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Exploring the influence of information and communication technology, national leadership and educational quality on educational tourism demand

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This study explores the role of information and communication technology (ICT) development, educational quality, and national leadership in explaining the behaviour of inbound educational tourism in Malaysia. The panel data from 2002 to 2019 across 149 countries that supply educational tourists to Malaysia for higher education were employed, and the censored (Tobit) panel regression analysis was executed in the analysis to strengthen the robustness of estimation results. Unlike the conventional expectation, the findings show that income has a non-linear quadratic relationship with educational tourism demand, whereas ICT infrastructure, educational quality and leadership quality have a positive effect on educational tourism. Besides, the impact of educational quality on tourism demand is moderated by ICT infrastructure and national leadership quality. The findings demonstrate that the impact of ICT infrastructure on the need for educational travel is also moderated by national leadership. Therefore, ICT infrastructure development, educational quality and national leadership are intertwined in influencing the choice of educational tourism destination. Several policies can be implemented to boost the educational tourism sector in Malaysia and thus stimulate economic growth.

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Introduction

Accelerating economic growth is one of the fundamental goals in macroeconomic policymaking because it directly affects people's living standards and alleviates socio-economic issues such as poverty, crime and unemployment. As such, voluminous theoretical and empirical studies were conducted to explore catalysts for sustaining growth (Doré and Teixeira, 2023). Past studies are likely to demonstrate that economic growth is attributable to the progress of tangible economic sectors, such as agriculture and manufacturing, which may have indirectly downplayed the economic effects of the services sector, such as tourism. Indeed, tourism has grown swiftly as a sector that significantly impacts the host country's economy (Özer et al., 2022). Consequently, many advanced and emerging economies also widely acknowledge the tourism-led growth model as an effective growth engine. This wisdom has motivated many empirical studies investigating tourism demand behaviour (e.g., Oh and Ditton, 2005; Ooi et al., 2013; Falk, 2015; Kadir and Nayan, 2021; Ulucak et al., 2020).

Although tourism is always associated with the purpose of holidays and leisure, Gibson (1998) claimed that travelling abroad for education is a significant prospect for the future tourism segment. Ritchie (2003) named this segment educational tourism. Since globalisation and the internationalisation of higher education are gaining momentum, students will likely travel abroad for better education (Tang, 2021). In addition, studies attempting to determine the factors influencing the mobility of international students in educational tourism are flourishing (e.g., Abbott and Silles, 2015; Ahmad et al., 2016; Monterio and Pereira, 2016; Grabowski et al., 2017; Rahimi et al., 2018; Sidhu et al., 2021; Yang, 2022; Tang et al., 2023). As such, educational stakeholders and governments around the globe compete to attract international students and retain the best talent for knowledge-based economic development (Gribble, 2008). Gopal (2014) added that educational tourism would help provide and build a pool of talented labour (human capital) to further invigorate long-term sustainable growth, particularly if they are permitted to work and offered permanent residence status upon completion. For these reasons, educational tourism is a vital tourism segment for growth.

Based on our literature survey, the research agenda on tourism also begins to pay particular attention to understanding the segment of educational tourism since it brings a substantive contribution to economic growth and development (e.g., Rodríguez et al., 2012; Abubakar et al., 2014; Bento, 2014; Matahir and Tang, 2018; Hussein et al., 2022; Tang et al., 2023). Nevertheless, empirical studies on educational tourism have mainly focused on

Western countries. In contrast, information about developing countries like Malaysia is sparse, even though Malaysia has made significant progress in promoting and attracting international students worldwide. As Song et al. (2009) claimed, many business and management failures, which delayed economic growth, were attributed to failures in understanding market demand behaviour. Therefore, the present study attempts to investigate and understand empirically the major influential factors on inbound educational tourism demand in Malaysia, utilising panel data of 149 tourism source countries from 2002 to 2019.

According to the statistics from the *UNESCO Institute for Statistics* (UIS) database, Malaysia is a well-known destination for higher education in Asia and worldwide. Malaysia was regarded as the third most desirable destination in Asia for international students in 2016, while tenth in the world with a record of 124 thousand international students. Figure 1 presents data on the number of inbound internationally mobile students by continent of origin from 2006 to 2021 in Malaysia. The data reveals that Asia has consistently been the continent with the highest number of inbound students in Malaysia, with over 70,000 students in 2021.

The significant number of inbound students from Asia to Malaysia can be associated with geographical, cultural and economic factors. The strategic location of Malaysia in Southeast Asia is close to countries like Indonesia, Thailand, Vietnam and China, making travel more convenient and affordable. This geographical advantage allows students to stay connected to their families while pursuing education abroad. Culturally, Malaysia's diverse society, comprising Malay, Chinese and Indian communities, provides a familiar environment to students from neighbouring Asian countries. Economically, Malaysia offers high-quality education at affordable costs. Tuition fees and living expenses in Malaysia are significantly lower than those in Japan, Singapore and Western countries. Therefore, Malaysia has been an attractive option for students seeking value for money. More importantly, Malaysia's universities are increasingly recognised globally, with many appearing in international rankings by QS and Times Higher Education.

In contrast, the Caribbean & Central America had the smallest number of students throughout the period, with only 1,820 students in 2021. Africa had the lowest number of inbound students to Malaysia in 2006 with 2821 students, but experienced significant growth in 2009 with 15,506 students, before gradually decreasing to 14,411 students in 2021. Europe and Oceania had relatively smaller numbers of inbound students compared to Asia, but their numbers remained consistent over the years. North

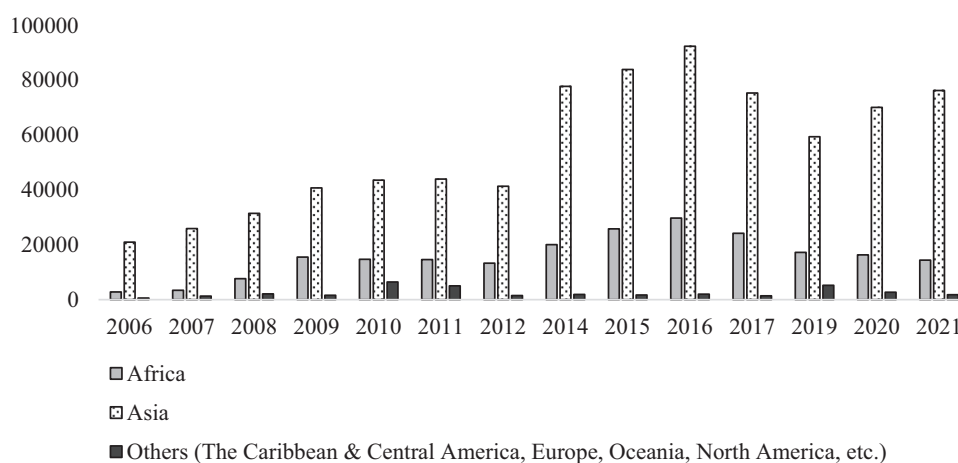


Fig. 1 Inbound internationally mobile students by continent of origin.

