Diversification in Tourism-Related Activities and Social Sustainability in the State of Hidalgo, Mexico

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Abstract: The objective of this paper is to explore the empirical relationships between the economic diversification of tourism-specific products (TSPs) and human development (as a key piece of social sustainability) at the sub-state level using the scenario of the State of Hidalgo in the year 2014 (the most recent period available) as the context for the study. The first step was to develop an algebraic analysis using the reflection method (RM) to map, for the first time, the diversity and ubiquity of the municipalities of Hidalgo in relation to tourism-related activities in the region. Secondly, additional diversity proxy measures were calculated, namely Shannon's entropy and the Hirshman–Herfindalhl index, using employment data derived from the TSPs. This allowed us to run a series of regressions that show the explanatory power of the diversification of tourism-related activities on human development. In conclusion, it was demonstrated that the diversification of tourism activities within the analyzed context is essential for social sustainability, which frames the relevance of tourism to promote the development of the region. Finally, it is noted that one of the greatest contributions of this research is the provision of empirical evidence regarding the diversity of the TSPs in a specific context, because given the peculiar structure of tourism, it is not easy to quantify the diversification of the tourism sector in an economy.

Keywords: diversification; social sustainability; tourism-specific products

1. Introduction

Social sustainability occurs when formal and informal processes, systems, structures, and relationships actively support the ability of current and future generations to create healthy and habitable communities. Socially sustainable communities are equitable, diverse, connected, and democratic, and offer a good quality of life. Similarly, social sustainability is also considered a process to create sustainable and successful places that promote human wellbeing by understanding that people are affected by the places where they live and work [1]. The relationship between export variety and economic growth has been paid much attention in academia [2]. This document explores, more specifically, the relationship between the variety of tourism-specific products (TSPs) and human development as a proxy for social sustainability.

This paper introduces the promising new field of empirical research on the interrelations between development and economic diversification, and in this case, specifically of TSPs. There are many different methodologies available to measure them, but here we will focus on the reflection method (RM), linked with a set of regressions. This approach allowed us to obtain robust results.

The study has three dimensions of analysis: (A) Diversification is a concept that features prominently in a variety of disparate disciplines. A comprehensive composite measures of diversity should include variety, disparity, and balance as different core aspects of diversity. Hence, *variety* measures the number of elements (in this case, the number of tourism-related activities). Meanwhile, *balance* measures the quantity of each element and *disparity* measures how different the elements are [3]. Diversification therefore determines the type, quality, and variety of work alternatives that individuals have in their home region [4] and in this case, those alternatives will be linked to the tourism sector. (B) Tourism-related activities: We adapted the list of TSPs related to visitor consumption generated by the World Tourism Organization to recognize the activities that belong to the tourism sector. (C) Social sustainability: We adopt the Amartya Sen's approach, because his holistic vision allows us to match human development (wellbeing and capacities) with social sustainability. It is deeply known that the process of convergence between the perspective of human development and sustainable development is seen as a new theoretical paradigm focused on human beings, who make development a scenario of empowerment of the capacities and opportunities of a society that moves towards equitable development with social integration [5]. Furthermore, economic diversification can be considered as an aggregate proxy indicator of productive capacities, and in this case, human development index as a proxy of social sustainability. It becomes obvious that economic diversification and human development are strongly related to each other and that the study of complex relations between the two proceeds ideas relevant to politics [4].

The organization of the work is detailed as follows: In the first section, a literature review is shown, then the methodology used is broken down, followed by the analysis of results and interpretations, and finally, the conclusions and reflections of the study.

2. Literature Review

Social sustainability, despite being one of the most confusing aspects of sustainable development (see Figure 1), has a series of elements that tend to improve the quality of life, basic human needs (reflected in the human development index (HDI), equity, and social participation. Sweden, for example, is one of the current leaders in social sustainability. It has a slightly more holistic concept and defines a sustainable society as a society in which economic development, social welfare, and integration are linked with a quality environment. This society has the ability to meet its current needs without hindering the ability of future generations to meet theirs. Therefore, the challenge to achieve social sustainability implies meeting the basic needs of the individual, as established in the general principles of international treaties on human rights [6,7].
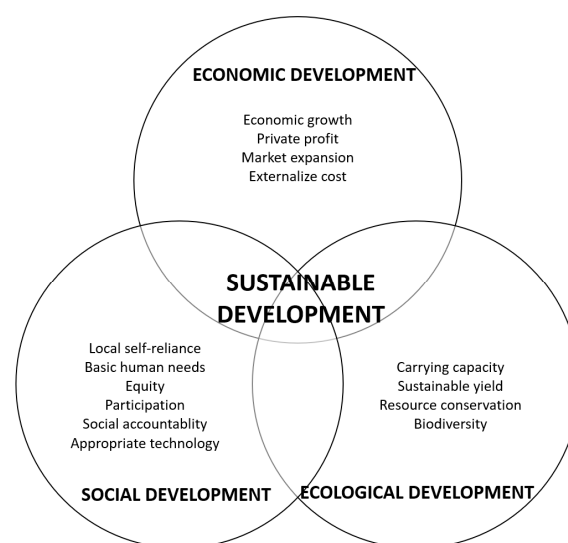

