The Coupling Coordination Relationship between Tourism Competitiveness and Economic Growth of Developing Countries

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Abstract: On the basis of the coupling coordination degree (CCD) model and information entropy weight method, this study examined the relationship between tourism competitiveness and economic growth of 56 developing countries from 2008 to 2017. The results show that: (1) the overall status of the CCD between tourism competitiveness and economic growth was in a state of unbalance that was mainly caused by the lag of economic growth, which demonstrates the important contribution of tourism in developing regions. (2) the CCD has been gradually improving since 2008, and the differences amongst the CCDs of developing countries have been shrinking and (3) the spatial distribution of the CCD between tourism competitiveness and economic growth has heterogeneity. Latin America & the Caribbean, and East Asia & the Pacific have the highest CCD, whereas Sub-Saharan Africa witnessed severely unbalanced development between tourism competitiveness and economic growth in 2008–2017.

Keywords: tourism competitiveness; economic growth; developing country; coupling coordination relationship

1. Introduction

Tourism is an essential sector in the global economy and a catalyst for economic and social development. An important geographical overlap exists between natural and cultural resources and high incidence of poverty [1]. Hence, tourism is regarded as a significant means for boosting economic growth in developing countries, and it can increase income and employment [2]. According to the United Nations World Tourism Organisation, up to 40% of the GDP and jobs in the least developed countries are generated by tourism, and more than 70% of their total service trade revenue is derived from tourism exports [3]. Given the importance of tourism development for economic improvement, the majority of developing countries have utilised resource advantages to enhance tourism competitiveness (TC) and boost economic growth (EG). In the past decades, governments in developing countries have allocated a large amount of capital to the construction of airports, transportation, hotels, cruise ships and scenic spots. For example, in China, tourism was listed as a national strategic pillar industry in 2009. China’s tourism investment reached 161.5 billion U.S. dollars in 2018, an increase of 4.40% year-on-year [4].

Academics have focused increasing attention on TC over the past decades, and relevant studies have focused on comprehensive frameworks [5–7], measurement index [6,8–10] and the comparison of destination competitiveness [11–13]. Nevertheless, the TC–EG nexus has been largely ignored. Does tourism promote EG in destinations with TC advantages? The answer is not consistent and is even controversial.

Krstic, Jovanovic, Jankovic–Milic and Stanisic [14] used the Travel and Tourism Competitiveness Index (TTCI) as the indicator of TC and found that economic competitiveness was affected by TC in...
sub-Saharan Africa countries. However, the cross-section research of Webster and Ivanov involving 131 countries revealed that TC (also measured via TTCI) has no statistically significant influence on tourism’s contribution to economic growth [15]. In addition, the inconsistency of the abovementioned conclusions may be caused by the variation between the economy level and the research context. In view of the importance of the tourism industry for less-developed areas and the limited studies on the TC–EG nexus, in-depth investigations of the TC and EG relationship in developing countries should be conducted.

This research aims to investigate the TC–EG nexus of developing countries using the Coupling Coordination Degree (CCD) model. Hopefully, it can make contributions to tourism research in the following aspects. Firstly, this research contributes to the in-depth understanding of the tourism-economic nexus. Despite being a hot topic that attracts the attention of scholars, limited literature has studied the relationship between the two factors from the perspective of TC. In comparison with previous studies that have measured tourism using the value of tourism receipts or the number of tourist arrivals, TC assesses tourism development on the basis of multidimensional indices and can comprehensively reveal the strengths and weaknesses of tourism destinations. Thus, this work differs from previous research because it has applied new perspectives to reinvestigate the relationship between tourism and the economy.

Secondly, tourism has become the backbone of the economy in many less-developed areas [16]. Nevertheless, insufficient research has been done on the relationship between TC and EG in the context of developing regions due to the shortage of statistic data. Hence, this research fills this gap in the existing tourism literature regarding the coupling coordination relationship between the two factors, as well as the spatial and temporal variations of the CCD between TC and EG.

Thirdly, this research offers useful insights into the method for examining the relationship between tourism and the economy. As the systematic evaluation of TC and EG is a multicomponent and multidisciplinary process, system theory is necessary to evaluate the relationship between the two systems. The CCD model applied in this research is oriented based on synergistic theory and can reflect the coupling degree and development level of different systems. It therefore is a proper approach to investigate the TC–EG nexus. From a methodological perspective, the CCD model constructed in this research can shed light on the investigation of the relations between tourism development and national economic, social and other dimensions.

The remainder of the paper is structured as follows: The TC–EG nexus literature and the model of CCD are reviewed in Section 2, and the evaluation index system and the CCD between TC and EG are constructed and calculated in Section 3, respectively. Moreover, the overall status and temporal and spatial variation of CCD between the TC and EG of 56 developing countries in 2008–2017 are analysed in Section 4. Section 5 provides the key findings and implications, as well as the limitations and recommendations for future work.

2. Literature Review

2.1. TC–EG Nexus

Firstly, with regard to the relationship from EG to TC, scholars have explored various influencing factors of TC, including the information and communications technology [17,18], globalisation [19], hotel industry [20], human resources [17], health and hygiene [21], environmental management [22], transportation [23], consumer protection legislation [24] and corruption [25]. By contrast, limited research has been performed in terms of economic impacts on the competitiveness of the tourism sector.

Secondly, in respect to the relationship from TC to EG, the influence of TC on economic competitiveness [14], tourism’s contribution to EG [15] and tourism poverty reduction [26] have been examined in the tourism literature. However, no consensus has been made on whether or not the enhancement of TC will lead to EG.
Thirdly, limited studies have addressed the CCD between TC and EG. However, the tourism–economy nexus has been widely discussed over the past decades, which provided useful insights into the research topic of this study. Ozturk [27] and Chatziantoniou, Filis, Eeckels and Apostolakis [28] summarised the causality between tourism and EG into four different hypotheses. Firstly, the uni-causality is found from the tourism sector to EG—the tourism-led economic growth (TLEG) hypothesis. Secondly, a uni-causality is proven from EG to the tourism sector—the economic-driven tourism growth (EDTG) hypothesis. Thirdly, a bidirectional relationship exists between tourism and EG—the bidirectional causality (BC) hypothesis. Fourthly, no causality is suggested between tourism and EG—no causality (NC) hypothesis. In sum, no consistent theoretical and empirical grounds have been established if tourism development leads to EG or EG promotes tourism development [29]. Moreover, this finding may be caused by different indices chosen to measure tourism and EG, the variation of study period and the differentiation of research context [30].