America had a stable number of inbound students to Malaysia, with around 60,000 students each year. The number of students from other continents was relatively small, with a peak of 5268 students in 2019. The COVID-19 pandemic and travel restrictions significantly impacted the demand for educational tourism worldwide, including Malaysia. In 2020 and 2021, the number of inbound students decreased, highlighting the need for more research on the impact of COVID-19 on educational tourism demand in Malaysia. Therefore, Malaysia is a crucial case study for educational tourism demand, and it is essential to enrich the literature.

The present study contributes to the body of knowledge and policymaking in various ways. First, this study employs the censored (Tobit) panel regression approach to estimate the educational tourism demand model, which yields robust estimation results. This regression approach makes it possible to estimate the model even if some data for educational tourist arrivals (the dependent variable) is not observable. Second, the present study provides an innovative and comprehensive research framework for educational tourism demand by considering new non-economic factors, such as information and telecommunications technology (ICT) development, quality of education and national leadership quality. To the best of our knowledge, the impacts of these non-economic factors on educational tourism demand are not widely explored. Third, this study examines the direct effects of the mentioned non-economic factors and assesses their moderating effects on educational tourism demand.

Fourth, this research investigates not only the linear effect of income but also the possibility of the non-linear effects of income on educational tourism demand. Thus, this study provides more informative findings than the existing literature, particularly for tourism marketing strategy and national policymaking. Finally, by learning from Malaysia's experience, other countries can develop effective approaches to deal with similar challenges and attract international students as a means of economic growth. The findings of this study can also provide insights into what makes a country attractive to students and how investment in education can contribute to economic growth, which can be relevant for developing countries seeking to enhance their education systems and attract international students. Undeniably, these findings enrich the literature and assist stakeholders and policymakers in creating more effective educational marketing strategies to attract more educational tourists.

The remainder of this study is presented as follows. Section "Review of past studies on educational tourism demand" reviews past studies on educational tourism demand. The methodology and data are presented in Section "Methodology and data". Section "Empirical results and discussions" presents the analytical findings and discusses the estimation results. Section "Conclusion, policy implications and limitations" wraps up the study and addresses policy implications.

Review of past studies on educational tourism demand

Academic mobility has already become an essential activity for students to gain a high-quality education standard, enhance their personal experience and network and learn about social-cultural differences (Monterio and Pereira, 2016; Monterio et al., 2016). In the review of past literature, academic tourism, academic destination, international student mobility and other terms have been used interchangeably to describe educational tourism (Rodríguez et al., 2012; Martínez-Roget et al., 2013; Bento, 2014; Kosmaczewska and Jameson, 2021). Tourists who travel to a destination for educational purposes, to obtain new knowledge pertaining to their discipline, are referred to as educational tourism

(Camilleri, 2017). Educational tourism, on the other hand, was defined by Pitmann (2003) as a global process of building socio-economic capital and empowerment for learners and host communities. Likewise, Ritchie (2003) suggested that educational tourism is primarily a form of travel undertaken by people who are staying overnight or going on an excursion, with education and learning being a primary or secondary aspect of their journey. Therefore, educational tourism demand refers to the educational-related customers' willingness and their ability to acquire varying amounts of a tourism product at different prices, at different times, and demand (or consumer perspective) for educational tourism is influenced by a variety of quantifiable and non-quantifiable factors (Dwyer et al., 2020).

Several studies have attempted to estimate the demand for educational tourism in both developed and developing countries. The most prevalent explanatory factors employed were income, price in tourism destinations, price in competitor countries, and the quality of education. Hussein et al. (2022) and Matahir and Tang (2018) found that income is positively associated with educational tourism demand, while Rodríguez et al. (2012) argued that the enrolment of foreign students is likely from countries with relatively low per capita incomes to a higher-income country. As such, Tang et al. (2023) added that foreign students' decision-making about where to study is heavily dependent on the relative differences between home and destination countries' income. Besides income, the empirical findings of Hussein et al. (2022) and Tang et al. (2023) found that the price of education in a destination has a significant adverse effect on educational tourism demand. In contrast, the quality of education, as measured by university rankings, programme quality and research and teaching quality, has been identified as a major factor in attracting educational tourists flow to destination countries (Bento, 2014; Matahir and Tang, 2018; Hussein et al., 2022; Tang et al., 2023).

Additionally, dummy variables were accommodated into the demand model by some studies to capture the qualitative effects of socioeconomic factors, crises and events on educational tourism demand. For example, prior studies have captured the impact of economic and political events, pandemic diseases, financial crises, seasonality, natural disasters and tourism promotion packages on educational tourism demand. Particularly, Matahir and Tang (2018) and Ahmad and Hussain (2015), for example, discovered that government promotional initiatives have no significant impact on attracting more educational tourists to Malaysia. Besides qualitative variables, little research was carried out utilising qualitative and explanatory research methodologies to understand foreign students' choice of destination. Not much deviated from the earlier findings, but the qualitative-based researchers (e.g., Eder et al., 2010; Abubakar et al., 2014; Singh et al., 2014; Ahmad and Buchanan, 2016; Kenfack and Öztüren, 2021) also discovered that students seeking education in other countries are mostly motivated by the reputation and quality of educational institutions; culture, language, tuition fees and scholarships; quality of life and living expenses; safety and low discrimination; political stability; communication quality; and ease of access.

