



# World Heritage Sites in developing countries: Assessing impacts and handling complexities toward sustainable tourism

Keyvan Hosseini<sup>a,\*</sup>, Agnieszka Stefaniec<sup>a</sup>, Seyedeh Parisa Hosseini<sup>b</sup>

<sup>a</sup> School of Social Sciences, Södertörn University, SE-141 89, Stockholm, Sweden

<sup>b</sup> School of Public Affairs, University of Science and Technology of China, 230026, Hefei, China

## ARTICLE INFO

### Keywords:

Sustainable tourism  
World heritage site  
In danger world heritage list  
Developing countries  
COVID-19 pandemic  
Degrowth  
Nonhegemonic partnership  
Data envelopment analysis

## ABSTRACT

The current study addresses several concerns regarding World Heritage Sites (WHSs) in developing countries. Using a novel super-efficiency parallel framework, this research firstly elucidates how WHS designation impacts the tourism sector in the 21 developing nations with the greatest number of WHSs from 2000 through 2016. The proposed parallel model assesses the tourism industry at both the macro level in the context of resource-oriented efficiency and the micro level in facility-oriented efficiency. The results demonstrate that the WHS brand positively impacts the tourism demand in developing countries and can be used as a promotional tool. Secondly, this work draws attention to the socio-ecological concerns related to WHSs in developing countries. It sets out a critical and factual discussion based on the current designation and conservation status of WHSs. The analysis highlights an unfair distribution of WHSs between developing and advanced economies and reveals negligence in their preservation, since around 94% of sites labeled In Danger are located in developing nations. The study concludes that the conservation of WHSs is a complex societal problem and offers policy implications for handling heritage inscription and preservation issues in developing countries. Finally, it explores pathways toward sustainable conservation of WHSs, based on United Nations sustainable development goals (SDGs) for safeguarding heritage and sustainable communities (SDG 11), for more effective institutions (SDG 16), and for fair and nonhegemonic partnership between advanced economies and developing countries (SDG 17). The outcomes may be of practical value to policymakers aiming to improve tourism and heritage management.

## 1. Introduction

### 1.1. Background

Whether the tourism industry is vital (Milano et al., 2019) or unnecessary (Higgins-Desbiolles et al., 2019) for the human economy, its socio-economic impact presently cannot be underestimated as it accounts for more than 10% of global GDP and a similar share in worldwide employment (WEF, 2019). As an offspring of neoliberalism and like every capitalistic activity, modern tourism comes with several positive and negative footprints. Although, due to the public's fear, social distancing, and constrained mobility in the COVID-19 pandemic era, the tourism sector collapsed around the world (Rather, 2021; Rossolatos, 2020), the effect of the pandemic cannot be permanent because many nations around the world are highly dependent on the income from tourism activities. Currently, the world is witnessing slow and selective but continuous lifting of border restrictions globally.

The advantages of the tourism industry are tremendous from regional and international perspectives. Tourism generates numerous domestic long-term employment, and a large proportion of these jobs do not require special skills or high academic background (Hjalager, 2007). The development of tourism can strengthen the process of globalization and eradicate prejudice and self-exaltation because of its intercultural characteristic, while concurrently boosting tolerance and fraternalism among cultures and civilizations. Currently, the tourism sector is an integral part of the economy in many developing countries around the world (Assaf, 2012; Durbarry, 2004) and is vital for their economic growth. The capital generated by the tourism supply chain also can offset the cost of protection and maintenance of natural and cultural assets and, in this way, contribute to sustainable usage of resources. Furthermore, tourism is a beneficial tool for relieving distress and alleviating pressure from daily life in human society (Büscher & Fletcher, 2017). Attractive features like these highlight the importance of the tourism industry, particularly in developing nations, as a tool which can

\* Corresponding author.

E-mail addresses: [keyvan.hosseini@sh.se](mailto:keyvan.hosseini@sh.se) (K. Hosseini), [agnieszka.stefaniec@sh.se](mailto:agnieszka.stefaniec@sh.se) (A. Stefaniec), [parisa@mail.ustc.edu.cn](mailto:parisa@mail.ustc.edu.cn) (S.P. Hosseini).

contribute to the alleviation of poverty (Xiao, 2013) and accelerate development in a sustainable manner which is environmentally friendly, socially human-oriented, and financially attractive.

Tourism activities raise several environmental and social concerns by stressing the biosphere and communities. Massive tourism-related projects are sometimes run directly by foreign investors or through the hegemonic partnership between foreign businesses and local governments entangled in systemic corruption and crony capitalism in developing countries (Franceschini, 2020; Jeyacheya & Hampton, 2020); such projects can create inequitable conditions for domestic businesses to compete with their counterparts from wealthy nations. This pattern also gives unleashed and unaccountable authority to foreign investors to exploit local communities without proper redress (Wijesinghe & Mura, 2018), forming neo-colonialism in developing countries. In recent years, due to tourism mismanagement and profit-maximization-oriented policies, many tourist sites and human communities, as well as the wildlife around them, suffer from overcrowding by tourists. This so-called overtourism (Cheung & Li, 2019; Seraphin et al., 2018) depicts the failure of current policies promoting tourism, leading to continued and increased destruction of cultural sites, degradation of natural heritage, and concurrent harm to local communities living in or around the tourist areas. Moreover, the tourism sector is notorious for its waste production (Büschler & Fletcher, 2017). The production of waste can intensify as a result of overtourism since more visitors generate more waste. Additionally, because of the heavy reliance of the tourism sector on transportation, it causes increased GHG emissions (Carrier & Macleod, 2005), in particular, from the jet aircraft (Denstadli & Veisten, 2020) servicing international tourism.

The Travel and Tourism Competitiveness Report (WEF, 2019) stated that, with the exceptions of China, Mexico, and Malaysia, the top thirty states in the travel and tourism competitiveness index were advanced economies. Although developed countries are on stronger ground in tourism competitiveness (Assaf & Josiassen, 2012), the tourism sector is still a more feasible arena for developing countries to compete with their advanced counterparts compared to other sectors like the high-tech industry. In the case of some resources, developing countries are quite competitive. For instance, the top thirty states in terms of price competitiveness are developing nations (WEF, 2019), indicating that leisure in these countries is relatively inexpensive and affordable compared to developed economies. Besides, some developing countries are among the top nations in the natural resource rankings and in terms of cultural resources and business travel. These factors make the developing states attractive destinations for many tourists and give them the potential to compete with the well-established tourism industry in advanced economies.

The tourism sector is founded on natural, geographical, cultural, and historical properties. To recognize their value and preserve them, UNESCO began labeling the most prominent of these properties as World Heritage Sites (WHSs). WHSs are grouped into three categories: cultural, natural, and mixed. Any WHS is recognized as a great representation of life and inspiration which has survived throughout history. The identification and conservation of these heritage sites constitute a magnificent contribution to humanity (UNESCO, 2020). The treaty regarding the safekeeping of WHSs was adopted by UNESCO in 1972, and by 2020, it was ratified by 194 countries. The WHS list has been growing through time and currently includes 1121 properties in 167 countries.

The sophisticated procedure of WHSs designation begins with the inscription of potential properties on a tentative list submitted by each state member, after which the World Heritage Committee investigates the application and gives a green light if the site meets criteria such as having outstanding universal value, integrity, and authenticity (UNESCO, 2017). The committee also has the right to refer, defer, or reject the nominated site. Several studies have investigated the influence of WHS quantity on the tourism sector of advanced economies (See Section 1.2). However, the literature neglects the impact of WHSs in the case of developing countries.

To avoid a superficial analysis of the tourism sector, which is an intricate system, this study proposes a novel parallel investigative framework to profoundly examine the current status of this sector in two contexts (Fig. 1). On the one hand, the facility-oriented component expresses how effectively each country employs the available tourism infrastructure to attract tourists. In other words, this component examines the performance of the tourism industry at the micro level, showing to what degree the investment in facilities contributes to the development of tourism in the studied countries. On the other hand, the resource-oriented component measures the tourism industry efficiency at the macro level in reference to available resources that can be allocated to tourism purposes. This component employs macroeconomic factors to show the extent to which each country's capacity has been exploited and reveal any untapped potential to expand the domestic tourism supply chain. Furthermore, our key variable, the number of UNESCO WHSs in each state, is used as one of the indicators for both parallel components, representing the role of globalization and sustainability in the proposed model. Consequently, this comprehensive model offers a detailed examination of the tourism supply chain in developing countries to synthesize knowledge and clarify previous controversial issues around the role of WHS in tourism sector performance (see Table 1).

Moreover, this study highlights the two important issues regarding the preservation and identification of WHSs in developing nations. First, a comparison between the numbers of WHSs located in different parts of the world shows the asymmetry and an unjust distribution. For instance, by 2019, less than 10% of WHSs were located in Africa, while more than 40% were in Europe. More than 20% of these sites were located in just five nations (France, Germany, Italy, Spain, and the UK). Second, around 94% of sites labeled In Danger are located in developing countries. The study concludes that the preservation of WHSs is a complex societal problem that should be handled by multiple neutral experts and actors. By employing Compram methodology (DeTombe, 2002), we offer improvement suggestions concerning the World Heritage In Danger list designation procedure.

## 1.2. Previous works

Recognizing the capability of data envelopment analysis (DEA) in efficiency measurement, several studies have utilized this methodology to measure the efficiency of various sectors (Assani et al., 2018; Emrouznejad & Yang, 2018). Such research has addressed the tourism supply chain from different perspectives. Assaf (2012) applied DEA and stochastic frontier techniques to compare the efficiency of the leading tour operators and hotel companies across several Asia Pacific states. That study also reported the best performers among tour operators and hotels in each territory. Applying the super-efficiency model, Chaabouni (2019) investigated the tourism sector in 31 Chinese provinces over the period 2008–2013 to identify the factors influencing tourism sector efficiency, concluding that trade openness, hotel capacity, and temperature are important factors. The article by Barros et al. (2011) proposed an efficiency assessment method for leading tourism regions in France, examining French destinations based on accommodation capacities and natural and historical resources.

