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The Taxonomy of the Least Developed Countries Based on the Tourism Economic Impact Analysis

Gabriela Hrubcova[a]*, Tomas Loster [a], Petr Obergruber[a]

[a]*University of Economics, Prague, W. Churchill Sq. 1938/4, 130 67 Prague 3, Czech republic*

Abstract

Taxonomy as primarily empirical approach to the classification has become an important part of science in development of the diverse socio-economic processes. Furthermore, the topic of developing countries is currently a discussed topic at the international level. It is closely related to tourism as one of the sources of their potential growth. This paper aims to develop the taxonomy of the least developed countries based on the tourism economic impact analysis. We use the cluster analysis as a quantitative method for constructing taxonomies and analyze the countries based on the several different measures. As a result, taxonomy is developed based upon the outcomes of the cluster analysis.

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Keywords: Taxonomy; Classification; Dendrogram; Cluster analysis; Tourism economic impact analysis; Least developed countries

1. Introduction

Tourism is one of the most important industries in the world in terms of generation of the foreign revenues and employment creation. In addition, it has potential to provide international economic growth and development. United Nations World Tourism Organization estimates that by 2030 the sector will reach 1,8 billion international tourist arrivals worldwide (UNWTO, 2015. The sector is an important driver of growth and also might play a role in the poverty reduction, especially within developing countries. One half of the least developed countries already consider tourism as one of the main drivers of their development. Position of the least developed countries in the international

* Gabriela Hrubcova.Tel:+4-34-54-34-3
E-mail address: qhrug00@vse.cz

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tourism has recently significantly changed, in particular in terms of their participation as importers or exporters. International arrivals in the group of the least developed countries increased between 1990 and 2009 by an average of 11 percent a year and this trend is very likely to continue. International organizations, governments and the national tourism organizations admit and recognize the unique potential of tourism to become a driver of sustainable economic development of the least developed countries (UNWTO,2015 UNDP).

Classification is the general process of grouping entities by similarity and either can be unidimensional (based solely on a single dimension or characteristics) or multidimensional (based on a number of dimensions), where the dimensions are generally thought to be related or correlated. Taxonomy as primarily empirical approach to the classification has become an important part of science in development of the diverse socio-economic processes. Like classification, the term taxonomy can refer to both – the process and the end result (Bailey, 1994).

The aim of this paper is to develop the taxonomy of the least developed countries based on the tourism economic impact analysis. We focus on the following indicators: visitor exports, domestic spending, government spending, internal tourism consumption, business and leisure spending, capital investments and direct and total contribution of tourism to the gross domestic product. We use the cluster analysis as a quantitative method for constructing taxonomies and analyse the countries based on the several different measures. To determine the optimal number of clusters, we use various techniques and criteria - the knowledge of the economic theory, the basis of the appropriate criteria and the basis of the dendrogram. As a result, taxonomy is developed based upon the outcomes of the cluster analysis. We set several clusters of the individual countries as optimum based on the evaluating coefficients and the dendrogram to show the specific groups of countries. The paper is organized as follows: firstly, the theoretical framework following the method, the empirical results and the conclusion.

2. Theoretical framework

Travel & Tourim is defined as “the activity of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes not remunerated from within the place visited”; the phrase “usual environment” is introduced to exclude from the concept of ‘visitor’ persons commuting every day between their home and place of work or study, or other places frequently visited (UN). Without a doubt, it is an important economic activity in most countries around the world, including many developing and the least developed countries. The sector has significant direct, indirect and induced impacts. Year 2014 proved to be another success for the sector: world gross domestic product growth increased from 2.3% in 2013 to 2.4% in 2014 and the direct gross domestic product growth contribution of tourism grew by 3.5%, up from 3.4% in 2013 (WTTC. 2015).

The issue of tourism and development of the least developed countries is closely related, as tourism is considered as a possible source of their development and a half of all the least developed countries already consider tourism as a driver of their development. However, classification of developing countries through the international organizations differs. Several classification approaches of the developing countries exist. Forty-eight countries are currently designated by the United Nations (The UN Committee for Development Policy - CDP) (UNCTAD) as the least developed countries. Following three criteria are used by the CDP:

- Per capita income criterion, based on a three-year average estimate of the gross national income (GNI) per capita, with a threshold of 992 USD for possible cases of addition to the list, and a threshold of 1,190 USD for graduation from LDC status.
- Human assets criterion, involving a composite index (The Human Assets Index).
- Economic vulnerability criterion, involving a composite index (The Economic Vulnerability Index).