In summary, although it is widely acknowledged that education and training are essential components of human capital that contribute significantly to promoting economic growth (Blundell et al., 1999), only a few empirical studies have critically examined the demand for educational tourism in Malaysia. The present study noticed that many of the earlier studies on inbound educational tourism demand in Malaysia are often centred on quantitative survey methodologies (Fernandez, 2010; Baharun et al., 2011; Basha et al., 2016; Ojo et al., 2016; Ling and Richardson, 2017). Moreover, past studies have largely

concentrated on the direct linear impacts of educational tourism while ignoring the importance of non-linear and moderating effects. Furthermore, our literature review emphasises that past studies rarely consider the roles of ICT infrastructure and national leadership in shaping the demand for educational tourism, despite their critical importance in fostering educational travel. The growth of ICT infrastructure in the destination nation is expected to increase demand for education tourism. This outcome is due to the accessibility and availability of Internet services, which facilitate access to resources, including micro-credential courses, and help academic institutions market their programmes to prospective students. Furthermore, the quality of national leadership plays a crucial role in promoting education and training by enacting policies that invest in education, incentivise individuals to acquire new skills, and create a supportive environment for lifelong learning (Pont et al., 2008). Motivated by these limitations, it is essential to extend the literature by assessing the behaviour of educational tourism demand in Malaysia, which encompasses economic and non-economic factors such as ICT and national leadership quality and their moderating effects on educational tourism demand.

Methodology and data

Theoretical model. This study aims to estimate the demand function for inbound educational tourism in Malaysia. To accomplish this, economic theories are utilised to help us figure out what functional forms of demand and factors should be accommodated into our educational tourism demand model. Literally speaking, various forms of demand functions have been proposed in the literature (Morley, 1991; Varian, 1992); however, the Cobb–Douglas demand function was the most widely used due to its relevant assumption that the goods and services of home and destination countries are not perfectly substitutable. Consequently, the relationships between demand and its determinants are inherently non-linear. In practice, the Cobb–Douglas function can be estimated through a log-linear transformation. As a result, the log-linear tourism demand model has been widely used in many empirical studies (e.g., Garin-Munoz and Montero-Martin, 2007; Surugiu et al., 2011; Li et al., 2017; Tang et al., 2023). Johnson and Ashworth (1990) added that log-linear tourism demand specification is very convenient because the estimated coefficients can be directly interpreted as demand elasticities. Moreover, it also shows superior performance to the linear demand model because it minimises the error variance (Jud and Joseph, 1974; Uysal and Crompton, 1984). Therefore, the Cobb–Douglas form of demand is widely used in the literature.

Given that the demand for tourism is the trade in services, the present study borrows the gravity theory of trade and the Marshallian demand theory to construct the fundamental framework and choose the explanatory variables for our educational tourism demand model. Following the basic intuition of the gravity trade model, tourism flows are not only influenced by variables or economic conditions in the home (Z_i) and destination (Z_j) countries, but also the distance (D_{ij}) between home and destination countries, which reflects travelling costs. Moreover, the gravity model was extensively used in the literature to understand the behaviour of tourism demand (e.g., Morley et al., 2014; Lorde et al., 2016; Adeola and Evans, 2020; Dropsy et al., 2020; Jong et al., 2020; Rossello Nadal and Santana-Gallego, 2022). Hence, the generic Cobb–Douglas form of the gravity model for inbound educational tourism demand can be written as follows:

$$\text{EDT}_{ij} = A_0 \frac{Z_i^{\alpha_1} Z_j^{\alpha_2}}{D_{ij}^{\alpha_3}} e^{\lambda_t \varepsilon_{ij}} \quad (1)$$

where A_0 is the constant term, whereas λ_t and ε_{ij} are the exponential time-specific effect and disturbance terms, respectively. EDT_{ij} is the flow of educational tourists (foreign students) from home country i to destination country j (Malaysia) at time t . Then, D_{ij} represents the distance between home country i and destination country j . However, Z_i and Z_j are the vectors of variables affecting the demand for educational tourism in the home and destination countries, respectively. Indeed, numerous factors reflect the characteristics of both home and destination countries. Demand theory suggests that tourists' decision-making of where to go is driven mainly by their income and the relative prices between home and destination countries. According to the law of demand, a negative relationship exists between price and tourism demand, mainly due to income and/or substitution effects. However, the impact of income on tourism demand is mixed. On the one hand, the demand theory stipulates that demand increases with income, as higher income enhances tourists' ability to purchase goods and services. On the other hand, Engel's law of demand argues that demand can decline with increased income, especially if tourists perceive the tourism services as inferior. As such, there might be a non-linear relationship between income and educational tourism demand (Menegaki et al., 2020; Tang et al., 2023).

When choosing a destination for education, some empirical studies have shown that educational tourists place a high value on the quality of education offered in the destination country. A high quality of education positively influences the demand for educational tourism, as well-prepared graduates are more likely to secure better employment opportunities and earn lucrative incomes (Matahir and Tang, 2018; Tang et al., 2023). Furthermore, telecommunication infrastructure—such as the availability and accessibility of Internet services—plays a crucial role in educational tourism demand. Well-developed telecommunication services enable educational tourists to learn more effectively and access various valuable resources, including micro-credential courses. Besides benefiting the current students, such infrastructure allows academic institutions to market and attract prospective students globally through online social media platforms by showcasing their academic achievements, expertise and unique programmes. Therefore, investment in ICT infrastructure in the destination country is necessary to moderate educational quality and uplift the demand for inbound educational tourism. Indeed, some past empirical studies, such as Nguyen and Nguyen (2022) and Matahir and Tang (2018), have also attested that ICT infrastructure development is positively related to tourism demand because it helps to locate tourist attractions, accommodation, transportation and other tourism-related information. Therefore, ICT infrastructure development will improve the competitiveness of the destination country (Ballina et al., 2019).

Furthermore, the quality of national leadership is another important factor affecting the demand for educational tourism. Effective national leadership is likely to create a stable political and economic environment, fostering freedom, transparency, better control of corruption and effective governance (Arndt, 1984; Tang and Lim, 2024). Apart from that, solid national leadership can influence the quality of education by improving and monitoring the education system and allocating resources for research and infrastructure development, including ICTs (Pont et al., 2008). As a result, national leadership quality is essential in moderating the effects of education quality and ICT infrastructure on the demand for educational tourism.