Figure 1. Social components of sustainable development [8].

Human development, in the form of people being better educated, healthier, less weakened, and so on, is not only constitutive of a better quality of life, but also contributes to a person's productivity and his/her ability to make a larger contribution to the progress of economic prosperity [9]. Therefore, the HDI is an adequate proxy for sustainable development with a social approach, given that, according to Sen, the options to achieve a decent standard of living are mainly manifested in aspects of employment, health, and education (elements of the HDI). In other words, an individual does not live under conditions of poverty due to a lack of income or satisfactions but because of a lack of capacity to better his life conditions [10]. That is why a good proxy for social sustainability is the HDI, since it focuses on the wellbeing of individuals and their opportunities, capabilities, and liberties.

Economic diversification, on the other hand, is seen as the one that leads to changes in the alternatives available in an economy, determining the number, type, and quality of labor alternatives, consumer goods, as well as lifestyle and human capital. Therefore, it is obvious that economic diversification and human development are strongly related to each other and that the study of the complex relationship between the two can provide pertinent ideas for the development of public policy, since, in theory, a more diversified economy can favor the establishment of a pluralistic society with multiple occupations and a better distribution of economic and political power. However, this will only happen if people have adequate access to information and the skills to understand systemic relationships and actively contribute to the development processes. Otherwise, they could get caught up in blind specializations and, instead of being active agents of development, they could become increasingly ignorant or exploited within an increasingly diversified and demanding system [4].

Also, it is well known that tourism affects the livelihoods of the communities living in tourism destinations in both good and bad ways [11]. In that sense, it is relevant to recognize the impact of the diversity in TSPs on economic growth and social sustainability, given that activities such as ecotourism, rural tourism, soft tourism, alternative tourism, and many other terms describe the tourism activity in peripheral rural areas, and tourism in general is recognized as a sustainable way to develop regions that have abundant tourism resources. Thus, it is interesting to analyze different forms of tourist activities [12].

Tourism is one of the most important economic activities in the world. For many regions, it represents the single largest product in their export basket. However, it is a difficult product to chart, as "exporters" of tourism do not ship it abroad, but they welcome importers inside the country. Tourism is an atypical export sector. Instead of shipping products outside a country, the exports—mostly locally consumed services—never leave the country. Instead, the importers themselves—the tourists—travel to the country to make their purchases. Given this peculiar structure, it is not easy to quantify the diversity and impact of the tourism sector on the economy of a country, even if it is considered one of the most important economic activities in the world [13].

On the other hand, empirical studies that link economic diversity or variety with tourism activities have found that "a diversity in livelihoods can be a productive analytical tool in addressing aspects of social sustainability such as social cohesion" [14] and that "undifferentiated policies, while useful for the commercial expansion of small tourism businesses, are less successful in generating local social sustainability" [15].

In the US context, researchers have identified that, for instance, tourism authorities in the Las Vegas region have suggested the diversification of the tourism industry as a strategy to improve the vitality of rural communities outside the metropolitan area and that the social construction of tourism by residents has important implications for tourism planners in the region. Therefore, this suggests the need for the implementation of an inclusive tourism diversification strategy that takes advantage of both gambling and alternative tourism [16].

In the Chinese context, studies show that improvements in livelihood diversity have been identified with most residents adopting a multi-activity strategy using synergistic relationships between tourism and other sources of income, thereby enhancing the overall livelihood sustainability. However, freedom

to engage in new livelihoods varies, as those with limited assets have difficulty participating in tourism. An income gap has emerged within the community [11].

Finally, in our context, the economic importance of tourism in the state of Hidalgo is identified as relevant, since the State Development Plan 2011–2016 mentions the variety of offers for both attractions and tourist modalities developed in the entity that have generated a significant number of jobs. Similarly, the plan of the recent administration (2016–2022) not only recognizes the capacity of the sector to generate jobs, but also places it as a lever of economic growth in terms of its ability to attract and retain national and foreign investors [17].