According to UNCTAD (2012), different thresholds are used for all three criteria to identify cases of addition to the list of the least developed countries and cases of graduation from it. Definitions of three groups of countries can be considered in case of problems specific for tourism: Least Developed Countries, Land-locked Developing Countries and Small Island Developing States. The World Bank (2014), methodology ranks countries into four income groups; main criterion for classifying economies is GNI per capita. Based on its GNI per capita, every economy is classified as low, middle (subdivided into lower middle and upper middle), or high income. The third of the developing countries classification concept is The United Nations Development Programme, methodology, based

on the Human Development Index (HDI), composite statistic of life expectancy, education, and income indices (Hrubcova, Loster, 2015).

3. Method

For our purpose of creating the clusters of similar least developed countries, we chose the multivariate statistical technique - cluster analysis. As a quantitative method of classification, this term originated in psychology, where is also used the related term of the pattern analysis. Basically, cluster analysis seeks to group a sample of objects into homogenous classes on the basis of their similarity on M variables (Bailey, 1994). Based on the evaluation of different methods in different situations (Loster, 2014; Loster, 2015), for clustering we use the Ward-Wishart method in conjunction with the square of the Euclidean distance measure In case of the non-identical measurement units, we use standardization of variables. Ward method solves clustering principle by minimalizes of heterogeneity of the clusters. In other words, the method creates cluster by maximization intragroup homogeneity (Rezankova, Husek, & Snasel, 2009). The Ward criterion indicated by G1 measures homogeneity of the clusters by the intragroup square sum of deviations from cluster average. G1 is defined by relationship

$$G_1 = \sum_{h=1}^{k}\sum_{i=1}^{n_h}\sum_{t=1}^{m}\left(x_{hit} - \bar{x}_{ht}\right)^2, \tag{1}$$

where:

x_{hit} is the average value of i-th object, t-th variable in h-th cluster,

$\bar{x}_{ht}$ is the average value of t-th variable in h-th cluster,

n_h is the number of objects in h-th cluster,

m is the number of variables characterizing the objects

k is the number of clusters.

The criterion for clustering originates from the idea of minimal increase of G_1, hence the following term is minimized:

$$\Delta G_1 = \sum_{i=1}^{n_g}\sum_{t=1}^{m}\left(x_{git} - \bar{x}_{gt}\right)^2 - \left(\sum_{i=1}^{n_h}\sum_{t=1}^{m}\left(x_{hit} - \bar{x}_{ht}\right)^2 + \sum_{i=1}^{n_{h'}}\sum_{t=1}^{m}\left(x_{h'it} - \bar{x}_{h't}\right)^2\right) \tag{2}$$

The calculation of Euclidean distance D between i-th and j-th object is based on Pythagoras:

$$D_{\mathrm{E}}(\mathbf{x}_i, \mathbf{x}_j) = \sqrt{\sum_{t=1}^{m}\left(x_{it} - x_{jt}\right)^2}, \tag{3}$$

where x_i represents i-th object a where x_j represents j-th object (Hrubcova, Loster, 2015). To determine the optimal number of clusters, several techniques and criteria are used: the basis of the appropriate criteria, the knowledge of the economic theory and the basis of the dendrogram. We used IBM SPSS version 20 to determine the allocation of the individual countries in the clusters.

With the aim to analyze the economic impact of tourism in the least developed countries in 2014, we have selected the least developed countries according to the classification by the United Nations (UNCTAD). We classified those countries according to the Economic Impact Research by the Oxford Economics and the World Travel and Tourism Council (WTTC). The tourism economic impact is currently being measured in 35 of the least developed countries (Oxford Economic & WTTC). In practical terms, WTTC and Oxford Economics implemented the Tourism satellite account: Recommended methodological framework UN to develop a method for computing the demand- side components of GDP as consumption, government investment and net exports. In addition, by using the input-output tables to translate demand-side expenditures into supply-side outputs and also to split the total GDP and employment into direct and indirect components (Hrubcova, Loster, 2015). For our own analyses, we focus on the

following indicators: visitor exports, domestic spending, government spending, internal tourism consumption, business and leisure spending, capital investments and direct and total contribution of tourism to the gross domestic product.