Considering the distance variable and factors in the home and destination countries as highlighted in the gravity theory of trade

Table 1 Summary of descriptive statistics and data sources.

Variables	Units of measurement	Sources						
Panel A: The unit of measurement and source of data								
<i>Dependent variable</i>								
Educational tourism, $\ln\text{ETD}_{ijt}$	Number of foreign students flowing to Malaysia	MOHE, Malaysia and UIS database						
<i>Explanatory variables</i>								
Income, $\ln\text{GDP}_{it}$	Per capita real GDP (US\$)	WDI and UNdata databases						
Price, $\ln\text{PRICE}_{it}$	Relative CPI-adjusted with exchange rate	WDI and IFS databases						
Distance, $\ln\text{DIST}_{it}$	Kilometres	DistanceFromTo.net						
Quality of education, $\ln\text{QEDU}_{it}$	Number of scientific publications	Scopus database						
Telecommunication, $\ln\text{ICT}_{it}$	Internet users per 100 population	WDI database						
Quality of leadership, $\ln\text{QLEAD}_{it}$	Percentile score, 1 – 100	WGI database						
	$\ln\text{ETD}_{ijt} \leq 0$ (n1 = 241)	$\ln\text{ETD}_{ijt} > 0$ (n2 = 2441)						
Variables	Mean	SD	Min	Max	Mean	SD	Min	Max
Panel B: The sub-sample descriptive statistics of the explanatory variables in the model								
<i>Dependent variable</i>								
Educational tourism, $\ln\text{ETD}_{ijt}$	-	-	-	-	3.087	2.209	0.693	10.439
<i>Explanatory variables</i>								
Income, $\ln\text{GDP}_{it}$	8.929	1.374	6.045	11.671	8.399	1.564	4.644	11.622
Price, $\ln\text{PRICE}_{it}$	-1.005	2.445	-7.732	3.868	-1.936	2.943	-12.953	3.493
Distance, $\ln\text{DIST}_{it}$	9.255	0.487	7.765	9.891	8.878	0.642	5.935	9.891
Quality of education, $\ln\text{QEDU}_{it}$	8.797	1.121	7.187	10.201	8.996	1.007	7.187	10.201
Telecommunication, $\ln\text{ICT}_{it}$	4.019	0.323	3.476	4.433	4.061	0.258	3.476	4.433
Quality of leadership, $\ln\text{QLEAD}_{it}$	4.066	0.057	3.960	4.145	4.059	0.053	3.960	4.145
Note: Educational tourists in Malaysia are mainly from Asia, Africa and the Middle East, namely Bangladesh, China, Indonesia, Iran, Iraq, Libya, Nigeria and Pakistan. MOHE Ministry of Higher Education, Malaysia, UIS UNESCO Institute for Statistics, WDI World Development Indicators, UN Data United Nations Data, WGI Worldwide Governance Indicators.								

and demand theory, the following log-linear inbound tourism demand models are constructed:

$$\ln\text{ETD}_{ijt} = \beta_0 + \beta_1 \ln\text{GDP}_{it} + \beta_2 \ln\text{GDP}_{it}^2 + \beta_3 \ln\text{PRICE}_{ijt} + \beta_4 \ln\text{DIST}_{ij} + \beta_5 \ln\text{QEDU}_{jt} + \beta_6 \ln\text{ICT}_{jt} + \beta_7 \ln\text{QLEAD}_{jt} + \lambda_t + \varepsilon_{ijt} \quad (2)$$

$$\ln\text{ETD}_{ijt} = \beta_0 + \beta_1 \ln\text{GDP}_{it} + \beta_2 \ln\text{GDP}_{it}^2 + \beta_3 \ln\text{PRICE}_{ijt} + \beta_4 \ln\text{DIST}_{ij} + \beta_5 \ln\text{QEDU}_{jt} + \beta_6 \ln\text{ICT}_{jt} + \beta_7 \ln\text{QLEAD}_{jt} + \theta_1 (\ln\text{QEDU} \times \ln\text{ICT})_{jt} + \lambda_t + \varepsilon_{ijt} \quad (3)$$

$$\ln\text{ETD}_{ijt} = \beta_0 + \beta_1 \ln\text{GDP}_{it} + \beta_2 \ln\text{GDP}_{it}^2 + \beta_3 \ln\text{PRICE}_{ijt} + \beta_4 \ln\text{DIST}_{ij} + \beta_5 \ln\text{QEDU}_{jt} + \beta_6 \ln\text{ICT}_{jt} + \beta_7 \ln\text{QLEAD}_{jt} + \theta_2 (\ln\text{QEDU} \times \ln\text{QLEAD})_{jt} + \lambda_t + \varepsilon_{ijt} \quad (4)$$

$$\ln\text{ETD}_{ijt} = \beta_0 + \beta_1 \ln\text{GDP}_{it} + \beta_2 \ln\text{GDP}_{it}^2 + \beta_3 \ln\text{PRICE}_{ijt} + \beta_4 \ln\text{DIST}_{ij} + \beta_5 \ln\text{QEDU}_{jt} + \beta_6 \ln\text{ICT}_{jt} + \beta_7 \ln\text{QLEAD}_{jt} + \theta_3 (\ln\text{ICT} \times \ln\text{QLEAD})_{jt} + \lambda_t + \varepsilon_{ijt} \quad (5)$$

where $\beta_0 = \ln A_0$, \ln denotes the natural logarithm, λ_t is the time-specific effect and ε_{ijt} is the error-term. According to the economic theories and past empirical literature, the present research hypothesised that $\beta_1 > 0$, $\beta_2 < 0$, $\beta_3 < 0$, $\beta_4 < 0$, $\beta_5 > 0$, $\beta_6 > 0$, $\beta_7 > 0$, $\theta_1 \neq 0$, $\theta_2 \neq 0$, and $\theta_3 \neq 0$. ETD_{ijt} is the inbound educational tourism demand measured by the number of foreign students from country i flows to destination country j (Malaysia). GDP_{it} represents educational tourists' income measured by the per capita real gross domestic product (GDP) in the home country i at time t and GDP_{it}^2 is the square of per capita real GDP. PRICE_{ijt} is the relative price of home and destination country

adjusted with the exchange rate, and DIST_{ij} is the distance between the home and destination countries which is time-invariant.