Ma et al. (2009) employed DEA to evaluate the resource use efficiency of 136 Chinese national parks. They noted that environmental concerns are prioritized above the recreational and economical functions of national parks. A bi-objective DEA model was used to examine 69 Taiwanese hotels in the study of Yin et al. (2020). They mentioned that in future studies of the tourism industry, bigger samples should be collected to provide a more comprehensive picture, and environmental factors should be included. Using the DEA bootstrap method, Assaf and Josiassen (2012) checked the performance of 120 countries around the world to identify the determinants of tourism industry performance. Their outcomes indicated that the majority of the top 20 performing countries are advanced economies and in contrast, the lowest 20

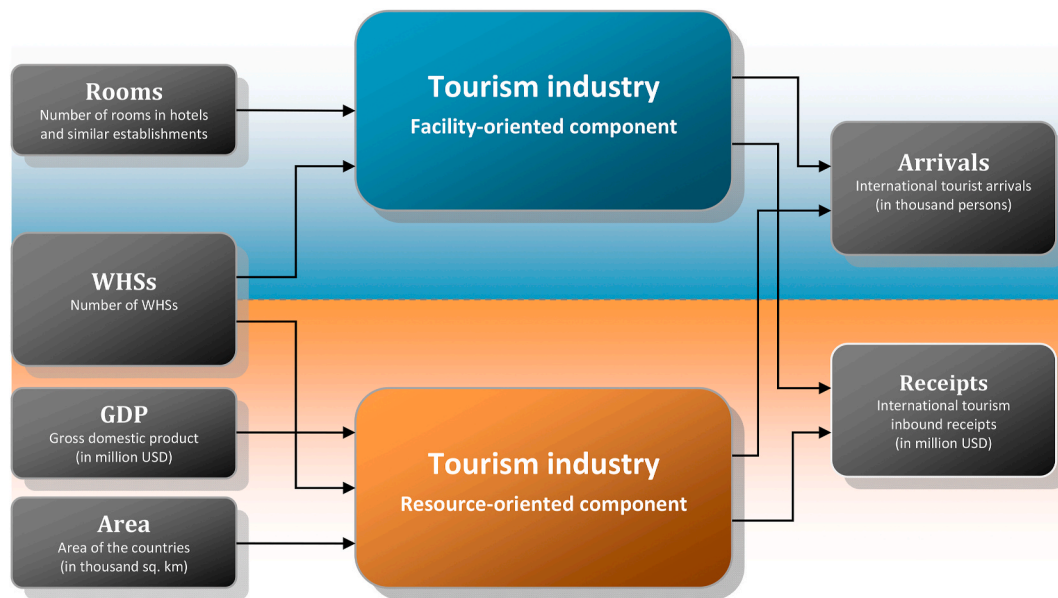


Fig. 1. Illustration of the proposed parallel framework.

**Table 1**  
Summary of literature on World Heritage Sites designation and conservation.

Authors	Sample	Effect of WHSs on the tourism sector
Kim et al. (2007)	Changdeok Palace Complex in South Korea	WHSs have high economic value and increase tourists' willingness to pay a higher price for a ticket to visit the heritage site.
Yang et al. (2010)	WHSs in 26 provinces in China	WHS designation increases the number of tourists significantly.
Poria et al. (2013)	WHSs in Israel	The WHS designation does not influence tourism growth, but it does signal the authenticity and notability of the site.
King and Halpenny (2014)	Five WHSs in Queensland, Australia, and Hawaii Volcanoes National Park, United States	The WHS symbol is not recognized by tourists and does not have a strong effect on tourism demand.
Wang et al. (2015)	Kanas National Nature Reserve in Xinjiang, China	WHS designation does not inevitably increase tourism and economic growth but can have positive influences from the social and environmental points of view for the surrounding area.
Cuccia et al. (2016)	WHSs in Italy	WHSs negatively affect the tourism demand.
Adie et al. (2017)	Three WHSs in USA, Serbia, and Morocco	The WHS designation may cause long-term negative impacts on sites and the local area.
Cuccia et al. (2017)	WHSs in Italy	WHSs have a negative effect on the performance of tourism destinations.
Kim et al. (2017)	Two WHSs in South Korea	WHS status has a significant positive impact on both authenticity and economic benefit.
Mariani and Guizzardi (2020)	47 WHSs in Italy	WHS status negatively affects the overall assessment of the destination by tourists and heritage's artistic assets.

performing countries are mainly developing countries. Exploring the role of WHS designation in promoting the tourism industry in different regions in Italy, Cussia et al. (2016) applied a two-stage DEA method. They found that WHS designation does not have positive effects on tourism demand in Italy.

Although the influence of WHSs on tourism supply chains has been investigated in previous studies such as Cussia et al. (2016) and Kim et al. (2017), the issue remains controversial. The majority of the literature in this area continues to focus on a particular site or region, and the locations are mainly in advanced economies. Furthermore, previous studies typically focus on just one country or a small number of specific properties, which indicates small study samples (Table 1). For instance, Wang et al. (2015) noted that WHS labels do not inevitably increase tourism growth, but can positively influence the social development and protection of the environment. Recognition as a WHS has a more powerful impact on tourism growth for cultural sites than natural sites; this was revealed by Yang et al. (2010), who noted that the WHS designation has a significant tourist-enhancing effect. Conversely, Mariani and Guizzardi (2019) concluded that WHS status negatively affects the overall assessment of the destination by tourists. Poria et al. (2013) found that WHS status exerts no positive effect (and may even have a negative influence) on tourist intentions to visit a site because a WHS can be more crowded and more costly to visit. Kim et al. (2017)

concluded that WHS status can significantly improve the perceived authenticity of the site, which leads to economic advantages. Kim et al. (2007) noted that WHS status increases willingness to pay a higher price to visit these heritage sites. Also, King and Halpenny (2014), Cussia et al. (2017), and Adie et al. (2017) are among researchers who found that WHSs negatively impact tourism industry growth.

As Rasoolimanesh et al. (2017) mentioned, the size of the research sample should be large, and a variety of territories should be involved in the study to justify the generalization of outcomes regarding WHSs. Therefore, two important gaps can be noticed in the current literature. First, none of the previous studies concentrated on the global scale efficiency comparison related to WHSs. Existing studies tend to focus on one single country or a few geographical areas. Second, they are mainly limited to advanced economies. In this study, we extend the present literature in terms of scope (temporal and spatial). Instead of concentrating on one particular country, the focus here is on comparing several developing countries.

Hence, as mentioned above and also noted by Yang et al. (2019), scholarly understanding of the effects of WHSs on tourism sector efficiency remains vague. In light of this unresolved concern, this study offers a novel framework to examine the parallel efficiency of the tourism industry in the 21 developing countries with the greatest number of WHSs from 2000 to 2016 (see Fig. 1). The framework uses a

nonradial super-efficiency slack-based measure (super-SBM) approach introduced by Tone (2002). Analyzing the efficiency of multiple nations' tourism industries on such a scale is a comprehensive attempt to gain detailed insight into the interconnection between WHS status and tourism sector wellbeing. After obtaining the efficiency scores from the super-SBM model, the study analyzes the relationship between rankings and different factors influencing the tourism sector, including the number of WHSs possessed by each country.

The study proceeds as follows. Section 2 presents the methodology and describes the dataset. Section 3 interprets the results, explores the WHS designation and conservation concerns in developing countries, and offers relevant policy implications. Section 4 contains concluding remarks and corresponding future directions.

## 2. Method and material

### 2.1. Super-efficiency slacks-based measure

To measure the efficiency of the tourism industry in developing countries, which are the decision-making units (DMUs) in this study, we follow the mathematical approach introduced by Tone (2002). The proposed super-efficiency measure can determine not only the efficient DMUs but also discriminate between the best performers. The super-efficiency technique is founded on a slacks-based measure (SBM; Tone, 2001), which directly deals with input and output slacks because of its nonradial characteristics. SBM is also unit-invariant and monotonically decreasing in the input and output slacks. Because the current study aims to increase the number of tourists and their expenditure on tourist activities, we apply output-oriented super-SBM.

Assume that there are  $n$  DMUs with the input and output matrices  $X = (x_{ij}) \in R^{m \times n}$  and  $Y = (y_{ij}) \in R^{s \times n}$ , respectively. The dataset is assumed to be positive, i.e.  $X > 0$  and  $Y > 0$ . The production possibility set  $P$  is then defined as  $P = \{(x, y) | x \geq X\lambda, y \leq Y\lambda, \lambda \geq 0\}$ .

To estimate the efficiency of the DMU under evaluation, denoted as  $DMU_0$ , the following fractional program can be formulated (Tone, 2002):

$$\begin{aligned} \min \rho &= \frac{1 - \frac{1}{m} \sum_{i=1}^m s_i^- / x_{i0}}{1 + \frac{1}{s} \sum_{r=1}^s s_r^+ / y_{r0}} \\ \text{s.t. } x_0 &= X\lambda + s^-, \\ y_0 &= Y\lambda - s^+, \\ \lambda &\geq 0, s^- \geq 0, s^+ \geq 0. \end{aligned} \tag{Eq. 1}$$

where  $s^-$  and  $s^+$  represent the slacks (i.e. input excess and output shortfalls), respectively. The above fractional SBM program is then transformed into a linear program utilizing the Charnes–Cooper transformation. Based on the optimal solutions  $\rho^*, \lambda^*, s^{*-}$ , and  $s^{*+}$ , we define that a DMU is SBM-efficient if  $\rho^* = 1$ .

