⇏LNR	8.58495	5.87469	0.0000	
LMB ⇏LGDP	10.7307	7.19336	0.0000	MB → GDP
LGDP ⇏LMB	2.77710	0.50538	0.6133	
LFDI ⇏LTOUR	5.19389	2.78734	0.0053	TOUR ↔ FDI
LTOUR ⇏LFDI	6.09096	3.59664	0.0003	
LNR ⇏LTOUR	1.29882	−0.72579	0.4680	TOUR → NR
LTOUR ⇏LNR	7.27877	4.69142	0.0000	
LMB ⇏LTOUR	4.26732	1.75847	0.0787	MB → TOUR
LTOUR ⇏LMB	1.95259	−0.18792	0.8509	
LNR ⇏LFDI	4.34798	2.02421	0.0429	NR ↔ FDI
LFDI ⇏LNR	4.68259	2.32607	0.0200	
LMB ⇏LFDI	4.82354	2.20168	0.0277	MB ↔ FDI
LFDI ⇏LMB	4.21526	1.69421	0.0902	
LMB ⇏LNR	5.56279	2.32518	0.0049	MB → NR
LNR ⇏LMB	3.87191	1.42598	0.1539	

*, **, and *** symbolize the significance level at 1%, 5%, and 10% levels correspondingly

Lastly, the last phase of the econometric approach of empirical estimation is to realize the causality path among series, i.e., natural resource rent, mobile use, foreign direct investment, international tourism, and economic growth throughout the panel heterogeneous non-causality approach by Dumitrescu and Hurlin (2012). The conclusions of this test are presented in Table 7 and display a unidirectional causality (Growth hypothesis) association between GDP → TOUR, GDP → NR, MB → GDP, TOUR → NR, MB → TOUR, and MB → NR and a bidirectional causality (Feedback hypothesis) relation between GDP ↔ FDI, TOUR ↔ FDI, NR ↔ FDI, and MB ↔ FDI. Figure 4 explores the causality relationship schema of this study's variables. Our empirical outcomes are reliable to some earlier published studies (i.e., Akinboade and Braimoh 2010; Ampofo et al. 2020; Tugcu 2014; Adeola and Evans 2019; Yang and Usman 2021; Tang et al. 2007) in the circumstance of different panel nations.

In line with previous literature, numerous studies have explored how investments in the industry of information and ICT interlocked with economic growth, throwing similar conclusions; an increase in the investment in ICT results in a significant presence of mobile use in an economy, giving a result in GDP. Sassi and Goaied (2013) studied the interaction between ICT penetration and foreign investment in the MENA nation, finding a positive association in the

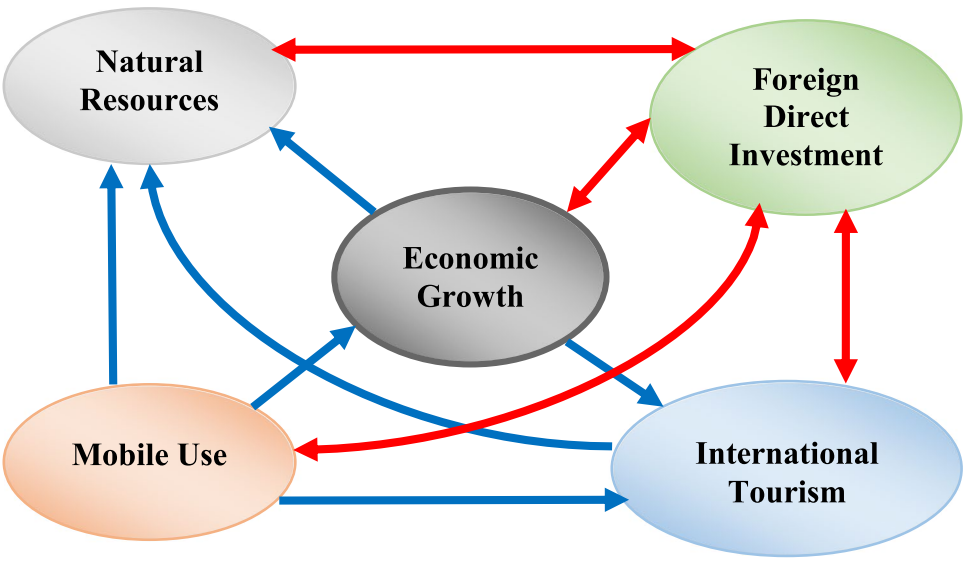

Fig. 4 Causality relationship schema

growth regression. In this case, Wamboye (2015) developed it and proved that mobile penetration reduces physical constraints and costs of distance and time, and leads to economic growth. ICT speculation plays a fundamental role in Korea's long-term and short-term economic expansion; there is a unidirectional association between ICT investment and economic growth (Sawng et al. 2021).