Nonetheless, QEDU_{jt} , ICT_{jt} and QLEAD_{jt} represent the quality of education, telecommunication infrastructure and the quality of national leadership in the destination country, respectively. To investigate the moderating effects of telecommunication infrastructure and national leadership, the interaction terms of $(\ln\text{QEDU}_{it} \times \ln\text{ICT}_{it})$, $(\ln\text{QEDU}_{it} \times \ln\text{QLEAD}_{it})$ and $(\ln\text{ICT}_{it} \times \ln\text{QLEAD}_{it})$ are accommodated into the demand model as presented in Eqs. (3) to (5).

Given the variables of QEDU_{jt} , ICT_{jt} and QLEAD_{jt} are inter-dependence, there is no direct interpretation for the estimated coefficients for the interaction terms. As such, Wooldridge (2002) suggests applying the partial derivation to obtain the marginal effects as presented below:

$$\frac{\partial \ln\text{ETD}_{ijt}}{\partial \ln\text{GDP}_{it}} = \beta_1 + 2\beta_2 \ln\text{GDP}_{it} \quad (6)$$

$$\frac{\partial \ln\text{ETD}_{ijt}}{\partial \ln\text{QEDU}_{jt}} = \beta_5 + \theta_1 \ln\text{ICT}_{jt} \quad (7)$$

$$\frac{\partial \ln\text{ETD}_{ijt}}{\partial \ln\text{QEDU}_{jt}} = \beta_5 + \theta_2 \ln\text{QLEAD}_{jt} \quad (8)$$

$$\frac{\partial \ln\text{ETD}_{ijt}}{\partial \ln\text{ICT}_{jt}} = \beta_6 + \theta_3 \ln\text{QLEAD}_{jt} \quad (9)$$

Data description. This study utilises balanced panel data from 2002 to 2019 across 149 educational tourism source markets in Malaysia (Appendix 1). The data used in this study are extracted from various databases, and the descriptive statistics are summarised in Table 1. Specifically, following the past studies of

Matahir and Tang (2018) and Tang et al. (2023), the present study uses the total number of foreign students enrolled in Malaysia's higher education institutions to measure the demand for inbound educational tourism (ETD_{ijt}). The data on foreign students is collected from the *Ministry of Higher Education* (MOHE) and the *UNESCO Institute for Statistics* (UIS).

Datasets for explanatory variables are obtained from various databases. The income of educational tourists is measured by the home country's per capita real GDP (2010 = 100), obtained from *UNdata* made available by the United Nations. Furthermore, the relative price variable, $PRICE_{ijt}$ is defined as the consumer price index (CPI, 2010 = 100) in Malaysia compared to the CPI in the home country i and adjusted for the respective exchange rate. The dataset for CPI and exchange rates are collected from two databases: the World Development Indicators (WDI) and the International Financial Statistics (IFS), published by the World Bank and International Monetary Funds (IMF), respectively. Furthermore, the statistics on Internet users per 100 population, which are used to measure ICT_{jt} in the destination country, Malaysia, are also sourced from the WDI database. (Besides Internet users per 100 people, there are a range of alternative indicators that may be used to gauge the ICT infrastructure. For instance, the number of broadband subscriptions, the number of secure Internet servers, fixed broadband subscriptions per 100 population, secure Internet servers per 1 million population and others. However, this study employs Internet users per 100 population since it reflects both the availability and Besides Internet users per 100 people, there is a range of alternative indicators that may be used to gauge the ICT infrastructure. For instance, the number of broadband subscriptions, the number of secure Internet servers, fixed broadband subscriptions per 100 population, secure Internet servers per 1 million population and others. However, this study employs Internet users per 100 population since it reflects both the availability and accessibility of ICT infrastructure. Indeed, this study also found that Internet users per 100 population are highly correlated with other ICT indicators, suggesting that it is a comprehensive and appropriate indicator for ICT.)

Moreover, information about the distance between the home country and Malaysia is sourced from *DistanceFromTo.net*. The quality of education in the destination country, $QEDU_{jt}$ variable is defined by the total number of Scopus-indexed scientific articles, research books and research letters published by Malaysian academic institutions. The relevant datasets are obtained from the Scopus database. Another important explanatory variable in this study is the quality of national leadership ($QLEAD_{jt}$) in Malaysia. The quality of leadership is likely a latent variable, and the socio-demographic backgrounds of leaders, such as education, age and experience, are commonly used to assess it. Unfortunately, the historical records show us a lot of evidence that national leaders with excellent educational backgrounds and extensive experience failed to manage their nations efficiently and effectively. In a nutshell, the present study follows the past studies of Tang and Salisu (2021) and Tan et al. (2010) to construct the outcome-based national leadership quality variable by calculating the simple arithmetic mean of the percentile score from four different indicators of governance and institutional quality, namely (a) *political stability and absence of violence*; (b) *control of corruption*; (c) *government effectiveness*; and (d) *freedom of voice and accountability*. These indicators are sourced from the *Worldwide Governance Indicators* (WGI) database.

Empirical results and discussions

The goal of this study is to estimate the demand model for inbound educational tourism demand in Malaysia with special attention to the role of telecommunication infrastructure,

quality of education and national leadership, as well as the non-linear impact of income on tourism demand. Given that the nature of the dependent variable of this study is left-censored and the explanatory variable of distance is time-invariant as presented in Table 1, the random effect panel Tobit regression model is very suitable to estimate the educational tourism demand. Furthermore, the maximum likelihood estimator (MLE) is used to estimate the random effect panel Tobit regression model. The estimation results are reported in Table 2.

Prior to discussing the estimation results, the present study begins the discussion by focusing on the diagnostic tests to validate the results and model used. Generally, results show that the statistics of the Wald test reported in Table 2 are consistently significant at the 1% level in all the five estimated demand models, suggesting that the specified log-linear demand models for educational tourism in Malaysia are well-fitted in the datasets. Likewise, the likelihood ratio (LR) test for poolability is also statistically significant at the 1% level, recommending that the random effect panel Tobit regression model is more efficient than the pooled Tobit model. As such, the estimated results in Table 2 are valid, and coefficients can be interpreted.