For any efficient DMU, the production possibility set spanned by  $(X, Y)$  excluding  $(x_0, y_0)$  is as follows:  $P \setminus (x_0, y_0) = \{(\bar{x}, \bar{y}) | \bar{x} \geq \sum_{j=1, \neq 0}^n \lambda_j x_j,$

$$\bar{y} \leq \sum_{j=1, \neq 0}^n \lambda_j y_j, \bar{y} \geq 0, \lambda \geq 0\}$$

Further, a subset  $\bar{P} \setminus (x_0, y_0)$  is defined as:  $\bar{P} \setminus (x_0, y_0) = P \setminus (x_0, y_0) \cap \{\bar{x} \geq x_0 \text{ and } \bar{y} \leq y_0\}$

The weighted distance from  $(x_0, y_0)$  to  $(\bar{x}, \bar{y}) \in \bar{P} \setminus (x_0, y_0)$  is expressed as below:

$$\delta = \frac{\frac{1}{m} \sum_{i=1}^m \bar{x}_i / x_{i0}}{\frac{1}{s} \sum_{r=1}^s \bar{y}_r / y_{r0}} \tag{Eq. 2}$$

In Eq. (2), the numerator involves distances in the input space, and the denominator considers distances in the output space.

The super-efficiency of  $DMU_0$  is then defined as the optimal objective function value  $\delta$  of the following program:

$$\begin{aligned} \delta^* &= \min \delta = \frac{\frac{1}{m} \sum_{i=1}^m \bar{x}_i / x_{i0}}{\frac{1}{s} \sum_{r=1}^s \bar{y}_r / y_{r0}} \\ \text{s.t. } \bar{x} &\geq \sum_{j=1, \neq 0}^n \lambda_j x_j, \\ \bar{y} &\leq \sum_{j=1, \neq 0}^n \lambda_j y_j, \\ \bar{x} &\geq x_0 \text{ and } \bar{y} \leq y_0, \\ \bar{y} &\geq 0, \lambda \geq 0. \end{aligned} \tag{Eq. 3}$$

It worth noticing that Eq. (3) guarantees that the super-efficiency score is not lower than that of  $(x_0, y_0)$ .

The fractional program is then transformed into a linear program applying the Charnes–Cooper transformation (Charnes & Cooper, 1962) as:

$$\begin{aligned} \tau^* &= \min \tau = \frac{1}{m} \sum_{i=1}^m \frac{\tilde{x}_i}{x_{i0}} \\ \text{s.t. } 1 &= \frac{1}{s} \sum_{r=1}^s \frac{\tilde{y}_r}{y_{r0}}, \\ \tilde{x} &\geq \sum_{j=1, \neq 0}^n \lambda_j x_j, \\ \tilde{y} &\leq \sum_{j=1, \neq 0}^n \lambda_j y_j, \\ \tilde{x} &\geq tx_0 \text{ and } \tilde{y} \leq ty_0, \\ \lambda &\geq 0, \tilde{y} \geq 0, t > 0. \end{aligned} \tag{Eq. 4}$$

The optimal solution of the Eq. (4) is based on  $(\tau^*, \tilde{x}^*, \tilde{y}^*, \lambda^*, t^*)$ .

Finally, the output-oriented super-SBM program is defined as follows:

$$\begin{aligned} \delta_o^* &= \min \delta = \frac{1}{\frac{1}{s} \sum_{r=1}^s \bar{y}_r / y_{r0}} \\ \text{s.t. } \bar{x} &\geq \sum_{j=1, \neq 0}^n \lambda_j x_j, \\ \bar{y} &\leq \sum_{j=1, \neq 0}^n \lambda_j y_j, \\ \bar{x} &= x_0 \text{ and } 0 \leq \bar{y} \leq y_0, \\ \lambda &\geq 0. \end{aligned} \tag{Eq. 5}$$

The DMU that obtains a score greater than or equal to unity is efficient, with higher scores denoting higher ranks even among the best performers. A score lower than unity indicates that DMU is inefficient.

### 2.2. Data description

The current study's key indicator, the number of WHSs in each



selected developing country, is taken as an input for both parallel components (Fig. 1). In the case of facility-oriented efficiency, the number of rooms available for tourists in hotels and similar establishments in each country is considered as a second input. This variable is determined by factors like the private and public investment in hotels, number of employees, and physical assets. Ivanov and Webster (2013) mentioned that geographic variables and economy size are adequate indicators to examine the tourism industry, so for resource-oriented efficiency, we selected the GDP of countries (in million USD) and area of the countries (in thousand sq. km.) as inputs. Furthermore, the same outputs were utilized for both stages, namely international tourist arrivals (in thousand persons) and international tourism inbound receipts (in million USD). It is noteworthy that international tourism inbound receipts express disbursements on goods or services by international tourists in the destination state. The super-SBM approach has a unit-invariant property, thus it is independent of the units of data. A summary of the descriptive statistics of the relevant data is shown in Table 2.

The current study has a larger dataset compared to previous empirical studies on WHSs. The data were assembled for 21 countries that are recognized by the International Monetary Fund (IMF, 2019) as developing nations and had the greatest number of WHSs in 2000–2016. As the number of WHSs grew only slowly through the years, we chose the five years 2000, 2004, 2008, 2012, and 2016 to represent the 2000–2016 period. The countries under consideration are Argentina, Brazil, Bulgaria, China, Colombia, Cuba, Ethiopia, Hungary, India, Indonesia, Iran, Mexico, Morocco, Peru, Poland, Romania, Russia, South Africa, Tunisia, Turkey, and Vietnam. There were eight or more WHSs located in each of the considered countries in 2016. As the number of countries meets the requirement that the number of DMUs should be bigger than triple the number of variables used for the DEA analysis (Li et al., 2017), high construct validity has been concluded for the proposed DEA model. It is noteworthy that our aim was not to evaluate all the countries with WHSs but to find the pattern and determine whether possessing WHSs significantly impacts the tourism industry in developing countries. That is why we choose the countries with the greatest number of WHSs. In this study, a robust and valid DEA-based framework requires a minimum of 15 countries (as a resource-oriented efficiency is calculated based on five variables, including three inputs and two outputs, while facility-oriented efficiency on four variables, two inputs and two outputs). However, only 14 developing countries had nine or more WHSs in 2016. Thus, we have also included all seven countries possessing eight WHSs to be fair.

The empirical data was drawn from the following sources: the World Bank (2019), UNWTO (2019), and UNESCO World Heritage list statistics (2019). Moreover, correlation analysis for the variables was also calculated. The correlation coefficients for the indicators of parallel efficiency components are shown in Table 3. The correlation coefficients are significantly positive, indicating that the inputs and outputs are significantly related and suitable for use in the proposed DEA framework.

**Table 2**  
Descriptive statistics of inputs and outputs for two parallel stages.

	Min	Max	Mean	Std. Deviation
Number of WHSs	3	49	13	9
Number of touristic rooms	3497	1,591,379	233,126	303,432
GDP	8242	11,190,992	664,331	1,470,625
Area	93,030	17,098,250	2,581,248	4,115,469
Inbound receipts	205	50,028	7921	9092
International Arrivals	136,000	59,270,000	10,223,600	11,886,210

### 3. Results and discussion

#### 3.1. Empirical results

The core intention of the current research is to investigate the effects of WHSs on the performance of the tourism industry in developing countries. Due to the complexity of the tourism sector and to highlight its minutiae, this study offers a comprehensive parallel framework covering the contexts of both facility-oriented efficiency and resource-oriented efficiency. Efficiency scores in the facility-oriented component represent how successfully each of the studied states utilizes existing facilities to promote tourism activities compared to their peers. States attaining higher scores in the resource-oriented component use their resources to advance their tourism supply chain more efficiently.

Table 4 reports the results obtained from the proposed performance measurement framework to evaluate the tourism sectors in 21 developing nations containing the greatest number of WHSs. The efficiency scores of the parallel components, ranging between 0 to infinity, rank the tourism services. In the super-SBM model, DMUs attaining a score of 1 or higher are efficient. Higher efficiency values represent better performance among the efficient tourism supply chains. In this way, we can even distinguish between efficient DMUs to recognize the better performers among them. Thus, the higher the score they earn, the more relatively efficient they are. Conversely, a lower score represents poorer relative efficiency. We ranked 21 countries based on the arithmetic mean scores for the five chosen years (Table 4). The outcomes are presented in Fig. 2 to compare DMUs in both components of the proposed model through the study period.

The following conclusions are deduced from Table 4. Turkey has the most efficient performance among selected countries, and it is also the only country that is efficient in both parallel components over the studied period. Additionally, Bulgaria and Hungary were efficient in the whole period in terms of resource-oriented performance, which shows the efficient exploitation of the available resources in these countries. Furthermore, in addition to Turkey, Poland and South Africa were recognized to be efficient in facility-oriented efficiency over the period; these states utilize their present tourism infrastructure more effectively than their peers. Conversely, within the given study period, Brazil received the lowest efficiency scores in both components of the proposed model. In the case of the facility-oriented component, Brazil, Columbia, Peru, Argentina, and Iran appeared to be the least efficient. Brazil, Ethiopia, India, Iran, and Colombia were listed as the least efficient performers in the resource-oriented efficiency. All in all, the high-efficiency scores in both parallel components of the proposed model indicate well-established tourism industries in Turkey, Morocco, and Bulgaria. In contrast, low performance in both parallel components suggests low productivity of the tourism sectors in Brazil, Columbia, Iran, Peru, and Ethiopia.

The results can be grouped to compare the countries across regions (Fig. 3). Among the selected African countries, Ethiopia had the lowest performance in both components. Tunisia was the most efficient at the beginning of the studied period, but its performance collapsed after 2008, possibly due to the Arab Spring influence. Morocco obtained the best performance among the selected African countries in the studied period. Although South Africa was efficient in the whole given period from the facility-oriented point of view, it had weak performance in the resource-oriented component, which suggests that the current tourism sector in South Africa does not utilize its available potential efficiently.