Assume the bidirectional linkage between foreign investment and tourism is an essential component of the world gross domestic product; it, directly/indirectly, employs a significant share of the universal workforce, and has a significant portion of overall exports, and foreign investment is an essential source of economic investment in world tourism (Jebli et al. 2019). Bidirectional relationships between foreign investment and tourism have been broadly studied globally. Moreover, bidirectional long-run causality-path among foreign investment and tourism development was found in Africa (Su and Lee 2022). Similarly, Fauzel (2020) showed bidirectional causality between foreign investment and tourism in 17 small island nations from 1995 to 2018. Selvanathan et al. (2012) proved a unidirectional causality from FDI to tourist arrivals in India, explaining the rapid growth in the tourism sector and foreign investment in India during the last decade. Khoshnevis Yazdi et al. (2017) studied the relationship between foreign investment, GDP growth, and the tourism sector in Iran, confirming bidirectional short-term causality between foreign investment and tourism. Sokhanvar (2019) found that the direction of causality in the FDI–tourism nexus changes from country to country. After studying a sample of various European countries, a bidirectional linkage is found in some of them, while in others, the opposite happens.

The unidirectional causality from tourism to natural resources has been explored in empirical literature by Bhuiyan et al. (2018), who described that the environmental impacts of TOUR are quite high in terms of natural resource depletion. Consequently, many "non-ecological" phenomena and certain energy utilization and pollution emissions influence the atmosphere. The impact of tourism activities on the environment is mainly replicated in the geological landforms, atmosphere, water, soil plants, animals, microorganisms, landscape, and so on (Zhao and Li 2018; Jahanger et al. 2023; Jahanger and Usman 2022). In an attempt to study the impact of tourism, renewable energy utilization, and economic growth on environmental damages and natural resources over a sample of 128 countries, Ali et al. (2021) got to the conclusion that an upsurge in tourism leads to a reduction in resource depletion. Tourism can be seen as highly dependent on natural resources, resulting in significant adverse environmental, cultural, social, and economic impacts (Aslam et al. 2018). The unidirectional causal relationship from mobile to tourism assumes that mobile phone data has transformed consumer hopes for wireless facility products and has transformed how people connect and work, potentially impacting economic development further. However, an association between ICT and tourism demand is observed for key tourist destinations and explores the effect of ICT on tourism demand based on tourist numbers. The causality conclusions specify that ICT causes tourism demand and supports the technology-led growth hypothesis. These researchers got to the same conclusions in other articles: discovering the nexus between ICT, tourism, and growth in Fiji or discovering the role of technology and tourism in Vietnam.

The results reveal bidirectional causality between foreign investment and natural resources plays an important role in economic growth, and foreign investment inflows are more aggressive in those countries rich in natural resources. The inflow aims to harness idle natural resources to obtain energy for its future operations, resulting in higher-than-expected revenue growth (Zeeshan et al. 2021). Willibald et al. (2015) explored those abundant natural resources that help stimulate foreign investment inflows and confirmed the positive correlation between natural resources and foreign investment inflows. Kolstad and Wiig (2012) also verified a positive relationship between natural resources and the amount of foreign investment, using the VECM method to declare a positive association between natural resources and foreign investment. While extending similar literature, Poelhekke and Van Der Ploeg (2009) found a positive correlation between natural resource abundance and foreign investment inflows. Natural resources demand used to cause this result to disappear, but the abundance of resources leads to an increased likelihood of wars and conflicts related to dependence on natural resources (Brunnschweiler 2008).

Furthermore, Luu (2016) demonstrated a bidirectional association between foreign investment and natural resources in Vietnam. Additionally, Levin et al. (2002) scrutinized this association in China's economy by considering the VAR approach. They determined that the mutual association between the two variables holds in China.

The bidirectional causality between foreign investment and mobile use penetration assumes that telecommunications development yields direct assistance through reduced transaction-based costs, enhanced marketing communications, and indirect profits due to quicker information dissemination (Greenstein and Spiller 1995). Ur Rehman et al. (2020) found a causal, linear/non-linear nexus between sectoral foreign investment inflow and the infrastructure sector (ICT, among others) in Pakistan. Pradhan et al. (2014) proved that the G-20 developing nations found bidirectional causality between telecommunications infrastructure and foreign investment. There is a bi-bidirectional relationship between foreign investment to ICT, with ICT infrastructure being significantly exaggerated by foreign investment inflow (Samir and Mefteh 2020). Bhujabal et al. (2021) found bidirectional causality between ICT and foreign investment

in major Asia Pacific countries between 1990 and 2018, meaning that an increase in ICT led to foreign investment increases, and an upsurge in foreign investment led to a rise in ICT infrastructure in the Asia Pacific countries. Finally, the unidirectional causality from economic development to natural resources boosts the global debate about allocating natural resources (Li and Li 2011; Zhang and Zhang 2021). Discussions have focused on increasing scarcity (resource depletion) and the export of natural resources that underlie many economies, especially developed countries. Most natural resources are deplorable, meaning they are limited in number and can be depleted if not appropriately managed. Natural resource economics aims to study aids to prevent their depletion (Lumen learning's course "Introduction to Natural Resource Economics"). Aziz et al. (2021) studied the role of natural resources, renewable energy use, and globalization in MINT countries, assuming the necessity of active policies to use natural resources sustainably in those countries. Since nature conservation and conservation tend to be greater in regions with faster economic development, economic growth may have positive and unidirectional causal effects on natural resources (López 1994).