As Yildirim, Sezgin and Ocal [31] and Eugenio-Martín and Morales [32] corroborated, the relationship of tourism development and EG differs between developed and developing economies. Additional studies are necessary to understand the TC–EG nexus in developing countries, given the importance of tourism for low-income countries and the scarcity of related research on the TC–EG relationship.

2.2. Evaluation of TC

It is very difficult to measure TC due to its complex and multidimensional nature. Thus, the evaluation index of TC has been a growing area of interest amongst scholars during the past two decades.

Crouch and Ritchie [5] were amongst the first researchers who proposed the indicators of TC. They identified 36 major destination competitiveness elements and clustered them into five main groups: supporting factors and resources; core resources and attractors; destination management; destination policy and qualifying and amplifying determinates. Moreover, Dwyer and Kim [13] and Dwyer et al. [33] developed the integrated destination competitiveness model, found 83 evaluation indicators of destination competitiveness and classified these indicators into four major groups: resource endowments, resources created, support factors and destination management elements. Furthermore, Gooroochurn and Sugiyarto [9] ranked the TC of over 200 countries according to the data of World Travel & Tourism Council. On the basis of a survey of experts, Crouch [34] ranked the influencing factors of TC through the analytical hierarchy process. With respect to the characteristics of island destinations, Croes [8] evaluated the TC of island regions based on panel regression analysis.

The abovementioned literature provides valuable implications for understanding TC evaluation. However, as Dwyer, Forsyth and Dwyer [26] claimed, these studies have offered a framework for including relevant variables rather than the actual measures of the competitiveness of different destinations. By contrast, the TTCI proposed by the World Economic Forum (WEF) can serve as a strategic tool for measuring the factors and policies that make the development of the tourism industry in different countries competitive [35]. In addition, the TTCI has been issued by the WEF since 2007, and eight editions have been published up to 2017. As a comprehensive and systematic collection of data on destination competitiveness [36], TTCI is very effective in judging the strengths and weaknesses of a country’s tourism development [37]. Therefore, the indicators and the results of the TTCI have been increasingly employed by scholars in evaluating destination competitiveness [12,14,15,19,36–40].

The World Tourism Organisation also claims that the TTCI can serve as a useful instrument to support the global development agenda, with potential to strengthen the competitiveness of the poorest countries [3]. Given the research context of developing countries in the current study, we employ the indicators in the Travel and Tourism Competitiveness Report [41] to investigate the coupling coordination relationship between the TC and EG of global developing countries.

Despite the extensive use of the TTCI, it also has been criticised due to the methodological issues [12,37,42–44]. Amongst the main criticisms pointed by Mazanec and Ring [12] and Croes and Kubickova [42], one shortage deserves special concern: the arbitrary weighting of indices in the
TTCI [37,43,45]. To solve this problem, an information entropy approach is used to calculate the weight of the indicators of the TTCI in this research.

2.3. Developing Country and Multidimensional Poverty Index

This study is concerned with the relationship between the TC and EG of developing countries. The term ‘developing country’ is an important prerequisite for this study.

O’Sullivan and Sheffrin [46] used ‘underdeveloped industry’ and ‘low human development index’ to measure developing countries. Nevertheless, this definition is not widely accepted due to the unclear classification criteria. For the convenience of statistics, a nation’s income level in comparison with other nations has generally been used for the designation of developing countries [47,48].

In 2010, the Oxford Poverty and Human Development Initiative at the University of Oxford developed the Multidimensional Poverty Index (MPI) for poverty measurement that goes beyond income analysis [49,50]. The MPI has since been regarded as a new index for developing countries [51]. In contrast to momentary assessment of income, the MPI can reflect multiple attributes of poverty with respect to education, health and living standards [52,53]. Moreover, it has been adopted as an international measure of acute poverty covering over 100 developing countries by the Human development Report Office of the United Nations Development Programme since its 2010 Human Development Report [54].

In addition, the MPI can measure poverty internationally and comparably which reflects the nature of developing country comprehensively. The current work analyses the CCD between TC and EG amongst the developing countries labelled with the MPI in the 2018 Human Development Report [55]. Given the availability of TCCI data, this research is conducted amongst the 56 developing countries that have TC data from 2008 to 2017.

2.4. CCD Model

Coupling is a term that originates from the field of physics. It refers to the phenomenon whereby two or more systems influence each other through an interactive mechanism [56]. Moreover, this interactive mechanism is complicated, and it involves different system components and changing simultaneously and dynamically over time [57]. Since the coupling degree cannot judge the development level of the coordination, the CCD model was employed to reflect the coordination level of system interaction [58].

Taken as an effective approach to investigate interactive effects, the CCD model has been confirmed to be useful and widely used in investigating the relations between tourism and the environment [59], resources and environment carrying capacity [60], tourism and cultural industries [61], as well as urbanisation and the environment [56,62]. The evaluation of the relationship between TC and EG involves multiple components, a systemic approach is required for an objective judgment. The CCD model can deal with the system interaction problems and is employed in this study to investigate the TC–EG nexus.

3. Methodology

3.1. Index Systems of Tourism Competitiveness and Economic Growth

3.1.1. Index System of Tourism Competitiveness

Initially, the index system of TC was constructed on the basis of the TTCI of the WEF. The TTCI is the broadest measure of TC available up to now [25], and it can be regarded as a comprehensive and systematic index system of destination competitiveness [37]. Further, the indices and data of the TTCI have been used in recent studies, such as Webster and Ivanov [15], Krstic, Jovanovic, Jankovic–Milic and Stanisic [14], Das and Dirienzo [25], and Ivanov and Webster [19], to conduct the TC analysis of different countries.
The WEF launched the TTCI in 2007, and seven editions of travel and tourism competitiveness report have been issued to date [63]. The pillars for measuring the TTCI have undergone certain adjustments since 2007. In the first issue of the travel and tourism competitiveness report [64], the TTCI was measured by using 13 ‘pillars’. After the modification of ‘pillars’ from 13 to 14 in 2008, it remained unchanged for 2009, 2011 and 2013 [65]. In the 2015 [66] and 2017 [67] editions of the Travel and Tourism Competitiveness Report, ‘policy rules and regulations’ and ‘affinity for travel and tourism’ were replaced by ‘business environment’ and ‘international openness,’ whereas the other 12 ‘pillars’ remained unchanged.