Considering Asia, Turkey witnessed a fall in both components' efficiency scores in the second half of the studied period. This drop coincides with the beginning of civil war in the neighboring countries of Syria and Iraq, leading to Turkey's engagement in these conflicts. Although Vietnam appeared inefficient in both components, a gradual upward movement can be seen in both its efficiency components, which could be related to the transition from a socialist-oriented economy to an open one.

**Table 3**  
Spearman correlation coefficients of variables.

	WHSs	Rooms	GDP	Area	Inbound receipts	International arrivals
WHSs	1					
Rooms	0.496	1				
GDP	0.659	0.700	1			
Area	0.501	0.554	0.749	1		
Inbound receipts	0.571	0.605	0.765	0.379	1	
International arrivals	0.531	0.640	0.616	0.269	0.805	1

**Table 4**  
Efficiency scores of selected developing countries over the period 2000–2016.

Region	State	2000		2004		2008		2012		2016		Mean		Rank	
		FOE	ROE	FOE	ROE	FOE	ROE	FOE	ROE	FOE	ROE	FOE	ROE	FOE	ROE
Africa	Ethiopia	0.206	0.111	1.112	0.162	0.366	0.153	0.436	0.158	0.474	0.158	0.519	0.148	14	20
	Morocco	0.980	0.906	1.281	1.101	1.685	1.245	1.599	1.267	1.354	1.318	1.380	1.167	2	4
	South Africa	1.040	1.040	1.187	0.735	1.057	0.676	1.195	0.582	1.117	0.800	1.119	0.767	5	7
Asia	Tunisia	1.306	1.306	1.141	1.141	1.199	1.199	1.132	1.132	0.652	0.652	1.086	1.086	6	6
	China	0.760	0.760	0.636	0.636	0.414	0.414	0.419	0.419	0.587	0.587	0.563	0.563	12	11
	India	0.191	0.099	0.329	0.133	1.026	0.139	1.247	0.127	1.639	0.283	0.886	0.156	7	19
	Indonesia	1.005	1.005	0.484	0.484	0.360	0.360	0.354	0.354	0.842	0.842	0.609	0.609	10	10
	Iran	0.273	0.273	0.439	0.175	0.234	0.112	0.259	0.109	0.383	0.159	0.317	0.166	17	18
	Turkey	1.021	1.088	1.526	1.869	2.517	2.855	2.376	2.726	1.423	1.543	1.773	2.016	1	1
	Vietnam	0.577	0.577	0.649	0.649	0.636	0.636	0.733	0.759	0.899	0.942	0.699	0.713	9	8
Europe	Bulgaria	1.450	1.059	1.229	1.316	0.869	1.285	0.962	1.342	1.234	1.595	1.149	1.319	4	2
	Hungary	1.211	1.359	0.589	1.262	0.613	1.301	0.690	1.244	1.123	1.354	0.845	1.304	8	3
	Poland	1.968	1.495	1.229	1.204	1.002	0.981	1.006	0.916	1.013	1.056	1.244	1.130	3	5
	Romania	0.271	0.271	1.003	1.001	0.342	0.436	0.303	0.368	0.390	1.012	0.462	0.617	15	9
Latin America	Russia	0.464	0.464	0.580	0.420	0.638	0.305	0.590	0.302	0.452	0.390	0.545	0.376	13	14
	Argentina	0.326	0.326	0.363	0.363	0.310	0.310	0.258	0.258	0.302	0.302	0.312	0.312	18	15
	Brazil	0.201	0.201	0.161	0.143	0.143	0.104	0.142	0.105	0.185	0.185	0.166	0.148	21	21
	Colombia	0.100	0.100	0.178	0.170	0.230	0.230	0.180	0.180	0.359	0.359	0.210	0.208	20	17
	Cuba	0.652	0.603	0.592	0.593	0.439	0.469	0.501	0.517	0.713	0.556	0.579	0.548	11	12
	Mexico	0.566	0.566	0.439	0.439	0.344	0.344	0.304	0.304	0.568	0.568	0.444	0.444	16	13
	Peru	0.143	0.143	0.213	0.213	0.209	0.209	0.225	0.225	0.302	0.302	0.219	0.219	19	16

Note: FOE = facility-oriented efficiency, ROE = resource-oriented efficiency.

Russia and Romania obtained lower efficiency scores compared to the other studied post-communist countries located in Europe, namely Poland, Bulgaria, and Hungary. The low efficiency scores of Romania and Russia indicate a poor tourism performance suffering from poorly developed infrastructure and a low degree of international openness (WEF, 2019), despite having unique tourist-attracting potential (Andrades & Dimanche, 2017). Although Poland had the highest efficiency scores among the selected countries in the European region in terms of both components at the beginning of the given period, its performance sharply decreased throughout the time, and by the end of the period, Poland was less efficient than Bulgaria and Hungary. This declining trend is attributable to one of the lowest tourism prioritization levels in the region (similar to Romania (WEF, 2019)), and the resulting inconsistency in tourist-attracting strategies of the Polish government.

Latin America appears to be the least efficient region in terms of both components. Cuba achieved slightly higher scores than its peers in Latin America but remained inefficient in all periods of the study. The low performance in this region possibly results from continuous high inflation rates, leading to low investment in business activities (Dobers & Halme, 2009) and thus preventing the development of the tourism industry.

### 3.2. Analysis of influencing factors

To examine the influence of WHSs on efficiency scores, a squared correlation analysis is performed. Both correlation coefficients, 0.624 for the resource-oriented component and 0.523 for the facility-oriented component, represent the strong, positive, and significant relationship between the density of WHSs and the means of efficiency scores obtained from the two components (Table 1). This analysis shows the

impact and importance of WHSs in promoting tourism activities in developing countries. However, like every complex system, low or high efficiency of the tourism industry can stem from multiple reasons. Safety is an important influencer on tourism demand. For instance, a high crime level may be driving the low efficiency in countries like Columbia, India, Brazil, and Mexico, despite them having abundant natural resources and a high biodiversity level. To examine the relationship between the results of the parallel framework and safety, data for the homicide rate and homicide count was derived from the United Nations Office on Drugs and Crime (UNODC, 2020). The importance of safety is supported by a strong significant negative correlation between the means of resource-oriented performance scores and homicide rate (-0.524) and homicide count (-0.703). Also, a significant negative correlation confirmed the inverse relationship between the means of facility-oriented efficiency scores and homicide rate (-0.447) and homicide count (-0.469). In view of the above, we conclude that improved safety measures can promote tourism demand.

Moreover, political instability creates an unsafe destination and weakens the tourism industry (Khoshnevis Yazdi & Khanalizadeh, 2016). Political unrest and lack of infrastructure in Ethiopia, and also government turmoil in Brazil, are among the reasons for the poor performance of the tourism sector in these countries. The weak resource-oriented performance reveals great untapped tourism potential in enormous countries like India, Argentina, Russia, and Brazil, indicating that their natural and cultural assets can be used more efficiently in the future.

Iran and India, both recognized as the cradles of civilization (Sharifi et al., 2015; Tignor et al., 2017), boast numerous cultural and historical attractions. For the economy of Iran, a nation dominated by the polluting oil and gas industry (Hosseini & Stefaniec, 2019) backed by

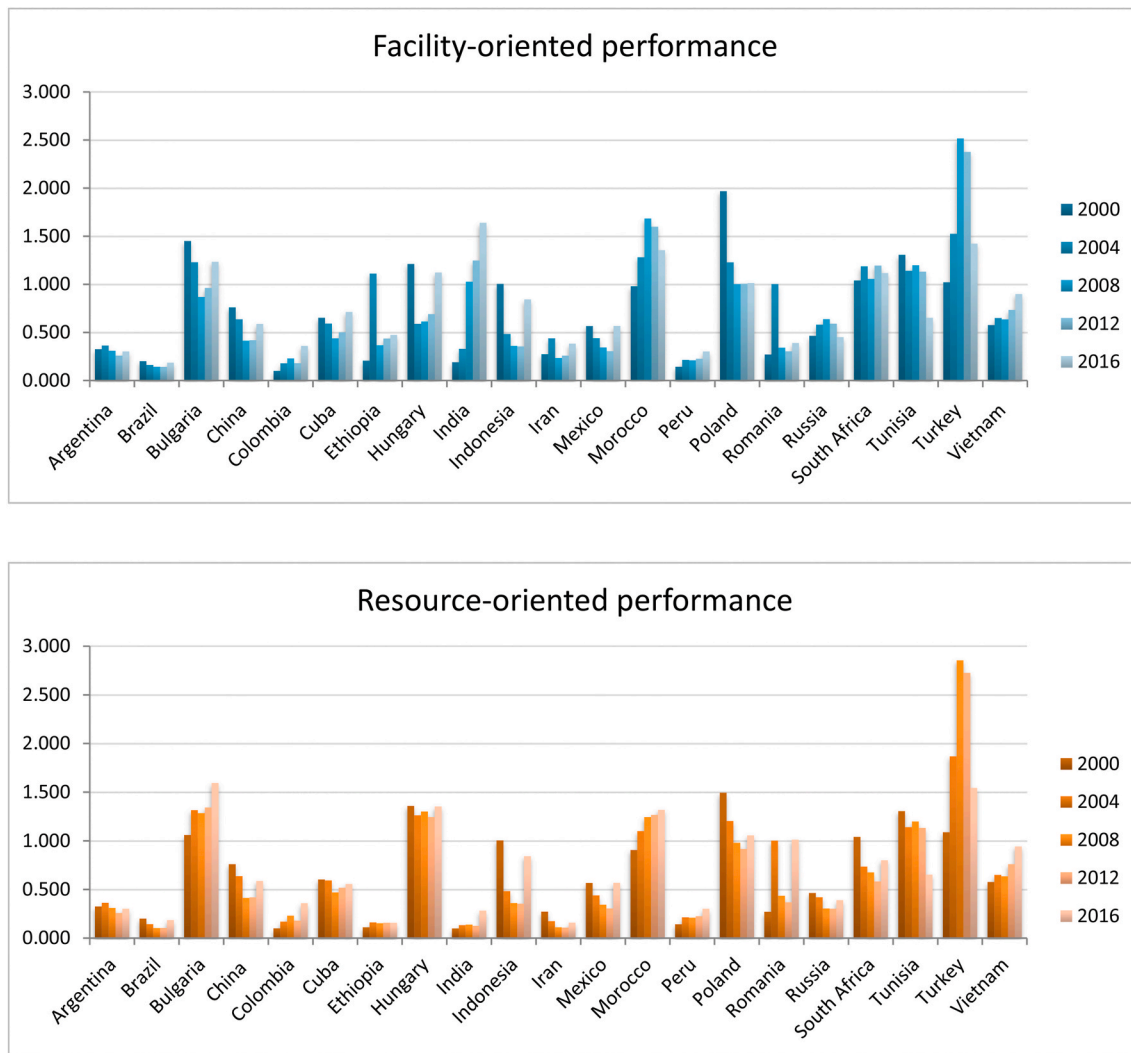


Fig. 2. Parallel facility-oriented and resource-oriented performances based on the super-SBM model.