4. Results

The aim of this paper was to develop the taxonomy of the least developed countries based on the tourism economic impact analysis. As a result, taxonomy is developed based upon the outcomes of the cluster analysis. Four clusters of the individual countries are set as the optimum based on the evaluating coefficients (CHF, PTS and Dunn / Davies-Bouldin coefficients). Table 1 shows the detail of composition of clusters; results of the cluster analysis display the Dendrogram using Ward Linkage. We decided to name the clusters according to the mean of tourism economic impact in the countries grouped in the cluster:

- Cluster number three (27 countries) – "low tourism economic impact"
- Cluster number four (5 countries) – "lower middle tourism economic impact"
- Cluster number one (2 countries) – "upper middle tourism economic impact"
- Cluster number two (1 country) – "high tourism economic impact"

The biggest number of countries is included in the cluster number three - 27 countries with "low tourism economic impact": Benin, Burkina Faso, Burundi, Central African Republic, Chad, Comoros, Dem. Rep of the Congo, Gambia, Guinea, Haiti, Kiribati, Lesotho, Madagascar, Malawi, Mali, Mozambique, Nepal, Niger, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Togo, Uganda, Vanuatu, Zambia. Most of those countries show generally more stable development over the years. Nevertheless, tourism demonstrate the lowest overall economic impact in this cluster. Cluster number four with "lower middle tourism economic impact" includes five countries (Cambodia, Ethiopia, Myanmar, Sudan and Yemen). Cluster number one with "upper middle tourism economic impact" includes two countries (Angola and the United Republic of Tanzania) and cluster number two only one country – Bangladesh, with "high tourism economic impact".

Table 1. Composition of clusters, data 2014.

Case	2014	Case	2014
1:Angola	1	19:Mali	3
2:Banglade	2	20:Mozambiq	3
3:Benin	3	21:Myanmar	4
4:Burkina Faso	3	22:Nepal	3
5:Burundi	3	23:Niger	3
6:Cambodia	4	24:Rwanda	3
7:Central African Republic	3	25:Sao Tome and Principe	3
8:Chad	3	26:Senegal	3
9:Comoros	3	27:Sierra Leone	3
10:Dem. Rep of the Congo	3	28:Solomon Islands	3
11:Ethiopia	3	29:Sudan	4
12:Gambia	3	30:Togo	3
13:Guinea	3	31:Uganda	3
14:Haiti	3	32:United Rep. of Tanzania	1
15:Kiribati	3	33:Vanuatu	3
16:Lesotho	3	34:Yemen	4
17:Madagasc	3	35:Zambia	3

To verify the accuracy of distribution of the countries among the clusters, we checked the results of grouping with the specific components from demand and supply point of view, confirming the results of the taxonomy. Regarding the situation from the supply side perspective, countries in the cluster number three also reached the lowest values in the component of Travel & Tourism direct GDP. However, with slowly increasing trend up to the mean 0,29 US$ bn in 2014. The highest values has reached the country in the cluster number two, up to the mean 3,82 US$ bn in 2014. The demand side perspective, based on the overall spending in the economy on Travel & Tourism activity by households, businesses, overseas visitors or government also confirmed our previous results. The example is the component of the Visitor exports, where the cluster three achieved the lowest results, as well.

5. Conclusion

The aim of this paper was to develop the taxonomy of the least developed countries based on the tourism economic impact analysis. As a quantitative method for constructing taxonomies and analysing the countries based on the several different measures, we chose cluster analysis with focus on the specific indicators. To determine the optimal number of clusters, we used various techniques and criteria - the knowledge of the economic theory, the basis of the appropriate criteria and the basis of the dendrogram.

As a result, taxonomy was developed based upon the outcomes of the cluster analysis. We decided to name the clusters according to the mean of tourism economic impact in the countries grouped within the cluster: cluster number three with 27 countries as the group with “low tourism economic impact”, cluster number four with five countries as the group with “lower middle tourism economic impact”, cluster number one with two countries as the group with “upper middle tourism economic impact” and cluster number two with only one country as the “high tourism economic impact”.

Consequently, to verify the accuracy of our taxonomy results, we checked the results of grouping with the specific components from demand and supply point of view, which confirmed the distribution of the countries among the clusters within the taxonomy.

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