Concerning the modifications of TTCI ‘pillars’ in the different editions of the Travel and Tourism Competitiveness Report, and to compare the CCD between TC and EG in different years, this research selects the 12 same ‘pillars’ (Table 1) in the travel and tourism competitiveness report of 2008, 2009, 2011, 2013, 2015 and 2017 as an evaluation index system of TC.

### Table 1. Weights of tourism competitiveness (TC) indices.

| Index                        | 2008  | 2009  | 2011  | 2013  | 2015  | 2017  |
|------------------------------|-------|-------|-------|-------|-------|-------|
| Sustainability of environment (x₁) | 0.074 | 0.064 | 0.061 | 0.074 | 0.082 | 0.094 |
| Tourism safety (x₂)          | 0.059 | 0.070 | 0.103 | 0.075 | 0.085 | 0.092 |
| Health and hygiene (x₃)      | 0.109 | 0.105 | 0.100 | 0.103 | 0.086 | 0.077 |
| Priority of tourism development (x₄) | 0.074 | 0.076 | 0.072 | 0.087 | 0.070 | 0.082 |
| Airport infrastructure (x₅)  | 0.094 | 0.089 | 0.090 | 0.086 | 0.101 | 0.095 |
| Road and port infrastructure (x₆) | 0.088 | 0.069 | 0.066 | 0.066 | 0.062 | 0.087 |
| Tourist service (x₇)         | 0.104 | 0.116 | 0.091 | 0.103 | 0.102 | 0.090 |
| ICT infrastructure (x₈)      | 0.066 | 0.073 | 0.072 | 0.067 | 0.081 | 0.088 |
| Competitiveness of price (x₉) | 0.052 | 0.053 | 0.061 | 0.060 | 0.067 | 0.044 |
| Human resources for tourism (x₁₀) | 0.099 | 0.092 | 0.090 | 0.074 | 0.047 | 0.059 |
| Natural tourism resources (x₁₁) | 0.100 | 0.107 | 0.107 | 0.112 | 0.134 | 0.105 |
| Cultural tourism resources and business travel (x₁₂) | 0.081 | 0.086 | 0.088 | 0.094 | 0.085 | 0.087 |

#### 3.1.2. Index System of Economic Growth

Given the availability of economic data for developing countries, this study selects GDP and GDP per capita as evaluation indices of EG. GDP is the sum of gross value added by all resident producers in the economy plus any product tax and minus any subsidy excluded in the value of the products, and GDP per capita is the GDP divided by midyear population [68]. These two indices have been used as the core indicators of EG in previous studies, such as Nowak, Sahli and CortésJiménez [69], Tugcu [70], Min, Roh and Bak [71], Meyer, Bruyn and Meyer [72], Liu, Nijkamp and Li [73], Perles–Ribes, Ramón–Rodriguez and Rubia, et al. [74], Bilen, Yilanci and Eryüzlü [75] and Croes, Riddersta and Niekerk [76].

The research data of GDP and GDP per capita (in constant 2010 U.S. dollars) were obtained from the World Development Indicators published by the World Bank (https://data.worldbank.org.cn/).

#### 3.2. Determination of Index Weight

The information entropy approach was used to determine the index weight of TC and EG and solve the problem of arbitrary weighting of pillars in TTCI [37]. The concept of information entropy was introduced by Shannon in 1948 [77]. It refers to the measurement of uncertainty about the information sources. The term of redundancy was defined by Shannon as “one minus the relative entropy” [77]. The concepts of information entropy and redundancy can be used to calculate the index weight by analysing the correlation degree and information amongst indices, thereby avoiding the bias induced by subjective influence to a certain extent [59]. The information entropy approach has been proven to be useful in calculating the index weight of tourism development [59], urbanisation [56], environment [56,59] and resources and environment carrying capacity [60].
According to Li, Li, Zhou, Shi and Zhu [56], the steps for the information entropy approach are as follows:

Step 1. Normalisation index values.

The index values are normalised using Equations (1) and (2) to eliminate the influence of dimension, magnitude and positive and negative orientation.

Positive index: \[ X'_{ij} = \frac{X_{ij} - \min (X_j)}{\max (X_j) - \min (X_j)} \] (1)

Negative index: \[ X'_{ij} = \frac{\max (X_j) - X_{ij}}{\max (X_j) - \min (X_j)} \] (2)

where \( X_{ij} \) and \( X'_{ij} \) represent the original and normalised values of the evaluation index; \( \max (X_j) \) and \( \min (X_j) \) are the maximum and minimum values of index \( j \).

Step 2. Calculating index weights.

Initially, the ratio of the index \( Y_{ij} \) is calculated to understand the contribution of the \( j \)-th evaluation index in the \( i \)-th year.

\[ Y_{ij} = X'_{ij} \sum_{i=1}^{m} X'_{ij} \] (3)

Thereafter, according to the definition of information entropy, the entropy of index \( j \) \( (e_j) \) is calculated using Equation (4), and the entropy values of the evaluation indices of TC and EG can be figured out.

\[ e_j = \frac{1}{\ln m} \sum_{i=1}^{m} Y_{ij} \times \ln Y_{ij} \ (0 \leq e_i \leq 1) \] (4)

Entropy redundancy \( (d_j) \) is then calculated based on \( e_j \) to figure out the deviation degree of index \( j \).

\[ d_i = 1 - e_i \] (5)

If the deviation degree of index \( j \) is greater, then the weight of index \( j \) becomes larger as the information that index \( j \) contributes increases. In this context, the weight of the index \( j \) \( (W_j) \) is calculated as follows:

\[ W_j = d_j / \sum_{j=1}^{n} d_j \] (6)

where \( m \) and \( n \) represent the number of the years and indices, respectively.