That is why it will be useful to explore the empirical relationships between the economic diversification of TSPs and human development (as a key piece of social sustainability). Therefore, our objective is to map the locations of the municipalities in terms of the ubiquity and diversity of tourism-specific products and compare it with other measures of diversification of the tourism industry in Hidalgo in order to identify the explanatory power of the variety of TSPs on human development as a proxy for social sustainability. Therefore, in this study, we have several hypotheses to test:

H1: There is significant relationship between the economic diversification measured by all the metrics of diversity (DIVERSITY BY RCA, UBIQUITY AVERAGE, SHANNON ENTROPY, and HIRSCHMAN INDEX) of TSPs on human development as a proxy of social sustainability.

H2: Economic diversification of TSPs is even more essential for human development as a proxy of social sustainability than for Income per capita.

H3: The regions with greater average diversity and lower average ubiquity (quadrant D) concentrate the dominant trends in the tourist development of the region.

The problem of measuring diversification of TSPs is that, at the sub-state level, there is a lack of empirical studies focused on measuring it, and this lack of observations leads (in most cases) to the political, academic, and governmental efforts that seek to increase it being misjudged. On the contrary, having a wide range of these types of studies allows the efforts made to boost the economy to be validated and/or corrected.

The justification for this work is even broader, considering that "diversity and ubiquity metrics are relevant because they help explain the differences in the income level of places, but, more importantly, because they predict in the best way possible future economic growth" [18]. However, there has not yet been an analysis about the impact on social sustainability. Other indexes do not account for the diversity and ubiquity of the productive structure and, as a result, it is impossible to identify the regions given the diversification of TSPs.

Hartmann et al. stressed that there is a strong debate within the field of economic geography about the extent to which sectoral concentration or diversification drives innovation and regional replaceable development [19]. This work uses data from the variety of products and services that generate employment compiled from the National Institute of Statistics and Statistical Geography and provides empirical evidence of the diverse behaviors of TSPs in the state of Hidalgo to search for differentiated policies that can help to prevent the generation of greater regional imbalances in existing policies. Therefore, making data-based rankings provides decision makers and society in general with opportunities to compare and illustrate the areas where progress has been made and also to highlight strengths and weaknesses [19].

Thus, new methods to quantify diversity and ubiquity serve to expand the available empirical toolbox so that researchers, policy makers, and entrepreneurs can better understand the role of knowledge in economy growth [20]. For this purpose, we decided to adopt a quantitative method using the reflection method (RM) to form metrics of TSP diversity and ubiquity.

The limitation of this work is that it is based only on data from the formal economy of TSPs, excluding TSPs derived from the informal economy.

3. Materials and Methods

This study adapted the list of TSPs related to visitor consumption generated by the World Tourism Organization, which comes from the Standard International Classification of Tourism Activities [21], whose objective is to promote a more complete statistical representation of tourism. Following the adaptation of the list of TSPs, we compiled 97 economic activities related to tourism from the original list and adapted to the context of Hidalgo.

To calculate the diversity of the TSPs in the state of Hidalgo, we used data from the Economic Census of INEGI in the year 2014 [22]. We considered the number of people employed in each kind of exclusive TSP economic activity (α) per municipality (m). An important aspect that distinguishes the present study from the analysis of previous studies (see [23–25]), is that data on the employed population were used instead of exports (international trade); this data adjustment allowed the exclusive incorporation of tourism-specific products. This dataset is appropriate, since it adequately characterizes the economic structure of the tourism industry in the region.

The general methodology involved the development of an empirical study in two ways. We focus on the reflection method (RM), linked with a set of regressions. The first one is used to verify the diversity and ubiquity of the products and other metrics of diversification -it is an algebraic procedure that is deeply applied in studies of economic complexity. Then, the statistical analysis is useful to verify the empirical effects of economic diversification and its explanatory power in the TSPs on social sustainability. The first methodology is the input that we need in order to have a variety of regressors (independent variables) related with the diversification in TSPs in our statistical analysis.

In other words, the first was the application of the reflection method (RM) to map the ubiquity and diversity of the municipalities of Hidalgo for the year 2014 (the most recent available period) based on the matrix binary, $M_{m,\alpha}$, which indicated the economic activities of the TSPs in which each municipality specializes within the tourism industry. For this, the revealed comparative advantage (RCA) was calculated by breaking down Equations (1)–(5) with the objective of identifying the quadrants in which the municipalities of Hidalgo are located in terms of diversity and ubiquity and, in this way, being able to map them (these can be used as road maps to generate and evaluate regionalized tourism promotion plans).