crony capitalism, tourism offers an alternative source of income to reduce its dependency on oil and gas production. However, continuous international political conflicts and regressive theocratic totalitarian policies for more than 40 years have given Iran a negative perception among travelers. The Indian tourism industry improved rapidly in the studied period in terms of facility-oriented efficiency but achieved one of the lowest resource-oriented performance scores. This contrast shows that India successfully employed its available infrastructure to promote the tourism industry, but the country's great potential is still unexploited.

### 3.3. World Heritage designation in developing countries

The empirical results obtained from the proposed super-SBM framework reveal that possessing WHSs can play a significant positive role in enhancing tourism marketing in developing countries. A first look at the distribution of the WHSs globally reveals apparent favoritism in the designation process by the World Heritage Committee. Currently, more than one-fourth of WHSs are located in seven developed states (Italy, Spain, France, Germany, the UK, the US, and Japan). Italy and France together host 100 WHSs, exceeding the 96 WHSs located in all African countries combined in 2019. This shows the unfair distribution of WHSs, especially cultural properties, among member states. Although 194 states have ratified the WHS convention, the majority of selected sites are located in advanced economies, and this pattern of unfair

distribution is consistent (Table 5).

One could ask why just the developed countries should enjoy such promotion and prestige. Obviously, the distribution is not due to the superiority of sites in advanced economies, as many outstanding heritage sites like the Taj Mahal, Angkor, Persepolis, Chichen-Itza, and the Giza Pyramid complex are located in developing countries.

Evidently, countries with larger economies more successfully utilize their resources to nominate and obtain validity for selecting their sites to the WHS list (Table 5). For instance, the Chinese government spent considerable amounts of money to increase the number of WHSs in China (Wang et al., 2015). State bureaucratic superiority (Reyes, 2014) and diplomatic ability (Brown et al., 2019) are among the most important predictors of nominations and awarding of WHS status, as it corresponds to whether states can fill out the complicated paperwork and also can overcome the visible and hidden costs of the designation. This is confirmed by the fact that countries like Egypt or Iraq, despite their magnificent historical background, have relatively few WHSs compared to more developed economies. Seven WHSs are currently located in Egypt, while there are 33 sites on the country's tentative list, out of which 13 have been waiting to be accepted since 1994. In the case of Iraq, five sites are designated on the World Heritage list, while some magnificent sites like the Arch of Ctesiphon (also known as Taq Kasra) are not even on the tentative list. Therefore, the process of designation of WHSs is easier for wealthier nations, which is confirmed by the higher number of WHSs in countries like China, France, and Italy.

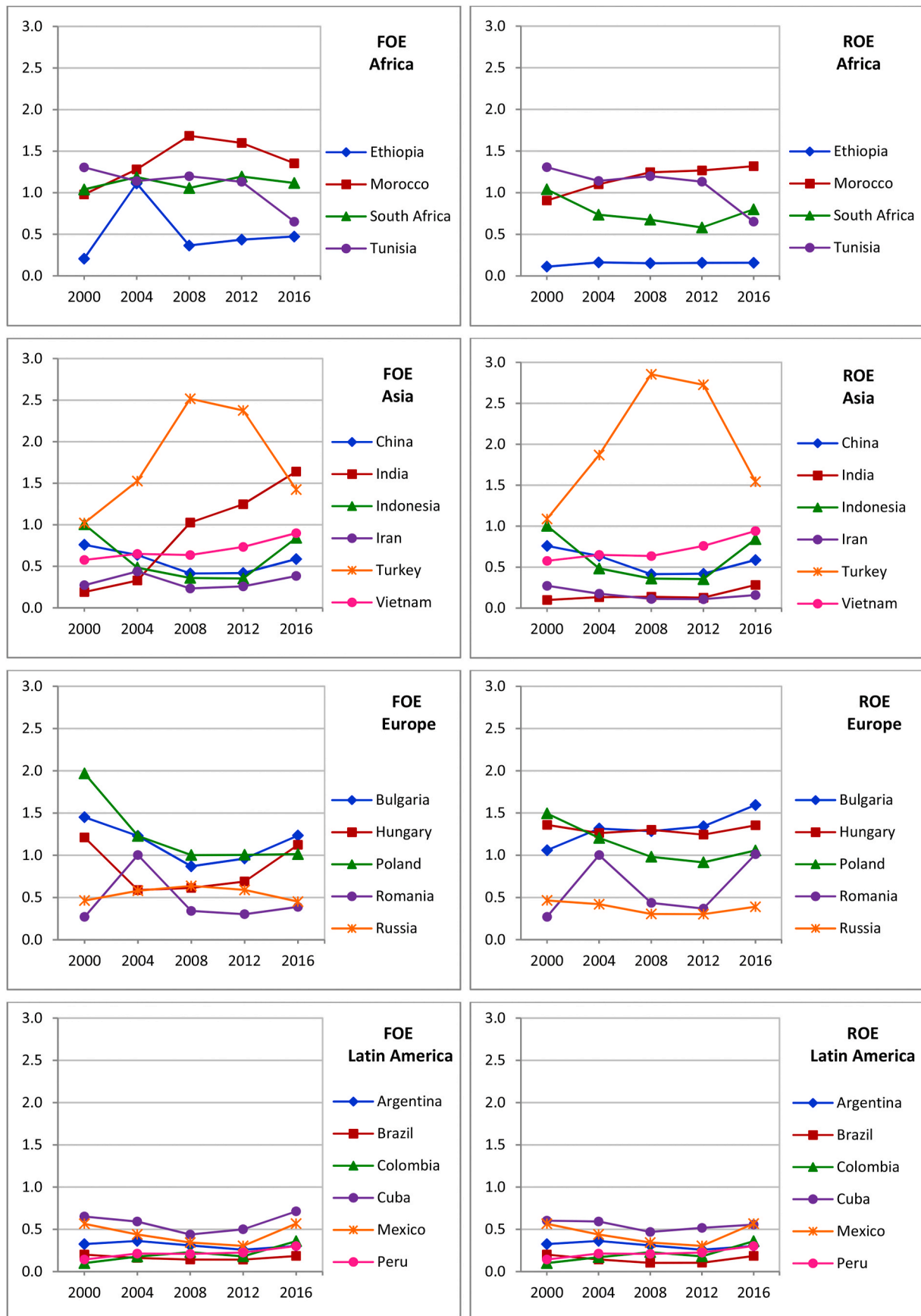


Fig. 3. Facility-oriented and resource-oriented efficiencies across regions over the period 2000–2016. Note: FOE = facility-oriented efficiency, ROE = resource-oriented efficiency.



**Table 5**

The number of World Heritage properties inscribed in specific years by region (UNESCO, 2019).

Year	Europe and North America	Asia and the Pacific	Latin America and the Caribbean	Arab States	Africa
2000	34	11	12	1	3
2004	16	11	2	2	3
2008	12	8	3	2	2
2012	10	8	1	3	4
2016	6	8	4	2	1
2019	15	10	1	2	1

Based on the results of our analysis, UNESCO, as the executor of the WHS project, should adjust the selection procedure to better match the capability of unprivileged state members. This could be done, for instance, by reducing the required paperwork in the process of designation of the sites. Furthermore, UNESCO and advanced state members can empower relevant institutions in developing countries by providing technical and transparent financial assistance in line with the 16th UN Sustainable Development Goal (SDG) to boost the effectiveness of the WHS selection process.

### 3.4. World Heritage conservation in developing countries

It is worth noting that true sustainability requires more than just economic efficiency (Ko, 2005). Any development ignoring societal and environmental concerns is short-term and may lead to destructive and hazardous outcomes (Stefaniec et al., 2020). Hence, besides the facility-oriented and resource-oriented approach, tourism development needs to be examined from the socio-ecological perspective, considering the impact of tourism activities on cultural and natural sites and the communities around them. A goal of the World Heritage Convention is to conserve nature and to preserve cultural properties (UNESCO, 2017). The modern era sees never-ending civil wars in several developing countries, acts of vandalism at cultural sites committed by terrorists and warlords, threats to destroy Iranian cultural heritage sites by US President Donald Trump (BBC, 2020), a change of identity of a WHS (Hagia Sophia) by the Turkish government, deforestation, rapid climate change, out-of-control urbanization, and tourism mismanagement by governments which leads to overtourism and hyper-exploitation of tourism resources. Because these problems exist, the goals of the World Heritage Convention have become more prominent than ever.

More than 94% of sites labeled In Danger by UNESCO are located in developing countries. This shows the neglect in fulfilling the treaty goal we mention above in the case of sites located in developing countries. Brown et al. (2019) stated that their powerful economy and bureaucracy create impunity for rich countries to avoid the listing of their at-risk sites in the In Danger heritage list. Once more, their superiority in diplomatic tactics helps the developed countries influence the outcomes of the World Heritage decision-making process in their favor. In this way, it can be concluded that the real number of In Danger sites is higher than currently presented in official statistics.