The weight of each index of TC and EG was determined using the above calculation formulas (Tables 1 and 2).

| Year | 2006 | 2007 | 2009 | 2011 | 2013 | 2015 |
|------|------|------|------|------|------|------|
| GDP (\( y_1 \)) | 0.362 | 0.350 | 0.344 | 0.339 | 0.336 | 0.333 |
| GDP per capita (\( y_2 \)) | 0.638 | 0.650 | 0.656 | 0.661 | 0.664 | 0.667 |

3.3. Calculating CCD

According to Li, Li, Zhou, Shi and Zhu [56], the CCD between TC and EG is calculated as follows:

\[ C = \sqrt{\frac{t(x) \times e(y)}{((t(x) \times e(y))/2)^2}} \] (7)

\[ T = \alpha \times t(x) + \beta \times e(y) \] (8)

\[ D = \sqrt{C \times T} \] (9)
where $C$ is the coupling degree; $D$ is the coupling coordination degree; $t(x)$ and $e(y)$ represent the level of TC and EG, respectively; $T$ denotes the total level of TC and EG; $\alpha$ and $\beta$ reflect the ratio of TC and EG, respectively. Section 4 deals with the determination of these values.

Based on the results developed by Li, Li, Zhou, Shi and Zhu [56] and Tang [59], the level of CCD of TC and EG was classified into three categories and six subcategories (Table 3). Then, 18 different types were divided according to the TC–EG nexus.

### Table 3. Classification of the CCD between TC and EG.

| Category               | Subcategory               | Type                        |
|------------------------|---------------------------|-----------------------------|
| Balanced status        | 0.8 < $D \leq 1$ Superiorly balanced status | $e(y) - t(x) > 0.1 \quad 0 \leq |e(y) - t(x)| \leq 0.1$ Lag of TC |
|                        |                           | $t(x) - e(y) > 0.1 \quad e(y) - t(x) > 0.1$ TC–EG synchronisation |
| Balanced status        | 0.6 < $D \leq 0.8$ Favorably balanced status | $e(y) - t(x) > 0.1 \quad 0 \leq |e(y) - t(x)| \leq 0.1$ Lag of TC |
|                        |                           | $t(x) - e(y) > 0.1 \quad e(y) - t(x) > 0.1$ TC–EG synchronisation |
| Transitional balanced status | 0.5 < $D \leq 0.6$ Barely balanced status | $e(y) - t(x) > 0.1 \quad 0 \leq |e(y) - t(x)| \leq 0.1$ Lag of TC |
|                        |                           | $t(x) - e(y) > 0.1 \quad e(y) - t(x) > 0.1$ TC–EG synchronisation |
|                        | 0.4 < $D \leq 0.5$ Slightly unbalanced status | $e(y) - t(x) > 0.1 \quad 0 \leq |e(y) - t(x)| \leq 0.1$ Lag of TC |
|                        |                           | $t(x) - e(y) > 0.1 \quad e(y) - t(x) > 0.1$ TC–EG synchronisation |
| Unbalanced status      | 0.2 < $D \leq 0.4$ Moderately unbalanced status | $e(y) - t(x) > 0.1 \quad 0 \leq |e(y) - t(x)| \leq 0.1$ Lag of TC |
|                        |                           | $t(x) - e(y) > 0.1 \quad e(y) - t(x) > 0.1$ TC–EG synchronisation |
|                        | 0 < $D \leq 0.2$ Seriously unbalanced status | $e(y) - t(x) > 0.1 \quad 0 \leq |e(y) - t(x)| \leq 0.1$ Lag of EG |
|                        |                           | $t(x) - e(y) > 0.1 \quad e(y) - t(x) > 0.1$ Lag of EG |

### 4. Results

Three values of $\alpha$ and $\beta$ ($\alpha = 1/3, \beta = 2/3; \alpha = 1/2, \beta = 1/2; \alpha = 2/3, \beta = 1/3$) were selected to identify the respective influence of TC and EG on the CCD between them. Figure 1 depicts the results of the CCD for each case from 2008 to 2017. Meanwhile, the comparison of the three sets of the CCD indicates that the general trends were consistent despite the fact that they differed slightly in the specific CCD value. Given that CCD is not clearly influenced by the contribution of the indices of TC and EG, our research focuses on the overall tendency of the results. Ultimately, the analysis of the CCD in the following sections was based on the case of $\alpha = \beta = 1/2$. 
4.1. Overall Status of CCD

The CCD between the TC and EG of the 56 developing countries from 2008 to 2017 was calculated via the CCD model (detailed information is listed in Appendix A). Firstly, as far as the class of the CCD was concerned, the 56 developing countries were divided into two categories: transitional balance and unbalanced status (Table 4). Therefore, no CCD between the TC and EG of the 56 developing countries belongs to the category of balanced status from 2008 to 2017.

Table 4. Category and subcategory of the CCD between the TC and EG of developing countries from 2008 to 2017.

| Category                      | Subcategory                | 2008  | 2009  | 2011  | 2013  | 2015  | 2017  |
|-------------------------------|----------------------------|-------|-------|-------|-------|-------|-------|
| Transitional balanced status  | Barely balanced status     | 4     | 4     | 4     | 4     | 4     | 4     |
|                               | (7.1%)                     | (7.1%)| (7.1%)| (7.1%)| (7.1%)| (7.1%)|       |
|                               | Slightly unbalanced status | 6     | 6     | 6     | 8     | 11    | 11    |
|                               | (10.7%)                    | (10.7%)| (10.7%)| (14.3%)| (19.6%)| (19.6%)|       |
| Unbalanced status             | Moderately unbalanced status | 34    | 33    | 35    | 35    | 33    | 34    |
|                               | (58.9%)                    | (60.7%)| (62.5%)| (62.5%)| (58.9%)| (60.7%)|       |
|                               | Seriously unbalanced status | 13    | 13    | 11    | 9     | 8     | 7     |
|                               | (23.2%)                    | (23.2%)| (19.6%)| (16.1%)| (14.3%)| (12.5%)|       |

Note: No CCD between the TC and EG of the 56 developing countries belongs to the category of balanced status.