The second aspect consisted of estimating additional diversity proxy measures, namely Shannon's entropy and the Hirshman–Herfindalhl index (Equations (6) and (7)). Afterwards, a series of linear regressions (Equation (8)) was run to show the explanatory power of the diversification of tourism-related activities on human development. For this procedure, the following dependent variables were additionally compiled: The human development index and the per capita income of the year in question for each municipality. The phases mentioned are broken down analytically below.

Methodological Process

The revealed comparative advantage (RCA) is a key indicator that is used to calculate the economic diversity that, in this case, reflects whether an entity has comparative advantages in the development of TSPs. The RCA of a municipality (m) in terms of its productive activity (α) is represented as follows:

$$RCA_{m,\alpha} = \frac{\dfrac{E_{m.\alpha}}{\sum_{\alpha=1}^{n} E_{m,\alpha'}}}{\dfrac{\sum_{m=1}^{84} E_{m'\alpha}}{\sum_{m=1,\ \alpha=1}^{m=84,\ \alpha=n} E_{m'\alpha'}}} \tag{1}$$

where $E_{m.\alpha}$ is the number of people employed in the economic activities of the TSPs (α) in the municipality of Hidalgo (*m*); meanwhile, $\sum_{\alpha=1}^{n} E_{m,\alpha'}$ is the total number of people employed in municipality m. $\sum_{m=1}^{84} E_{m'\alpha}$ represents the total number of people employed in the economic activities of the TSPs (α) throughout the state of Hidalgo; similarly, $\sum_{m=1,\ \alpha=1}^{m=84,\ \alpha=n} E_{m'\alpha'}$ is the total number of people employed in the whole state. If this ratio is greater than 1, the place is said to have a comparative

advantage in that sector or product. The RCA is also used to define the binary matrix, where the use of VCR≥1 as a threshold; this implies that the country or entity is specialized in the economic activity or product in question [23], while $M_{m,\alpha}$, is equal to 1 if the place has an RCA ≥ 1 and zero in other cases. This is:

$$M_{m,\alpha} = 1 \quad si\ VCR_{m,\alpha} \geq 1$$
$$M_{m,\alpha} = 0 \quad si\ VCR_{m,\alpha} < 1$$

(2)

According to Hidalgo and Hausmann, the matrix $M_{m,\alpha}$ allows the level of ubiquity and diversity of products to be defined. Municipalities are represented by *m*, while the economic activities of TSPs are denoted by α [23]. Algebraically,

$$Diversity = k_{m,0} = \sum_{\alpha=1}^{n} M_{m,\ a}$$

(3)

$$Ubiquity = k_{\alpha,0} = \sum_{m=1}^{84} M_{m,\ a} \ .$$

(4)

In this case, diversity is a vector of 1 × 84 municipalities of Hidalgo, whose entries can take values between one and n. Each of the entries indicates the number of economic activities of the TSPs in which each municipality specializes. Ubiquity, on the other hand, is a vector of 1 × 97 activities derived from the TSPs, whose entries take values between one and 84. Each of its entries indicates the number of municipalities that are specialized in each exclusive economic activity of the TSPs.

Subsequently, as suggested by [19,23,26], using the reflection method (RM) we can define a matrix that connects municipalities that have similar economic activities by determining them by the inverse of the ubiquity of a product or activity (to discount common products–services) and normalizing by the diversity of the municipalities. From a mathematical point of view, the first iteration that defines the average ubiquity derived from the RM is defined as:

$$k_{m,1} = \frac{1}{k_{m,0}} \sum_{a} M_{ma} * k_{p,N-1}$$

(5)

In accordance with Hidalgo and Hausmann, the diversity and ubiquity diagram was constructed with formulas (3)–(5). Then, the vectors $k_{m,0} - k_{m,1}$, expressed, as a result, the 4 quadrants of the average diversity and ubiquity level [23].

At this point, the methodology pinpointed the 84 municipalities according to their respective levels of diversity and ubiquity of tourism-related activities.

Based on the employment data of the TSPs, we calculated different proxy indicators for the economic diversity of the municipalities; that is to say, Shannon's entropy and the Hirschman–Herfindahl index. To those metrics we added those already compiled before, namely the number of revealed comparative advantages (Equation (3)) and the average ubiquity of the TSPs (Equation (5)). Each of these measures considers different diversity dimensions, such as the variety, balance, and quality of tourism-specific products, in which economies can reach a level of competitiveness and comparative advantage within the state.