Even though there are such hidden In Danger sites in rich countries due to infrastructure projects, uncontrolled urbanization, or decay, their situation is incomparable with the destruction of the WHSs like Hatra in Iraq, Palmyra in Syria, the Tropical Rainforest of Sumatra in Indonesia, or Timbuktu in Mali. Due to civil wars, more than half of the In Danger WHSs are located in war zones in Afghanistan, Congo, Iraq, Libya, Mali, Palestine, Syria, and Yemen. Moreover, the rising frequency of natural disasters (Amideo et al., 2018), acceleration of the decay processes at cultural sites (Sesana et al., 2020), prolific and undesirable spread of invasive species across natural sites (Perry, 2011) caused by rapid climate change, construction of roads or buildings, or other kinds of infrastructure within the heritages' boundaries are other serious issues harming WHSs. Also, if the quantity of visitors crosses a certain threshold, it leads to overtourism (Seraphin et al., 2018), which can

damage the site and the host community.

The above analysis shows that the preservation of WHSs is a multi-dimensional issue and a complex societal problem. Hasty solutions and posthaste interventions from policymakers to address such a sophisticated issue are often counterproductive and may result in harmful remedies (DeTombe, 2001; 2017). Superficial approaches to complex societal problems often neglect hidden causes and leave the issues unsolved.

To avoid such negligence and to profoundly handle social complex challenges, there is a need to employ structured and interdisciplinary methodologies like Compram (DeTombe, 2002). In order to align with Compram methodology and eliminate unfair interference from actors whose interests can change the In Danger Heritage list, it is recommended to entrust the judgment regarding the inscription of precarious sites to a team of neutral experts, preferably not from the state in which the site located. In this way, UNESCO can minimize the biases that can come due to partiality and favoritism. Also, vulnerability assessments (Sesana et al., 2020) should be performed by an independent team of experts from various fields of knowledge to monitor the status of WHSs in both advanced economies and developing countries from time to time. The experts' decision regarding the inscription of a particular site in the In Danger list must be final. After that, actors like site managers, officials, and policymakers assisted by experts can start to identify and implement desirable interventions for the preservation and maintenance of WHSs.

#### 3.4.1. World Heritage conservation and COVID-19 pandemic

Several publications have explored possible solutions to reduce negative tourism consequences, particularly overtourism, on natural and cultural resources and communities around them and have prescribed degrowth as a promising remedy to cope with tourism encroachments (Büscher & Fletcher, 2017; Higgins-Desbiolles et al., 2019). Defined as a systematic downscaling of supply and demand in the human economy (Kallis, 2011), degrowth is introduced as a pathway toward a sustainable future. However, the literature considers advanced economies as the model for running degrowth. Thus, there is doubt about the feasibility of degrowth in developing countries because many of them currently suffer from debt, sanctions, or extreme poverty. Moreover, some scholars doubt the outcomes of tourism degrowth even in advanced economies (Milano et al., 2019) as its social, financial, and political impacts have not yet been adequately explored (Valdivielso & Moranta, 2019).

The COVID-19 pandemic has revealed how the tourism industry in both advanced and developing states is nonresilient, unable to agilely respond to global shockwaves. UNWTO (2020) announced a 98% fall in the number of international arrivals in 2020 compared to 2019. Also, the pandemic caused forced degrowth that is not necessarily in line with sustainability, as it contracts the tourism demand while the tourism supply remains untouched. This pattern leads to social unsustainability, causing many tourism corporations to declare bankruptcy and raising unemployment rates. Nevertheless, from the environmental point of view and in terms of WHS conservation, COVID-19 restrictions have forced overtourism to fade, and the biosphere now has temporary relief from harmful human activities. In view of the above, the pandemic can be seen as a transformative pathway toward more sustainable tourism in the future (Brouder, 2020; Higgins-Desbiolles, 2020). Depending on the will of policymakers, the current lockdown can be used to reset the industry in favor of wildlife and local communities, and new regulations can be set to curb unbridled tourism in line with SDG 11 to make the industry more socially and environmentally just. Otherwise, the world is about to witness the recidivism of overtourism in the post-pandemic era, specifically in developing countries that are already under economic pressure due to COVID-19 restrictions.

#### 3.4.2. World Heritage conservation and SDG 17

Finally, the 17th SDG emphasizes partnership to make sustainable

development achievable not only for advanced economies but also for developing countries. Challenges such as climate change or conservation of natural and cultural heritages are global issues with global consequences. The prospects of both advanced and developing states are linked, so the goals of sustainable development cannot be met if advanced economies concentrate only on regional development while ignoring the struggles in poorer nations. Hosseini and Stefaniec (2019) asserted that without the stimulation of their economy, developing countries do not have sufficient resources to move toward sustainable development. Part of this stimulation should be received in the form of financial and technological assistance through a nonhegemonic North-South or China-South partnership.

Currently, developing nations are under various economic pressures like debt, sanctions, and illicit capital outflows. The disadvantages of illicit financial outflows from poorer nations to wealthier ones are far greater than the advantages of hegemonic foreign aid (Dobers & Halme, 2009) for sustainability transitions in developing states. To tackle the cash outflows, a genuine nonhegemonic North-South alliance in the form of effective, anti-corruption policies is needed to prevent the nontransparent capital inflows to advanced economies from the developing parts of the world. Also, the current sanctions or debt loads mainly distress poorer communities in the nations under sanction or indebted. Hence, relief programs, such as the Debt Service Suspension Initiative (World Bank, 2021) or even cancellation of debts (Büscher et al., 2021), are among other possible fair partnerships which can assist developing countries to move toward sustainable development in both the COVID-19 pandemic and post-pandemic eras. In the case of WHS preservation in developing countries, the abovementioned measures, along with technical and financial aid from advanced economies, are vital to protect endangered WHSs and revive the ruined ones. Due to finite resources (Perry, 2011) and to eliminate potential corruption, the usage of this aid should be monitored by UNESCO to ensure transparency.

#### 4. Conclusion

The core intention of this research was to synthesize knowledge about the current situation of WHSs in developing countries. Using a novel and informative parallel framework, the study assessed how WHSs impact tourism demand. It also offered policy implications for enhancing destination marketing and handling societal complexities regarding WHSs designation and preservation in developing states. The empirical assessment of the WHS status in developing countries leads to the following conclusions.

First, the efficiency scores obtained from both components of the proposed framework, namely facility-oriented efficiency and resource-oriented efficiency, have a significant positive correlation with the density of WHSs in each country. This result contrasts with previous similar research on this issue in advanced economies (Cuccia et al., 2016; King & Halpenny, 2014; Mariani & Guizzardi, 2020; Poria et al., 2013), which showed WHS branding has weak or no influence on fostering tourism growth. Therefore, based on our empirical results, WHS tagging in developing countries positively affects tourism marketing and can be used as a promotional tool to attract tourists. In light of the obtained results, the following guidelines would form a good strategy to foster the development of destination marketing: 1) increasing the number of properties designated as WHS in developing countries, 2) by recognizing all potential sites and nominating them in the tentative lists, and then 3) providing effective stratagems to prove to the UNESCO World Heritage Committee the universal value, integrity, and authenticity of nominated sites, there by justifying the addition of these sites to the WHS list.

Second, this study highlighted the unjust worldwide distribution of WHSs and, based on a scrupulous analysis of the WHS designation procedure, revealed its convoluted nature, which needs a herculean effort from state members to be overcome. There is no scarcity of appropriate sites for designation; the main reasons for the low distribution of WHSs in

developing countries compared to advanced economies are weak and corrupt financial systems loaded with crony capitalism, poor diplomatic tactics, and the absence of effective bureaucracy. To tackle the current inequities, UNESCO should reduce complexities and related paperwork related to WHS designation to make the procedure more feasible for unprivileged members. Moreover, in line with SDGs 16 and 17, advanced state members and UNESCO can assist developing countries and strengthen their destination management by helping them build more effective and reliable relevant institutions at all levels to more effectively and successfully execute the challenging designation of WHSs.

Third, in line with SDG 11, which emphasizes safeguarding natural and cultural heritage, the current study employs Compram methodology to reveal the need to eliminate the partiality highlighted by the fact that most inscribed WHSs on the In Danger list are located in developing states. Also, this research explored some pathways toward sustainable tourism and their socio-ecological impacts in developing countries. These pathways include tourism degrowth as a sustainable remedy for overtourism, COVID-19 pandemic as an opportunity for destination managers and stakeholders to transform pre-pandemic tourism into a more responsible and sustainable industry, and fair and nonhegemonic financial and technological alliance between advanced and developing economies in line with SDG 17.

This research is not without limitations. It investigated why most WHSs labeled In Danger are located in developing countries, but it did not examine whether the WHS tag positively influences the conservation of cultural and natural sites. Therefore, more studies are required to investigate how tagging a property as a WHS contributes to its preservation in developing countries. Also, there is a need for more research about the feasibility of tourism degrowth as one pathway toward sustainable tourism, especially in developing states challenged with large financial debt, sanctions, and extreme poverty. How can degrowth policies deal with the unemployment resulting from the shrinking of the economy in developing countries? How can policymakers manage the conflict arising from degrowth, specifically, conflict regarding the priority of employment or environmental sustainability? Our findings are more reliable than previous studies because they stem from a larger sample of countries. However, adding other pieces to the puzzle should give a more complete benchmark picture of the tourism sector as a complex system. One such piece would be evaluating different orientations (e.g. welfare orientation) in addition to conservation of natural and cultural sites. Another piece would be the use of other variables, such as those representing the quality of life of local communities or the amount of financial support for conserving and maintaining WHSs in developing countries. Such future studies should complement our conclusions from different perspectives and may bring further practical insights into developing tourism destinations.