Model (1) presented in Table 2 is our baseline educational tourism demand model, which takes into account three basic key determinants, namely home country income, prices and distance. In contrast to the standard demand theory, this study finds that income has a significant negative impact on educational tourism demand in Malaysia. Nonetheless, this is akin to Engel's law of demand. Specifically, results suggest that demand for educational tourism in Malaysia is inelastic to income (-0.212), demonstrating that higher education services in Malaysia are likely an inferior tourism product instead of normal or luxury, contrary to conventional wisdom. Moreover, prices of tourism and distance are both statistically significant at the 1% level across all five models, but they are adversely affected by educational tourism demand. These findings are corroborated by the assertion in the gravity theory of trade, demand theory and many other past empirical studies that prices of tourism and distance had a significant negative impact on educational tourism demand (e.g., Matahir and Tang, 2018; Hussein et al., 2022; Tang et al., 2023). Similar to the impact of income, the present study finds that educational tourism demand is also inelastic to the price of tourism. With a 1% increase in the price of tourism, holding other explanatory variables constant, educational tourism demand drops by approximately 0.086%. However, results also attest that distance carries a high impact on educational tourism, where demand tends to decrease by nearly 1.8% for every per cent increase in the distance between Malaysia and the home country. Indeed, the results are consistent with the rest of the demand models reported in Table 2.

Next, our attention is directed toward the quadratic demand models, i.e., Model (2) to Model (5), as reported in Table 2. Our estimate results consistently reveal that the impact of income on inbound educational tourism demand in Malaysia is non-monotonic, where both the $\ln GDP_{it}$ and $\ln GDP_{it}^2$ are statistically significant at the 1% levels across the four models. At first, the impact of income on educational demand is positive, but the effect turns negative after the threshold. Likewise, previous tourism demand studies such as Tang et al. (2023) and Menegaki et al. (2020) also found a similar inverted U-shaped relationship. On average, the results suggest that the threshold value of income ranges from approximately US\$1893.72 ($2.445 - 0.324\ln GDP_{it} = 0$) to US\$2246.17 ($2.454 - 0.318\ln GDP_{it} = 0$). An important point extracted from findings is that an increase in educational tourists'

Table 2 Results of panel Tobit regression analysis.

Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
Constant	−107.813*** (11.396)	409.224*** (51.110)	1162.416*** (174.777)	506.110*** (55.903)	355.460*** (56.289)
$\ln GDP_{it}$	−0.212*** (0.079)	2.454*** (0.537)	2.544*** (0.548)	2.445*** (0.539)	2.540*** (0.534)
$\ln GDP_{it}^2$	−	−0.159*** (0.032)	−0.166*** (0.033)	−0.162*** (0.033)	−0.165*** (0.032)
$\ln PRICE_{it}$	−0.086*** (0.029)	−0.094*** (0.030)	−0.062** (0.030)	−0.059** (0.029)	−0.097*** (0.030)
$\ln DIST_{it}$	−1.783*** (0.229)	−1.781*** (0.230)	−1.803*** (0.233)	−1.801*** (0.230)	−1.778*** (0.231)
$\ln QEDU_{it}$	−	1.323*** (0.109)	−2.871*** (0.104)	−4.777 (2.458)	0.948*** (0.129)
$\ln ICT_{it}$	−	0.892*** (0.256)	−4.852*** (1.744)	1.066*** (0.279)	−19.721** (9.853)
$\ln QLEAD_{it}$	−	1.921*** (0.582)	4.912*** (0.856)	−12.453** (5.465)	−20.087** (10.100)
$\ln QEDU_{it} \times \ln ICT_{it}$	−	−	1.218*** (0.288)	−	−
$\ln QEDU_{it} \times \ln QLEAD_{it}$	−	−	−	1.501*** (0.594)	−
$\ln ICT_{it} \times \ln QLEAD_{it}$	−	−	−	−	5.043** (2.380)
Marginal effects of educational quality moderated by ICT infrastructure development					
$\beta_5 + \theta_1 \ln ICT_{MEAN}$	−	−	2.070*** (0.273)	−	−
$\beta_5 + \theta_1 \ln ICT_{MAX}$	−	−	2.527*** (0.353)	−	−
Marginal effects of educational quality moderated by national leadership					
$\beta_5 + \theta_2 \ln QLEAD_{MEAN}$	−	−	−	1.318*** (0.127)	−
$\beta_5 + \theta_2 \ln QLEAD_{MAX}$	−	−	−	1.447*** (0.120)	−
Marginal effects of ICT infrastructure development moderated by national leadership					
$\beta_6 + \theta_3 \ln QLEAD_{MEAN}$	−	−	−	−	0.751** (0.323)
$\beta_6 + \theta_3 \ln QLEAD_{MAX}$	−	−	−	−	1.184*** (0.265)
Diagnostic tests					
Wald test	958.37***	1098.92***	962.24***	1044.01***	1076.68***
LR test for poolability	3244.88***	3317.70***	3293.21***	3321.61***	3383.49***
Time dummies	Yes	Yes	Yes	Yes	Yes
p-values	0.8013	0.8213	0.8126	0.8172	0.8231
Log-likelihood	−3472.25	−3374.33	−3496.86	−3429.08	−3391.47

Note: (.) denotes the standard errors. The asterisks *** and ** denote statistically significant at the 1% and 5%, respectively.

income would not continuously uplift the demand for education in Malaysia, but it tends to reduce after the per capita real GDP reaches its threshold value of approximately US\$1893.72 and US\$2246.17. With reference to the income group classification of the World Bank, results seem to highlight that foreign students from low- and lower-middle-income countries, especially those with per capita income of less than US\$2246.17, are more likely to choose Malaysia as a destination for education. Conversely, Malaysia is less likely to be an ideal destination for education, particularly from the viewpoint of foreign students from upper-middle and high-income countries, as they might view education in Malaysia as an inferior product compared to Engel's law assertion.

Besides, the present study discovers that the quality of education ($\ln QEDU_{it}$) and telecommunication infrastructure ($\ln ICT_{it}$) in the destination country (Malaysia) are both positively associated with educational tourism demand. These results shed light on the fact that foreign students' decision on where to study is not limited to distance and economic factors, but the quality of education and ICT infrastructure development also play a

prominent role, which is in tandem with Tang et al. (2023) and Matahir and Tang (2018). The explanation of these findings is quite straightforward. Given that employment opportunity is closely associated with knowledge and skills, the likelihood of being employed is higher for those who received a quality education. Furthermore, the existence of a well-developed ICT infrastructure will provide a platform for marketing, easy access to resources, and attending classes, which will eventually enhance the likelihood of attracting demand for education.