Conclusion and policy suggestions

The present research empirically scrutinized the inferences of tourism sector development, mobile use, FDI, and natural resources on real economic growth with an indication from MINT nations based on dynamic heterogeneous panel estimations. In the present globalized world, considerating this nexus is important for making sure and supporting the development in the MINT region. The expansion apparent is not now from the viewpoint of economic progress but also with reverence to the general welfare development of residents and citizens in these countries. Now, it has become crucial to recognize the essential fundamental factors that control economic growth in the MINT countries, in addition to the role that tourism sector development, mobile use, foreign investment, and natural resources threats play in developmental planning. Consequently, the real income growth was applied as an explained variable, while some other variables, such as tourism sector development, foreign investment, and natural resources, were implemented as regressors, and also these were taken using annual data. Considering this view, this study explores the nexus between natural resource rent, mobile use, foreign direct investment, and international tourism and economic growth in panel data of the MINT economies from 1971 to 2019, using the FMOLS and the DOLS estimators. The present study employed a first-generation panel unit root test and cointegration test for robust econometric investigation. Lastly, this paper employed the D–H causality test to find the causality paths. The outcomes of FMOLS and DOLS estimators indicated the positive and significant influence of natural resource rent and mobile use, as well as a significant positive influence of foreign direct investment and international tourism on economic growth in the sample countries. The panel D–H causality test outcomes disclose a unidirectional causality association between economic growth and international tourism to natural resources, mobile phones to international tourism, and a bidirectional causality association between economic growth and international tourism and natural resources.

The empirical outcomes recommend numerous vital policy suggestions to help these nations' government officials, regularity authorities, and policymakers. Firstly, governments and policymakers can develop the tourism sector by giving incentives to the tourism industry in the form of basic structures such as an immense airport, road, tax incentives/subsidies to the tourism-related sectors (i.e., hotels), and high-quality transportation system. Secondly, the government of MINT countries should also guarantee the safety of all tourists/visitors and express sustainable tourism strategies. This guarantees a secure, stable, and steady tourism demand for the MINT countries. Furthermore, natural resources are one of the primary suppliers of real economic growth. As a result, it is vital to make more potent strategies concerning natural resources and economic growth. In particular, these natural resources must be deployed competently, while believing in sustainable progress or rents of natural resource reserves for the upcoming generation. In addition, sustainability in natural resources is also a significant strategy instrument to be painstaking in the MINT countries as it will decrease reliance on natural resources.

Moreover, the government should provide financial support through subsidies and incentives to industries of total natural resource rents (oil rents, natural gas rents, coal rents, mineral rents, and forest rents). In addition, the government should reduce taxes on natural resources and rent industries in MINT countries, which will help promote growth. Besides, strategies that will develop the stipulation of the finest situation for foreign investment inflows should be promoted. Laws must be superior, and sensible industrial strategies must be made to guarantee efficiency in foreign investment allocation. Moreover, MINT nations must execute socioeconomic restructuring to diminish violence and terrorism to exploit investment prospects better. Initially, MINT countries should spotlight more on using foreign investment for sustainable economic progress and enhancements to livelihood principles to elevate per capita income growth.

Moreover, MINT nations require improvement in their capital and trade constraint strategies by restructuring the corporate supremacy organization, diminishing the corporate tax rate, and escalating employment prospects/opportunities by humanizing economic efficiency and resource

allocation to magnetize more overseas investment. The rationale for these suggestions is that foreign investment in these nations might not have accomplished the set level at which it can contribute to real economic development. In addition, it is advocated commencing redesigning policies to progress manufacturing sectors, such as linking the industrialized skills breach in the course of labor training agendas, implementing more stretchy work formations, and realizing on-the-job guidance proposals, among others.

The present study results are limited to high-income countries; therefore, future studies might replicate the model in other countries. In addition, a limitation of the present study is the unavailability of recent years' data. Therefore, future studies might use recent years' data and social and economic variables such as globalization and financial development. Future researchers might apply sophisticated econometric models, such as quantile-based GMM models, to repeat the model presented in the study. Finally, the present research only investigates the linear/symmetric effect of tourism, mobile use, foreign investment, and natural resources on economic growth; in the upcoming research, the researcher can scrutinize the asymmetric/non-linear influence of studied independent variables on economic growth.

Author contribution MU, DBL, LIL: conceptualization, methodology, software, validation, formal analysis, investigation, data curation, writing—original draft, writing—review and editing. DBL, MU: conceptualization, methodology, software, validation, formal analysis, data curation, writing—original draft, writing—review and editing, supervision. DBL, MU: validation, writing—review and editing, supervision. MU, AJ.: validation, writing—review and editing.

Data availability Under request.

Declarations

Ethics approval Not applicable.

Consent to participate All the authors have seen and approved the content of the submitted manuscript.

Consent to publish All the authors consent to publish the final manuscript.

Competing interests The authors declare no competing interests.

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