Secondly, from the perspective of the subcategory of the CCD between TC and EG in 2017, 60.7% of the developing countries were in a state of moderately unbalanced development. Moreover, the second
and third subcategories of the CCD were slightly unbalanced status and seriously unbalanced status; eleven (19.6%) and seven (12.5%) developing countries were classified into these two categories. Only four (7.1%) developing countries’ CCD achieved the status of barely balance, and no country fell into the two categories of superiorly balanced status and favourably balanced status.

Thirdly, with regard to the type of the CCD between TC and EG in 2017, 46 (82.1%) developing countries were affirmed to be EG lagged (Table 5). In addition, only 17.9% of the countries showed the state of TC–EG synchronisation, and no developing country was divided into the TC-lagged type.

Table 5. Type of the CCD between the TC and EG of developing countries from 2008 to 2017.

| Type                  | 2008 | 2009 | 2011 | 2013 | 2015 | 2017 |
|-----------------------|------|------|------|------|------|------|
| TC–EG synchronisation | 10   | 12   | 11   | 10   | 9    | 10   |
| (17.9%)               | (21.4%) | (19.6%) | (17.9%) | (16.1%) | (17.9%) |
| Lag of EG             | 46   | 44   | 45   | 46   | 47   | 46   |
| (82.1%)               | (78.6%) | (80.4%) | (82.1%) | (83.9%) | (82.1%) |
| Lag of TC             | 0    | 0    | 0    | 0    | 0    | 0    |
| (0%)                  | (0%) | (0%) | (0%) | (0%) | (0%) | (0%) |

4.2. Time Variation of CCD

The means of the CCD between the TC and EG of developing countries were very low, ranging from 0.304 to 0.326 in 2008–2017 (Table 6). However, as far as the time variation was concerned, the means of the CCD has showed a very slow but continuous upward trend since 2008, with the variance basically unchanged. Hence, although the CCD between the TC and EG of developing countries was low, the values of the CCD had been improving over time. This increase may be due to the slow improvement of TC and EG. Figure 2 illustrates that the overall level of TC and EG has grown slowly from 2008.

Figure 2. Values of the TC and EG of developing countries from 2008 to 2017.
Table 6. Statistics of CCD between the TC and EG of developing countries from 2008 to 2017.

| Value  | 2008   | 2009   | 2011   | 2013   | 2015   | 2017   |
|--------|--------|--------|--------|--------|--------|--------|
| Mean   | 0.304  | 0.304  | 0.309  | 0.315  | 0.320  | 0.326  |
| Variance | 0.014  | 0.013  | 0.012  | 0.013  | 0.014  | 0.012  |
| Range  | 0.555  | 0.548  | 0.554  | 0.552  | 0.543  | 0.538  |

In addition, the ranges of the CCD have generally declined in recent years (Table 6). Thus, with the overall improvement of the CCD level in developing countries, the CCD differences amongst developing countries are also showing a shrinking trend.

With regard to the time variation of the classification of the CCD between TC and EG, developing countries of moderately unbalanced status accounted for the highest proportion, and the lowest value of this subcategory was 58.9% in 2015. By contrast, developing countries of barely balanced status ranked the lowest, and the percentage was basically fixed at 7%. The proportion of developing countries of seriously unbalanced status had gradually declined, and the value dropped from 23.2% in 2008 to 12.5% in 2017. Furthermore, the proportion of developing countries classified as having a slightly unbalanced status increased to 19.6% in 2017 from 10.7% in 2008.

With respect to the time variations of the type of the CCD between TC and EG, EG-lagged developing countries have been occupying the highest proportion since 2008. Table 5 exhibits that approximately 45 developing countries belonged to this type of the CCD in the past 10 years. By contrast, the proportion of TC–EG synchronisation has been relatively low, ranging from 16.1% to 21.4% since 2008. The analysis also demonstrated that no developing country’s CCD was TC-lagged from 2008 to 2017.

4.3. Spatial Variation of CCD

To understand the regional differences of the CCD between TC and EG, this research examined the spatial distribution of the CCD in the 56 developing countries in 2017.

The 56 developing countries studied in this research are mainly distributed in Africa (39.3%), Asia (28.6%) and America (23.2%). In addition, five (8.9%) developing countries are also located in Europe. Thus, a discussion of the CCD between TC and EG from the perspective of global developing countries is possible.

Developing countries in Central America and East Asia had better CCD between TC and EG than countries in other regions. Four countries in these areas belonged to the category of barely balanced status: Mexico, Barbados, Trinidad and Tobago and China (Table 7). Moreover, the region with the worst CCD was Africa. The seven developing countries ( Chad, Ethiopia, Mali, Madagascar, Mozambique, Burundi and Gambia) belonged to seriously unbalanced status are all located in Africa.

Table 7. Spatial differentiation of the CCD between the TC and EG of developing countries in 2017.

| Category of the CCD | Total Number | Africa | Asia | Americas | Europe |
|---------------------|--------------|--------|------|----------|--------|
|                     |              | (0.0%) | (6.3%) | (23.1%) | (0.0%) |
| Barely balanced status | 4           | 0      | 1    | 3        | 0      |
| Slightly unbalanced status | 11           | 2      | 4    | 3        | 2      |
| Moderately unbalanced status | 34           | 13     | 11   | 7        | 3      |
| Seriously unbalanced status | 7           | 7      | 0    | 0        | 0      |
| TC–EG synchronisation | 10           | 4      | 3    | 3        | 0      |
| Lag of EG            | 46           | 18     | 13   | 10       | 5      |
The overall status of the CCD between TC and EG in Africa was the worst compared with other continents. From the CCD subclass perspective, 13 (59.1%) out of 22 countries belonged to moderately unbalanced status. In addition, seven countries belonged to seriously unbalanced status, thereby accounting for 31.8% of the 22 developing countries. Relatively speaking, countries in Southern Africa showed good CCD status, and Namibia and South Africa were grouped as slightly unbalanced status. In terms of the type of CCD, the vast majority of the developing countries in Africa were EG-lagged, except for Nigeria and Mauritania in West Africa, Chad in Central Africa and Algeria in North Africa.