Furthermore, findings reveal that the quality of national leadership is also positively associated with the demand for inbound educational tourism in Malaysia. This is within our expectation that countries with good national leaders are more likely to provide a secure, stable political and effective economic environment for businesses. Moreover, under the umbrella of good leadership, a variety of academic resources and infrastructure will be provided to develop a better educational system and society. In terms of magnitude, our estimated results show that demand is more elastic (or sensitive) to the change in national leadership

than educational quality and ICT. More specifically, with a 1% increase in national leadership quality, such as better control of corruption, freedom and government effectiveness, the demand for educational tourism will increase by approximately 1.921% (Model 2). Nonetheless, the educational tourism demand, on average, will increase by about 0.948–1.323% (Model 1 and Model 5) and 0.892% to 1.066% (Model 2 and Model 4), respectively, due to a 1% increase in educational quality and ICT.

After establishing the direct effect of educational quality, ICT and the quality of national leadership on educational tourism demand in Malaysia, this study extends the analysis and discussion to the findings of moderating effects. Since the variables are interdependent, the related coefficients have no direct interpretation. As such, this research follows the suggestion of Wooldridge (2002) and other empirical studies (Tang and Abosedra, 2019) to calculate the marginal effects by using the partial derivative of Eqs. (6–9). Furthermore, the present study uses the following formulae obtained from Aiken et al., (1991) to calculate the standard errors for the marginal effects of educational quality and ICT on educational tourism demand contingent upon the mean level of ICT infrastructure development and the quality of national leadership, respectively.

$$\hat{\sigma}_{\frac{\partial \text{EDT}}{\partial \text{QEDU}}} = \sqrt{\text{var}(\hat{\beta}_5) + \ln \text{ICT}^2 \text{var}(\hat{\beta}_6) + 2(\ln \text{ICT}) \text{cov}(\hat{\beta}_5, \hat{\beta}_6)} \quad (10)$$

$$\hat{\sigma}_{\frac{\partial \text{EDT}}{\partial \text{QEDU}}} = \sqrt{\text{var}(\hat{\beta}_5) + \ln \text{QLEAD}^2 \text{var}(\hat{\beta}_7) + 2(\ln \text{QLEAD}) \text{cov}(\hat{\beta}_5, \hat{\beta}_7)} \quad (11)$$

$$\hat{\sigma}_{\frac{\partial \text{EDT}}{\partial \text{ICT}}} = \sqrt{\text{var}(\hat{\beta}_6) + \ln \text{QLEAD}^2 \text{var}(\hat{\beta}_7) + 2(\ln \text{QLEAD}) \text{cov}(\hat{\beta}_6, \hat{\beta}_7)} \quad (12)$$

where $\text{var}(\hat{\beta}_5)$, $\text{var}(\hat{\beta}_6)$ and $\text{var}(\hat{\beta}_7)$ are the error-variances of $\ln \text{QEDU}_{it}$, $\ln \text{ICT}_{it}$ and $\ln \text{QLEAD}_{it}$, respectively. Then, $\text{cov}(\hat{\beta}_5, \hat{\beta}_6)$, $\text{cov}(\hat{\beta}_5, \hat{\beta}_7)$ and $\text{cov}(\hat{\beta}_6, \hat{\beta}_7)$ are the error-covariances of educational quality and ICT; of educational quality and national leadership; and of ICT and national leadership, respectively. The marginal effects on educational tourism demand at the mean and maximum levels of ICT and national leadership, along with their standard errors for inferential statistics, are reported in Table 2. The empirical results of this study indicate that the computed marginal effects for educational quality and ICT are positive and highly significant. Thus, the present study concludes that ICT development and the quality of national leadership play a significant role in shaping the effect of educational quality on educational tourism demand. Furthermore, findings show that the impact of ICT infrastructure development on tourism demand is moderated by the quality of national leadership in Malaysia.

At the mean level of ICT infrastructure development ($\ln \text{ICT}_{\text{MEAN}}$) and national leadership quality ($\ln \text{QLEAD}_{\text{MEAN}}$), estimated results show that a 1% improvement in educational quality tends to raise demand for educational tourism in Malaysia by nearly 2.070% and 1.318%, respectively. However, this study finds that the effects on educational tourism demand improve further to approximately 2.527% and 1.447% when ICT and national leadership are both at the maximum levels ($\ln \text{ICT}_{\text{MAX}}$, $\ln \text{QLEAD}_{\text{MAX}}$). It is obvious that the effects of educational tourism are contingent positively on the level of ICT infrastructure development and national leadership.

Although both ICT and national leadership are found to be effective moderators, especially for educational quality, comparatively, it is worth highlighting that the influence of ICT on the effect of educational quality seems greater than that of

national leadership quality. Educational tourists usually stay abroad, and they need to obtain relevant information before deciding on a study destination. Instead of physically being on campus, ICT would be the simplest and effective bridge for educational tourists to approach academic institutions. As such, a well-developed ICT infrastructure enables potential educational tourists to easily access resources or information pertaining to programmes, expertise, socio-economic environments and others before and after deciding the destination for education. Additionally, the development of ICT also provides an effective platform for academic institutions to promote and market their academic programmes to educational tourists. In light of these, it is plausible to find that the contribution of ICT infrastructure development to the relationship between educational quality and educational tourism demand tends to be greater.

Besides, results show the marginal effects for ICT (Model 5 column) are also positive (0.751 and 1.184) and statistically significant at both the mean and maximum levels of national leadership quality ($\ln \text{QLEAD}_{\text{MEAN}}$, $\ln \text{QLEAD}_{\text{MAX}}$). This implies that the effect of ICT on educational tourism demand in Malaysia also depends on the quality of national leadership. Improving national leadership quality, such as low corruption, effective governance and a stable political environment, is more likely to encourage investment and infrastructure development. As such, it is not surprising to find that the moderating effect of national leadership on ICT infrastructure development is much greater than its effect on educational quality.