To sum up, it is a duty for all people to contribute to the conservation of world inheritances of inestimable value, as the story of planet Earth and humankind is told through them. By protecting WHSs, we show respect to those who preceded us and our responsibility to those who will succeed us.

#### Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

#### Credit author statement

**Keyvan Hosseini:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Validation, Writing - original draft, Writing - review & editing. **Agnieszka Stefaniec:** Formal analysis, Methodology, Visualization, Resources, Validation, Writing - original draft, Writing - review & editing. **Seyedeh Parisa Hosseini:** Data curation, Investigation, Writing

– original draft.

## Declaration of competing interest

None.

## Acknowledgments

The authors are grateful to the editor Professor Brian Garrod and two anonymous referees for their constructive suggestions and comments on earlier drafts of this paper. The authors also appreciate Professor Peter Dobers for his valuable advice and support.

## References

- Adie, B. A., Hall, C. M., & Prayag, G. (2017). World heritage as a placebo brand: A comparative analysis of three sites and marketing implications. *Journal of Sustainable Tourism*, 26(3), 399–415. <https://doi.org/10.1080/09669582.2017.1359277>
- Amideo, A. E., Scaparra, M. P., & Kotiadis, K. (2018). Optimising shelter location and evacuation routing operations: The critical issues. *European Journal of Operational Research*, 279(2), 279–295. <https://doi.org/10.1016/j.ejor.2018.12.009>
- Andrades, L., & Dimanche, F. (2017). Destination competitiveness and tourism development in Russia: Issues and challenges. *Tourism Management*, 62, 360–376. <https://doi.org/10.1016/j.tourman.2017.05.008>
- Assaf, A. G. (2012). Benchmarking the Asia Pacific tourism industry: A Bayesian combination of DEA and stochastic frontier. *Tourism Management*, 33(5), 1122–1127. <https://doi.org/10.1016/j.tourman.2011.11.021>
- Assaf, A. G., & Josiassen, A. (2012). Identifying and ranking the determinants of tourism performance: A global investigation. *Journal of Travel Research*, 51(4), 388–399. <https://doi.org/10.1177/0047287511426337>
- Assani, S., Jiang, J., Cao, R., & Yang, F. (2018). Most productive scale size decomposition for multi-stage systems in data envelopment analysis. *Computers & Industrial Engineering*, 120, 279–287. <https://doi.org/10.1016/j.cie.2018.04.043>
- Barros, C. P., Botti, L., Peypoch, N., Robinot, E., & Solonandrasana, B. (2011). Performance of French destinations: Tourism attraction perspectives. *Tourism Management*, 32(1), 141–146. <https://doi.org/10.1016/j.tourman.2010.01.015>
- BBC News. (2020). *Trump under fire for threat to Iranian cultural sites*. Retrieved 10/02/2021. from: <https://www.bbc.com/news/world-middle-east-51014237>.
- Brouder, P. (2020). Reset redux: Possible evolutionary pathways towards the transformation of tourism in a COVID-19 world. *Tourism Geographies*, 1–7. <https://doi.org/10.1080/14616688.2020.1760928>
- Brown, N. E., Liuzza, C., & Meskill, L. (2019). The politics of peril: UNESCO's list of world heritage in danger. *Journal of Field Archaeology*, 44(5), 287–303. <https://doi.org/10.1080/00934690.2019.1600929>
- Büscher, B., Feola, G., Fischer, A. M., Fletcher, R., Gerber, J. F., Harcourt, W., & Wiskerke, H. (2021). *Planning for a world beyond COVID-19: Five pillars for post-neoliberal development* (Vol. 140). World Development. <https://doi.org/10.1016/j.worlddev.2020.105357>, 105357.
- Büscher, B., & Fletcher, R. (2017). Destructive creation: Capital accumulation and the structural violence of tourism. *Journal of Sustainable Tourism*, 25(5), 651–667. <https://doi.org/10.1080/09669582.2016.1159214>
- Carrier, J. G., & Macleod, D. V. (2005). Bursting the bubble: The socio-cultural context of ecotourism. *The Journal of the Royal Anthropological Institute*, 11(2), 315–334. <https://doi.org/10.1111/j.1467-9655.2005.00238.x>
- Chaabouni, S. (2019). China's regional tourism efficiency: A two-stage double bootstrap data envelopment analysis. *Journal of destination marketing & management*, 11, 183–191. <https://doi.org/10.1016/j.jdmm.2017.09.002>
- Charnes, A., & Cooper, W. W. (1962). Programming with linear fractional criteria. *Naval Research Logistics Quarterly*, 9, 181–186. <https://doi.org/10.1002/nav.3800090303>
- Cheung, K. S., & Li, L. H. (2019). Understanding visitor–resident relations in overtourism: Developing resilience for sustainable tourism. *Journal of Sustainable Tourism*, 27(8), 1197–1216. <https://doi.org/10.1080/09669582.2019.1606815>
- Cuccia, T., Guccio, C., & Rizzo, I. (2016). The effects of UNESCO World Heritage List inscription on tourism destinations performance in Italian regions. *Economic Modelling*, 53, 494–508. <https://doi.org/10.1016/j.econmod.2015.10.049>
- Cuccia, T., Guccio, C., & Rizzo, I. (2017). UNESCO sites and performance trend of Italian regional tourism destinations: A two-stage DEA window analysis with spatial interaction. *Tourism Economics*, 23(2), 316–342. <https://doi.org/10.1177/1354816616656266>
- Denstadli, J. M., & Veisten, K. (2020). The flight is valuable regardless of the carbon tax scheme: A case study of Norwegian leisure air travelers. *Tourism Management*, 81, 104150. <https://doi.org/10.1016/j.tourman.2020.104150>
- DeTombe, D. J. (2001). Compram, a method for handling complex societal problems. *European Journal of Operational Research*, 128(2), 266–281. [https://doi.org/10.1016/S0377-2217\(00\)00070-9](https://doi.org/10.1016/S0377-2217(00)00070-9)
- DeTombe, D. J. (2002). Complex societal problems in operational research. *European Journal of Operational Research*, 140(2), 232–240. [https://doi.org/10.1016/S0377-2217\(02\)00066-8](https://doi.org/10.1016/S0377-2217(02)00066-8)
- DeTombe, D. J. (2017). Societal problems more complex than presumed: The Compram methodology. *Journal of Systems Science and Systems Engineering*, 26(3), 303–320. <https://doi.org/10.1007/s11518-017-5334-8>
- Dobers, P., & Halme, M. (2009). Corporate social responsibility and developing countries. *Corporate Social Responsibility and Environmental Management*, 16(5), 237–249. <https://doi.org/10.1002/csr.212>
- Durberry, R. (2004). Tourism and economic growth: The case of Mauritius. *Tourism Economics*, 10(4), 389–401. <https://doi.org/10.5367/000000042430962>
- Emrouznejad, A., & Yang, G. L. (2018). A survey and analysis of the first 40 years of scholarly literature in DEA: 1978–2016. *Socio-Economic Planning Sciences*, 61, 4–8. <https://doi.org/10.1016/j.seps.2017.01.008>
- Franceschini, I. (2020). As far apart as earth and sky: A survey of Chinese and Cambodian construction workers in sihanoukville. *Critical Asian Studies*, 1–18. <https://doi.org/10.1080/14672715.2020.1804961>
- Higgins-Desbiolles, F. (2020). Socialising tourism for social and ecological justice after COVID-19. *Tourism Geographies*, 1–14. <https://doi.org/10.1080/14616688.2020.1757748>
- Higgins-Desbiolles, F., Carnicelli, S., Krolkowski, C., Wijesinghe, G., & Boluk, K. (2019). Degrowing tourism: Rethinking tourism. *Journal of Sustainable Tourism*, 27(12), 1926–1944. <https://doi.org/10.1080/09669582.2019.1601732>
- Hjalager, A. M. (2007). Stages in the economic globalization of tourism. *Annals of Tourism Research*, 34(2), 437–457. <https://doi.org/10.1016/j.annals.2006.10.006>
- Hosseini, K., & Stefaniec, A. (2019). Efficiency assessment of Iran's petroleum refining industry in the presence of unprofitable output: A dynamic two-stage slacks-based measure. *Energy*, 189, 116112. <https://doi.org/10.1016/j.energy.2019.116112>
- International Monetary Fund. (2019). *World economic outlook*. Retrieved 02/08/2020. from: <https://www.imf.org/~media/Files/Publications/WEO/2019/April/English/text/ashx?la=en>.
- Ivanov, S. H., & Webster, C. (2013). Tourism's impact on growth: The role of globalisation. *Annals of Tourism Research*, 41, 231–236. <https://doi.org/10.1016/j.annals.2012.12.008>
- Jeyacheya, J., & Hampton, M. P. (2020). Wishful thinking or wise policy? Theorising tourism-led inclusive growth: Supply chains and host communities. *World Development*, 131, 104960. <https://doi.org/10.1016/j.worlddev.2020.104960>
- Kallis, G. (2011). In defence of degrowth. *Ecological Economics*, 70(5), 873–880. <https://doi.org/10.1016/j.ecolecon.2010.12.007>
- Khosruevis Yazdi, S., & Khanalizadeh, B. (2016). Tourism demand: A panel data approach. *Current Issues in Tourism*, 20(8), 787–800. <https://doi.org/10.1080/13683500.2016.1170772>
- Kim, H., Oh, C. O., Lee, S., & Lee, S. (2017). Assessing the economic values of World Heritage Sites and the effects of perceived authenticity on their values. *International Journal of Tourism Research*, 20(1), 126–136. <https://doi.org/10.1002/itr.2169>
- Kim, S. S., Wong, K. K., & Cho, M. (2007). Assessing the economic value of a world heritage site and willingness-to-pay determinants: A case of changeok palace. *Tourism Management*, 28(1), 317–322. <https://doi.org/10.1016/j.tourman.2005.12.024>
- King, L. M., & Halpenny, E. A. (2014). Communicating the World Heritage brand: Visitor awareness of UNESCO's World Heritage symbol and the implications for sites, stakeholders and sustainable management. *Journal of Sustainable Tourism*, 22(5), 768–786. <https://doi.org/10.1080/09669582.2013.864660>
- Ko, T. G. (2005). Development of a tourism sustainability assessment procedure: A conceptual approach. *Tourism Management*, 26(3), 431–445. <https://doi.org/10.1016/j.tourman.2003.12.003>
- Li, Y., Shi, X., Yang, M., & Liang, L. (2017). Variable selection in data envelopment analysis via Akaike's information criteria. *Annals of Operations Research*, 253(1), 453–476. <https://doi.org/10.1007/s10479-016-2382-2>
- Mariani, M. M., & Guizzardi, A. (2020). Does designation as a UNESCO world heritage site influence tourist evaluation of a local destination? *Journal of Travel Research*, 59(1), 22–36. <https://doi.org/10.1177/0047287518821737>
- Ma, X. L., Ryan, C., & Bao, J. G. (2009). Chinese national parks: Differences, resource use and tourism product portfolios. *Tourism Management*, 30(1), 21–30. <https://doi.org/10.1016/j.tourman.2008.04.006>
- Milano, C., Novelli, M., & Cheer, J. M. (2019). Overtourism and degrowth: A social movements perspective. *Journal of Sustainable Tourism*, 27(12), 1857–1875. <https://doi.org/10.1080/09669582.2019.1650054>
- Perry, J. (2011). World heritage hot spots: A global model identifies the 16 natural heritage properties on the world heritage list most at risk from climate change. *International Journal of Heritage Studies*, 17(5), 426–441. <https://doi.org/10.1080/13527258.2011.568064>
- Poria, Y., Reichel, A., & Cohen, R. (2013). Tourists perceptions of world heritage site and its designation. *Tourism Management*, 35, 272–274. <https://doi.org/10.1016/j.tourman.2012.02.011>
- Rasoolimanesh, S. M., Jaafar, M., Ahmad, A. G., & Barghi, R. (2017). Community participation in World Heritage Site conservation and tourism development. *Tourism Management*, 58, 142–153. <https://doi.org/10.1016/j.tourman.2016.10.016>
- Rather, R. A. (2021). Demystifying the effects of perceived risk and fear on customer engagement, co-creation and revisit intention during COVID-19: A protection motivation theory approach. *Journal of Destination Marketing & Management*, 20, 100564. <https://doi.org/10.1016/j.jdmm.2021.100564>
- Reyes, V. (2014). The production of cultural and natural wealth: An examination of World Heritage sites. *Poetics*, 44, 42–63. <https://doi.org/10.1016/j.poetic.2014.04.003>
- Rossolatos, G. (2020). A brand storytelling approach to Covid-19's terrorealization: Cartographing the narrative space of a global pandemic. *Journal of Destination Marketing & Management*, 18, 100484. <https://doi.org/10.1016/j.jdmm.2020.100484>
- Seraphin, H., Sheeran, P., & Pilato, M. (2018). Over-tourism and the fall of Venice as a destination. *Journal of Destination Marketing & Management*, 9, 374–376. <https://doi.org/10.1016/j.jdmm.2018.01.011>