In Asia, 11 and 4 developing countries’ CCD between TC and EG were classified as moderately unbalanced and slightly unbalanced status, which accounted for 68.8% and 25.0%, respectively. Collectively, the CCD level in Asian developing countries showed evident spatial heterogeneity. Only China’s CCD was good and indicated a barely balanced status. The CCD of Southeast Asia’s Cambodia and Indonesia as well as West Asia’s Azerbaijan, Jordan and Armenia had a slightly unbalanced status. By contrast, the CCD of Southeast Asia’s Philippines, Vietnam and Thailand and South Asia’s Pakistan, Bangladesh, Nepal and India were worse and labelled as having a moderately unbalanced status. As far as the type of CCD was concerned, the level of synchronisation between TC and EG in Asian developing countries was low. Except for the three countries of Pakistan, Kazakhstan and China which achieved the simultaneous development of TC and EG, all the remaining 13 developing countries showed an EG-lagged status.

Amongst the 13 developing countries in the Americas, those in the CCD subcategory of a moderately unbalanced status accounted for the largest proportion (53.8%). The numbers of developing countries with a CCD of a barely balanced status and a slightly unbalanced status were equivalent, which accounted for 23.1%. Moreover, developing countries with a relatively good CCD, such as Mexico, Barbados, Trinidad and Tobago, were concentrated in Central America. With regard to the level of the CCD, only South America’s Colombia, Central America’s Barbados and Trinidad and Tobago had the status of TC–EG synchronisation. The rest of the developing countries were all classified as an EG-lagged type.

As for the five European developing countries, the spatial differences of the CCD between TC and EG were not evident in 2017. The CCD of Montenegro and Serbia was in the state of slightly unbalanced development. By contrast, Moldova, Macedonia, FYR and Albania all showed a moderately unbalanced status between TC and EG. In terms of the type of the CCD, all of these five countries were less developed in terms of their TC rankings.

5. Conclusions and Discussion

5.1. Conclusions and Discussion

On the basis of the CCD model and entropy weight method, this study investigated the coupling relationship between TC and EG of 56 developing countries from 2008 to 2017. To the best of our knowledge, this study was the first attempt to examine the relationship between these two factors in the context of developing regions. The findings reveal the following regularities. Firstly, despite the importance of the tourism industry for developing countries, most of their CCD between TC and EG was in the state of unbalanced development. This result may be explained from two aspects. On the one hand, the level of TC and EG in developing countries was relatively low, which causes the unbalanced status of the CCD between these two factors. On the other hand, the level of synchronisation between TC and EG was low, which can be reflected in the type of CCD (Table 5). Specifically, the lag is the most important cause of low CCD. By contrast, no developing country had poor CCD due to the backwardness of tourism development. This finding demonstrates that the tourism sector in developing countries has increased at a rate no less than EG since 2008, which confirms the significance and contribution of the tourism sector in developing regions [78]. In addition, as previous research has corroborated, TC is associated with a country’s level of economic development [79]. Thus, accelerating
EG is crucial in improving the most important drivers of destination competitiveness in terms of tourism infrastructure and destination management [47], and in increasing the global competitive positions of developing countries in the long run.

Secondly, from the perspective of the time-varying nature of the CCD between TC and EG, the CCD in developing countries showed gradually reduced improvement in recent years. It has also been found that the internal differences of the CCD amongst developing countries have been shrinking over the past decade. This finding reflects that the total status of the CCD between TC and EG in developing countries has been slowly upgrading with the improvement of the tourism industry and economic conditions. Not all TC indices have been improved at the same rate. Specifically, ICT infrastructure, tourism safety, road and port infrastructure, along with sustainability of environment, have greatly contributed to the advancement of TC in recent years.

Thirdly, the distribution of the CCD between the TC and EG of developing countries around the world had evident spatial heterogeneity. Latin America & the Caribbean, and East Asia & the Pacific had high CCD levels. By contrast, the CCD of Sub-Saharan Africa had the worst CCD level. Furthermore, at the country level, the CCD between TC and EG was good in several countries, including Mexico, Barbados, Trinidad and Tobago and China. Nevertheless, the seven African countries of Chad, Ethiopia, Mali, Madagascar, Mozambique, Burundi and Gambia witnessed severely unbalanced development between tourism and the economy in 2008–2017. These conclusions are consistent with previous studies conducted by Eugenio–Martín and Morales [32], Yildirim, Sezgin and Ocal [31] and Lee and Chang [30], who suggested that there are regional differences involving the tourism and economic nexus amongst different geographical units.

The different TC–EG relationships across developing countries may be caused by various determinants [80]. The Pearson correlation test deduced that a significant correlation exists between the MPI and CCD of TC and EG, and that the correlation coefficient was 0.771 in 2017. Therefore, the multidimensional poverty degree may be one of the determinants generating the differences of the CCD between TC and EG amongst the 56 developing countries. In addition, the size of the national economy [31,80,81], the weight of tourism on the national economy [82] and production capacity constraints [83] may be considered as some other factors influencing the TC–EG nexus.

5.2. Implications

This research provides useful implications for developing countries to promote tourism and economic development.

Firstly, the TC of the 56 developing countries has grown faster than EG since 2007. Therefore, tourism can be proved to be an important tool for helping developing countries to escape poverty and underdevelopment. In the future, developing countries should make full use of their comparative advantage of natural and cultural tourism resources, and improve tourism’s contribution to their economic development.

Secondly, due to the low level of EG, the improvement of TC in developing countries has been hindered, to a certain extent, in the investment and construction of airports, roads, communications and other infrastructure. It is very difficult for developing countries to reduce their economic underdevelopment in the short term. Hence, strengthening international cooperation in infrastructure construction merit further attention from developing countries.

Thirdly, Mexico, Barbados, Trinidad and Tobago and China all have a relatively good status with regard to the regional differences of the CCD between TC and EG amongst developing countries. Thus, the policies and paths of tourism development in these four countries can shed light on TC improvement for other developing countries with a low CCD.

5.3. Limitations and Future Work

Several limitations of this study should be acknowledged, which may provide guidance for future research. The first limitation is the time period which only covered 10 years (2008–2017)
due to the availability of the statistics data provided by the WEF. The second limitation is that this study only includes 56 developing countries, meaning whether the research conclusions apply to all developing countries remains to be tested. Thirdly, although this paper examines the CCD of TC and EG, the correlation between the two factors has not been studied. In addition, compared with EG (in terms of GDP and GDP per capita), the MPI can comprehensively reflect the development status of developing countries. Therefore, further research on the TC–MPI nexus is needed to investigate the economic and social contribution of tourism to developing countries.