Conclusion, policy implications and limitations

Conclusion. The present study attempts to provide new empirical evidence to the literature on tourism demand, particularly the demand for inbound educational tourism. To do so, this study employs panel data from 2002 to 2019 across 149 countries that supply educational tourists (foreign students) to Malaysia for higher education. Furthermore, the Tobit panel regression is used to estimate the demand model, and some key findings are obtained from our empirical analysis.

Unlike the existing literature, this study discovers a non-linear relationship between income and educational tourism demand, with income exerting a predominantly negative effect. This outcome suggests that Malaysia is perceived as an inferior destination for higher education, particularly by students from wealthier countries. These findings align with Rodríguez et al. (2012) and Tang et al. (2023), who argue that students from high-income countries are less inclined to pursue education in lower-income destinations. Thus, while Malaysia offers affordable education, it may be less appealing to students from advanced economies who prioritise prestige and perceived quality over affordability.

The findings of this study also highlight that education quality, ICT infrastructure and national leadership quality significantly influence inbound educational tourism demand in Malaysia. These results align with previous research, reaffirming the importance of academic quality (Bento, 2014; Hussein et al., 2022) and ICT infrastructure (Tang et al., 2023) in attracting international students. Moreover, the results indicate that the quality of education is moderated by ICT infrastructure, while national leadership quality moderates both ICT infrastructure and education quality in explaining educational tourism demand in Malaysia. These findings extend the work of Matahir and Tang (2018) by demonstrating that ICT and leadership quality reinforce the positive effects of their moderated factors on educational tourism demand. Additionally, this study introduces a novel dimension by incorporating leadership quality into the

demand model, an aspect that has been largely overlooked in previous research.

Policy implications. Several policy-relevant conclusions can be drawn from these key findings. Given the evidence that students from wealthier nations view Malaysia's higher education system as inferior, Malaysia should focus its promotional efforts on low- and middle-income countries. This is consistent with studies like Tang et al. (2023) and Hussein et al. (2022), which emphasise the sensitivity of education tourism demand to income levels. As an illustration, the government agencies and universities in Malaysia should leverage digital marketing platforms to promote the country as an education hub by taking part in more significant educational exhibitions in the targeted countries. Furthermore, scholarships should be offered to students from low- and lower-middle-income countries, particularly those with a per capita income below the threshold of US\$2246.17, as attested by our findings. Visitors to the general exhibition counter might receive advice on academic study plans, participate in a Q&A session, or attend other events. This promotional strategy would help to improve the likelihood of attracting educational tourists to pursue higher education in Malaysia, thus enlarging the educational tourism industry and fostering economic growth.

Nevertheless, marketing remains a short-term strategy for promoting educational tourism demand and may not be sufficient to sustain and develop the industry in the long term. Both past studies (e.g., Bento, 2014; Matahir and Tang, 2018) and the findings of this study consistently affirm that the quality of education is a critical determinant of demand for educational tourism. Therefore, to create long-term and sustainable educational tourism demand, the quality of education must be prioritised by policymakers and stakeholders, including the ministries of education, tourism and academic institutions. To improve the quality of education, academic institutions, particularly the top management and academicians, should monitor, review and update the structure of the academic programmes and the contents of the courses to ensure that the students will earn fundamentally correct and on-time knowledge in the discipline. Besides, academic institutions must also appreciate talented individuals and reward them equitably on the basis of merit. Although the contents of academic programmes and talented individuals are both essential, commonality or speaking the same language in teaching and research would provide a more comfortable environment for educational tourists, which in turn would attract a more diverse pool of international students and help to overcome the perception of Malaysia as an inferior destination.

In addition, one of this study's key contributions is its emphasis on the role of national leadership quality in fostering ICT development and boosting demand for educational tourism. The moderating role of leadership quality, which strengthens the positive effects of both ICT infrastructure and educational quality, highlights the need for strong, transparent and effective educational governance policies. This finding aligns with the literature on the impact of government effectiveness on education and economic development (Pont et al., 2008; Tang et al., 2023). The Malaysian government should continue prioritising investments in ICT infrastructure, including expanding broadband access and promoting digital literacy. Public-private partnerships can also play a crucial role in building the necessary infrastructure and enhancing Malaysia's global appeal in higher education. Additionally, addressing issues such as corruption, ensuring political stability and promoting freedom of expression will help create a safe and conducive environment for students. Enhancing leadership quality in these areas will make Malaysia more attractive to international students, as factors like political

stability and governance are often key considerations for students choosing to study abroad (Ahmad and Buchanan, 2016; Kenfack and Öztüren, 2021). Furthermore, the recommendations derived from our findings may also be applicable to other developing countries seeking to promote educational tourism as a driver of economic growth.

Research limitations and avenues for future studies. Despite the findings of the present study contributing to the body of knowledge and policymaking, it has a few drawbacks. The present study provides only general empirical evidence for policymaking at the macro level because it focuses mainly on the demand for inbound educational tourism at the aggregate level. As such, it has ignored the role of tuition fees, programme diversity, location, academic reputation and the environment of the university in explaining the behaviour of educational tourism demand. Besides, some of the variables used in this study, such as Internet users, the quality of national leadership and educational quality, vary only over time. Although this is commonly found in the literature, it is imperfect, and the findings about these variables should be viewed merely from the *pulling* perspective in determining the demand for educational tourism. With regard to these limitations, future studies may narrow the analysis to consider micro-level variables in explaining educational tourists' choice of destination. To further strengthen the findings, future studies may also consider the relative differences of the determinants in explaining the demand, such as the educational quality of Malaysia compared to the educational quality of the origin country or comparisons of national leadership between different countries, rather than absolute measures of educational quality or national leadership. As such, more comprehensive findings and conclusions could be drawn from future studies.

Data availability

The datasets generated during and/or analysed during the current study are available from the corresponding author upon reasonable request.

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Author contributions

Chor Foon Tang: Conceptualisation, data curation, formal analysis, investigation, methodology, supervision and writing original draft. Bee Wah Tan: Conceptualisation, resources, methodology and writing—original draft. Karoon Suksonghong: Conceptualisation, funding acquisition, resources, writing, review and editing, and supervision

Competing interests

The authors declare no competing interests.

Ethical approval

This study does not contain any studies with human participants performed by any of the authors.

Informed consent

This study does not include any studies involving human participants conducted by the authors.

Additional information

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