- Sesana, E., Gagnon, A. S., Bonazza, A., & Hughes, J. J. (2020). An integrated approach for assessing the vulnerability of World Heritage Sites to climate change impacts. *Journal of Cultural Heritage*, 41, 211–224. <https://doi.org/10.1016/j.culher.2019.06.013>
- Sharifi, A., Pourmand, A., Canuel, E. A., Ferer-Tyler, E., Peterson, L. C., Aichner, B., & Lahijani, H. A. (2015). Abrupt climate variability since the last deglaciation based on a high-resolution, multi-proxy peat record from NW Iran: The hand that rocked the Cradle of Civilization? *Quaternary Science Reviews*, 123, 215–230. <https://doi.org/10.1016/j.quascirev.2015.07.006>
- Stefaniec, A., Hosseini, K., Xie, J., & Li, Y. (2020). Sustainability assessment of inland transportation in China: A triple bottom line-based network DEA approach. *Transportation Research Part D: Transport and Environment*, 80, 102258. <https://doi.org/10.1016/j.trd.2020.102258>
- The World Bank. (2019). *World Bank open data*. Retrieved 12/08/2020. from: <https://data.worldbank.org/indicator/>.
- The World Bank. (2021). *Debt service suspension and covid-19*. Retrieved 14/02/2021. from: <https://www.worldbank.org/en/news/factsheet/2020/05/11/debt-relief-and-covid-19-coronavirus>.
- Tignor, R., Adelman, J., Brown, P., Elman, B., Kotkin, S., Prakash, G., & Pittman, H. (2017). *Worlds together, worlds apart: 1* (3rd ed., umc. New York, NY: W.W. Norton & Company.
- Tone, K. (2001). A slacks-based measure of efficiency in data envelopment analysis. *European Journal of Operational Research*, 130(3), 498–509. [https://doi.org/10.1016/S0377-2217\(99\)00407-5](https://doi.org/10.1016/S0377-2217(99)00407-5)
- Tone, K. (2002). A slacks-based measure of super-efficiency in data envelopment analysis. *European Journal of Operational Research*, 143, 32–41. [https://doi.org/10.1016/S0377-2217\(01\)00324-1](https://doi.org/10.1016/S0377-2217(01)00324-1)
- UNESCO. (2017). *Operational guidelines for the implementation of the World Heritage convention*. Retrieved 25/07/2020. from: <https://whc.unesco.org/document/163852>.
- UNESCO. (2019). *World heritage list statistics*. Retrieved 01/08/2020. from: <https://whc.unesco.org/en/list/stat>.
- UNESCO. (2020). *World heritage*. Retrieved 22/07/2020. from: <http://whc.unesco.org/en/about/>.
- UNODC. (2020). *Victims of international homicide*. Retrieved 25/07/2020. from: <https://dataunodc.un.org/content/data/homicide/homicide-rate>.
- UNWTO. (2019). *Tourism statistics*. Retrieved 19/08/2020. from: <https://www.e-unwto.org/toc/unwtotfb/current>.
- UNWTO. (2020). *Impact of COVID-19 on global tourism made clear as UNWTO counts the cost of standstill*. Retrieved 01/09/2020. from: <https://www.unwto.org/news/impact-of-covid-19-on-global-tourism-made-clear-as-unwto-counts-the-cost-of-standstill>.
- Valdivielso, J., & Moranta, J. (2019). The social construction of the tourism degrowth discourse in the Balearic Islands. *Journal of Sustainable Tourism*, 27(12), 1876–1892. <https://doi.org/10.1080/09669582.2019.1660670>
- Wang, Z., Yang, Z., Wall, G., Xu, X., Han, F., Du, X., & Liu, Q. (2015). Is it better for a tourist destination to be a world heritage site? Visitors' perspectives on the inscription of kanas on the world heritage list in China. *Journal for Nature Conservation*, 23, 19–26. <https://doi.org/10.1016/j.jnc.2014.11.001>
- Wijesinghe, S. N., & Mura, P. (2018). Situating Asian tourism ontologies, epistemologies and methodologies: From colonialism to neo-colonialism. *Asian Qualitative Research in Tourism*, 97–115. [https://doi.org/10.1007/978-981-10-7491-2\\_5](https://doi.org/10.1007/978-981-10-7491-2_5). Springer, Singapore.
- World Economic Forum. (2019). *The travel & tourism competitiveness report*. Retrieved 19/08/2020. from: [http://www3.weforum.org/docs/WEF\\_TTCR\\_2019.pdf](http://www3.weforum.org/docs/WEF_TTCR_2019.pdf).
- Xiao, H. (2013). Dynamics of China tourism and challenges for destination marketing and management. *Journal of Destination Marketing & Management*, 2(1), 1–3. <https://doi.org/10.1016/j.jdmm.2013.02.004>

- Yang, C. H., Lin, H. L., & Han, C. C. (2010). Analysis of international tourist arrivals in China: The role of World Heritage Sites. *Tourism Management*, 31(6), 827–837. <https://doi.org/10.1016/j.tourman.2009.08.008>
- Yang, Y., Xue, L., & Jones, T. E. (2019). Tourism-enhancing effect of world heritage sites: Panacea or placebo? A meta-analysis. *Annals of Tourism Research*, 75, 29–41. <https://doi.org/10.1016/j.annals.2018.12.007>
- Yin, P., Chu, J., Wu, J., Ding, J., Yang, M., & Wang, Y. (2020). A DEA-based two-stage network approach for hotel performance analysis: An internal cooperation perspective. *Omega*, 93, 102035. <https://doi.org/10.1016/j.omega.2019.02.004>



**Dr. Keyvan Hosseini** is a Lecturer in the School of Social Sciences at the Södertörn University in Stockholm, Sweden. His research interests include development economics, resource efficiency, social and environmental justice, and sustainable development. He uses both quantitative and qualitative operational research (OR) approaches to develop frameworks for sustainability assessment and handle complex challenges in the Global South. His research has been published in journals such as *Energy* and *Transportation Research Part D: Transport and Environment*.



**Dr. Agnieszka Stefaniec** is a Lecturer in the School of Social Sciences at the Södertörn University in Stockholm, Sweden. Her research interests lie in the area of sustainable urban development with a focus on socially sustainable transportation systems and inclusive urbanization. Most recently, she is adapting the targets of the United Nations' 11th Sustainable Development Goal for quantitative assessment of cities.



**Seyede Parisa Hosseini** is a Master's student in Public Administration at the University of Science and Technology of China. Her fields of interest include tourism sustainability, public policy, and sustainable development. Her past research investigates innovation policies in the tourism industry. Currently, she is researching the impact of infrastructure on the efficiency of the tourism industry.