In the future, the Granger causality test and regression analysis method can be used to conduct a more in-depth study of the CCD between TC and EG. Another avenue for future research is the quantitative examination of determinants influencing the temporal and spatial variation of the CCD between the TC and EG of developing countries.

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**Appendix A**

| Table A1. The CCD between TC and EG of developing countries from 2008 to 2017. |
|---------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Country                        | 2008           | 2009           | 2011           | 2013           | 2015           | 2017           |
| Chad                           | 0.1510         | 0.1451         | 0.1477         | 0.1703         | 0.1920         | 0.2003         |
| Ethiopia                       | 0.1182         | 0.1225         | 0.1398         | 0.1578         | 0.1676         | 0.1834         |
| Mali                           | 0.1907         | 0.1866         | 0.1795         | 0.1861         | 0.1888         | 0.1937         |
| Madagascar                     | 0.1604         | 0.1631         | 0.1519         | 0.1474         | 0.1539         | 0.1565         |
| Mozambique                     | 0.1377         | 0.1414         | 0.1498         | 0.1588         | 0.1586         | 0.1734         |
| Burundi                        | 0.0447         | 0.0442         | 0.0399         | 0.0394         | 0.0422         | 0.0398         |
| Nigeria                        | 0.2836         | 0.2757         | 0.2835         | 0.2940         | 0.2861         | 0.2913         |
| Senegal                        | 0.2342         | 0.2333         | 0.2331         | 0.2324         | 0.2332         | 0.2399         |
| Gambia                         | 0.1881         | 0.1856         | 0.1934         | 0.1899         | 0.1906         | 0.1887         |
| Uganda                         | 0.1831         | 0.1840         | 0.1895         | 0.1958         | 0.1969         | 0.2040         |
| Tanzania                       | 0.2066         | 0.2052         | 0.2054         | 0.2133         | 0.2232         | 0.2318         |
| Zambia                         | 0.2390         | 0.2454         | 0.2529         | 0.2638         | 0.2745         | 0.2751         |
| Mauritania                     | 0.2294         | 0.2211         | 0.1939         | 0.2132         | 0.2244         | 0.2182         |
| Cameroon                       | 0.2259         | 0.2277         | 0.2384         | 0.2452         | 0.2514         | 0.2500         |
| Pakistan                       | 0.2542         | 0.2436         | 0.2371         | 0.2388         | 0.2300         | 0.2267         |
| Bangladesh                     | 0.1963         | 0.1935         | 0.2058         | 0.2168         | 0.2147         | 0.2219         |
| Namibia                        | 0.3710         | 0.3796         | 0.3905         | 0.3956         | 0.4196         | 0.4170         |
| Kenya                          | 0.2367         | 0.2372         | 0.2253         | 0.2458         | 0.2561         | 0.2620         |
| Cambodia                       | 0.1951         | 0.2023         | 0.2113         | 0.2236         | 0.2298         | 0.2388         |
| Nepal                          | 0.1759         | 0.1748         | 0.1846         | 0.1952         | 0.2041         | 0.2072         |
| Zimbabwe                       | 0.2022         | 0.1963         | 0.1945         | 0.2152         | 0.2309         | 0.2293         |
| Lesotho                        | 0.1893         | 0.1963         | 0.2122         | 0.2066         | 0.2368         | 0.2513         |
| Guatemala                      | 0.3365         | 0.3358         | 0.3314         | 0.3252         | 0.3339         | 0.3340         |
| India                          | 0.3807         | 0.3762         | 0.3741         | 0.3774         | 0.3682         | 0.3744         |
| Bolivia                        | 0.2810         | 0.2737         | 0.2839         | 0.2962         | 0.3052         | 0.3144         |
| Honduras                       | 0.2992         | 0.2959         | 0.2987         | 0.2995         | 0.2972         | 0.3058         |
| Morocco                        | 0.3345         | 0.3292         | 0.3394         | 0.3499         | 0.3621         | 0.3630         |
| Nicaragua                      | 0.2679         | 0.2670         | 0.2719         | 0.2809         | 0.2871         | 0.2957         |
| Peru                           | 0.3797         | 0.3814         | 0.3975         | 0.4088         | 0.4194         | 0.4290         |
| Tajikistan                     | 0.1898         | 0.1984         | 0.2071         | 0.2131         | 0.2169         | 0.2320         |
| Mongolia                       | 0.2969         | 0.2966         | 0.3084         | 0.3283         | 0.3497         | 0.3556         |
| Philippines                    | 0.3108         | 0.3084         | 0.3079         | 0.3252         | 0.3291         | 0.3340         |
| El Salvador                    | 0.3317         | 0.3263         | 0.3313         | 0.3290         | 0.3323         | 0.3323         |
Table A1. Cont.

| Country     | 2008   | 2009   | 2011   | 2013   | 2015   | 2017   |
|-------------|--------|--------|--------|--------|--------|--------|
| Indonesia   | 0.3642 | 0.3661 | 0.3830 | 0.3884 | 0.4020 | 0.4022 |
| Mexico      | 0.5160 | 0.5144 | 0.5037 | 0.5124 | 0.5118 | 0.5160 |
| South Africa| 0.4570 | 0.4536 | 0.4464 | 0.4565 | 0.4694 | 0.4567 |
| Colombia    | 0.4173 | 0.4174 | 0.4228 | 0.4274 | 0.4317 | 0.4403 |
| Vietnam     | 0.2580 | 0.2624 | 0.2797 | 0.2851 | 0.2872 | 0.3002 |
| Egypt       | 0.3351 | 0.3389 | 0.3356 | 0.3366 | 0.3351 | 0.3391 |
| Paraguay    | 0.3029 | 0.2945 | 0.3030 | 0.3253 | 0.3361 | 0.3450 |
| Azerbaijan  | 0.3667 | 0.3862 | 0.4094 | 0.4137 | 0.4158 | 0.4305 |
| Jamaica     | 0.4073 | 0.4001 | 0.3907 | 0.3943 | 0.3797 | 0.3926 |
| China       | 0.5164 | 0.5285 | 0.5472 | 0.5487 | 0.5590 | 0.5660 |
| Dominican Republic | 0.3999 | 0.4000 | 0.3973 | 0.4009 | 0.4012 | 0.4265 |
| Macedonia, FYR | 0.3618 | 0.3708 | 0.3881 | 0.3900 | 0.3887 | 0.3958 |
| Barbados    | 0.5993 | 0.5917 | 0.5943 | 0.5914 | 0.5752 | 0.5782 |
| Algeria     | 0.3645 | 0.3486 | 0.3564 | 0.3279 | 0.3491 | 0.3622 |
| Albania     | 0.3340 | 0.3383 | 0.3713 | 0.3749 | 0.3633 | 0.3831 |
| Jordan      | 0.3788 | 0.3777 | 0.3775 | 0.3731 | 0.3598 | 0.3630 |
| Moldova     | 0.2660 | 0.2667 | 0.2722 | 0.2809 | 0.2922 | 0.2937 |
| Thailand    | 0.4288 | 0.4309 | 0.4295 | 0.4347 | 0.4422 | 0.4463 |
| Trinidad and Tobago | 0.5307 | 0.5236 | 0.5348 | 0.5338 | 0.5455 | 0.5465 |
| Montenegro  | 0.4252 | 0.4343 | 0.4582 | 0.4590 | 0.4494 | 0.4534 |
| Kazakhstan  | 0.4308 | 0.4355 | 0.4425 | 0.4620 | 0.4809 | 0.4879 |
| Serbia      | 0.3885 | 0.3868 | 0.3976 | 0.3958 | 0.4027 | 0.4069 |
| Armenia     | 0.3257 | 0.3339 | 0.3430 | 0.3547 | 0.3590 | 0.3725 |

Table A2. The subcategory and type of CCD between TC and EG of developing countries in 2017.

| Country           | Subcategory                         | Type                        |
|-------------------|-------------------------------------|-----------------------------|
| Chad              | Seriously unbalanced status         | TC-EG synchronisation       |
| Ethiopia          | Seriously unbalanced status         | Lag of EG                   |
| Mali              | Seriously unbalanced status         | Lag of EG                   |
| Madagascar        | Seriously unbalanced status         | Lag of EG                   |
| Mozambique        | Seriously unbalanced status         | Lag of EG                   |
| Burundi           | Seriously unbalanced status         | Lag of EG                   |
| Nigeria           | Moderately unbalanced status        | TC-EG synchronisation       |
| Senegal           | Moderately unbalanced status        | Lag of EG                   |
| Gambia            | Seriously unbalanced status         | Lag of EG                   |
| Uganda            | Moderately unbalanced status        | Lag of EG                   |
| Tanzania          | Moderately unbalanced status        | Lag of EG                   |
| Zambia            | Moderately unbalanced status        | Lag of EG                   |
| Mauritania        | Moderately unbalanced status        | TC-EG synchronisation       |
| Cameroon          | Moderately unbalanced status        | Lag of EG                   |
| Pakistan          | Moderately unbalanced status        | TC-EG synchronisation       |
| Bangladesh        | Moderately unbalanced status        | Lag of EG                   |
| Namibia           | Slightly unbalanced status          | Lag of EG                   |
| Kenya             | Moderately unbalanced status        | Lag of EG                   |
| Cambodia          | Moderately unbalanced status        | Lag of EG                   |
| Nepal             | Moderately unbalanced status        | Lag of EG                   |
| Zimbabwe          | Moderately unbalanced status        | Lag of EG                   |
| Lesotho           | Moderately unbalanced status        | Lag of EG                   |
| Guatemala         | Moderately unbalanced status        | Lag of EG                   |
| India             | Moderately unbalanced status        | Lag of EG                   |
| Bolivia           | Moderately unbalanced status        | Lag of EG                   |
| Honduras          | Moderately unbalanced status        | Lag of EG                   |
| Morocco           | Moderately unbalanced status        | Lag of EG                   |
Table A2. Cont.

| Country         | Subcategory                     | Type                     |
|-----------------|---------------------------------|--------------------------|
| Nicaragua       | Moderately unbalanced status    | Lag of EG                |
| Peru            | Slightly unbalanced status      | Lag of EG                |
| Tajikistan      | Moderately unbalanced status    | Lag of EG                |
| Mongolia        | Moderately unbalanced status    | Lag of EG                |
| Philippines     | Moderately unbalanced status    | Lag of EG                |
| El Salvador     | Moderately unbalanced status    | Lag of EG                |
| Indonesia       | Slightly unbalanced status      | Lag of EG                |
| Mexico          | Barely balanced status          | Lag of EG                |
| South Africa    | Slightly unbalanced status      | Lag of EG                |
| Colombia        | Slightly unbalanced status      | TC-EG synchronisation    |
| Vietnam         | Moderately unbalanced status    | Lag of EG                |
| Egypt           | Moderately unbalanced status    | Lag of EG                |
| Paraguay        | Moderately unbalanced status    | Lag of EG                |
| Azerbaijan      | Slightly unbalanced status      | Lag of EG                |
| Jamaica         | Moderately unbalanced status    | Lag of EG                |
| Dominican Republic | Slightly unbalanced status     | Lag of EG                |
| Macedonia, FYR  | Moderately unbalanced status    | Lag of EG                |
| Barbados        | Barely balanced status          | TC-EG synchronisation    |
| Algeria         | Moderately unbalanced status    | TC-EG synchronisation    |
| Albania         | Moderately unbalanced status    | Lag of EG                |
| Jordan          | Moderately unbalanced status    | Lag of EG                |
| Moldova         | Moderately unbalanced status    | Lag of EG                |
| Thailand        | Slightly unbalanced status      | Lag of EG                |
| Trinidad and Tobago | Barely balanced status      | TC-EG synchronisation    |
| Montenegro      | Slightly unbalanced status      | Lag of EG                |
| Kazakhstan      | Slightly unbalanced status      | TC-EG synchronisation    |
| Serbia          | Slightly unbalanced status      | Lag of EG                |
| Armenia         | Moderately unbalanced status    | Lag of EG                |

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