Entropy gives greater value to smaller activities; it measures both variety and balance. Shannon's Entropy (H) can be calculated as follows:

$$H = \sum_{i=1}^{n} P_i \log_2\left(\frac{1}{p_i}\right)$$

(6)

where P_i represents the participation of a certain activity *i* in the total employment of the state. The value of entropy grows along with an increase in the number of activities and with the uniformity of the distribution of participation of the labor force [27].

The Hirschman–Herfindahl index (HHI) gives greater weight to larger activities and basically measures their concentration and balance:

$$HHI = \sum_i \left(\frac{E_i}{\Sigma_j^N E_j} \right)^2. \qquad (7)$$

The value of the HHI varies between 0 and 1, where 1 represents an absolute concentration of the labor force towards a product *i*. Therefore, the lower the value is, the more balanced and less concentrated the activities will be.

The number of revealed comparative advantages (RCA) and the average ubiquity are indicators that measure the quantity and ubiquity/quality of the product diversification. Therefore, it was convenient to integrate them into the diversity analysis [23,28–30].

At this part of the process, a series of diversity measures was integrated. Then, following Hartmann (2014), we proceeded to evaluate the explanatory power of the economic diversification of the TSPs on social sustainability [10] using the following equation:

$$\text{Social sustainability} = f \text{ (Diversity of TSPs)} \qquad (8)$$

As proxy variables for social sustainability (dependent variables), the human development index (2014) and income per capita (2014) were compiled by municipality [22,31]; whereas, as independent variables of the set of simple linear regressions, Shannon's entropy (H), the Hirschman–Herfindahl index (HHI), the diversity calculated by RCA, and the average ubiquity were contemplated.

4. Results

We show the results in two ways: First, we highlight the findings derived from the reflection method (RM) that allowed us to map the locations of municipalities in terms of the ubiquity and diversity of the TSPs (applying Equations (1)–(5)).

Secondly, the results of the annexed diversity calculations are highlighted (Equations (6) and (7)) to finally break down the findings derived from the statistical analysis (Equation (8)), whose purpose was to identify the explanatory power of the diversity of TSPs on human development as a proxy for social sustainability.

4.1. Algebraic Results

The results of the algebraic operations developed (Equations (1)–(5)) can be seen in Figure 1, which shows that the best positioned municipalities are grouped in quadrant D (which denotes a greater average diversity and lower average ubiquity).

The municipalities located in this quadrant are Tizayuca, Tula De Allende, Mineral De La Reforma, Pachuca, Tulancingo De Bravo, Ixmiquilpan, Atotonilco De Tula, Actopan, Cuautepec, Zacualtipan, Mixquiahuala, Progreso, Emiliano Zapata, Huejutla, Tezontepec De Aldama, Lugo Guerrero, Apan, Tlahuelilpan, Zimapan, Atotonilco El Grande, Zempoala, Huichapan, Tlaxcoapan, Francisco I. Madero, Zapotlan, Chapulhuacan, Acaxochitlan, San Felipe Orizatlan, Mineral Del Monte, Jacala, Tecozautla, San Salvador, Calnali, and Molango.

Regarding these municipalities, it should be noted that although in the first instance they are the ones that show better diversity in the activities in their TSPs, giving them an RCA, their characteristic tourism products are those that, in most regions, would cease to exist in significant amounts or those for which the level of consumption would be significantly reduced in the absence of visitors and from which it seems possible to obtain statistical information. In contrast, related tourism products are those that are consumed by visitors in quantities that are significant for the visitor and/or the supplier but are not included in the list of characteristic tourism products. Tourism-specific products (TSPs) are

the set of both characteristic and related tourism products; the specificity is associated with a special compilation [21].

Given the previous characterization, the municipalities located in quadrant "D" may or may not be natural tourist destinations; however, all of them show the important characteristics of a greater average diversity (ranging between 20 and 60 TSPs with an RCA) in parallel with a lower inter-municipal ubiquity (only one-third of the municipalities are able to reach such TSPs). This has an additional interpretation if we recognize that the total number of TSPs is 97 activities. This total implies that, for example, even the municipality of Ixmiquilpan, which is ahead in diversity (58 TSPs with RCA), still has the possibility of expanding its diversity.

In this quadrant (Figure 2), we can identify municipalities that have diversified their TSPs and in which many of the practices point toward the use of cultural/gastronomic resources. Hence, this modality of cultural tourism represents the development potential for the state, not only to attract tourists, but because it can also encourage the generation of employment and the production of goods and services in those communities that, facing the agricultural crisis, have been left without economic alternatives [17].
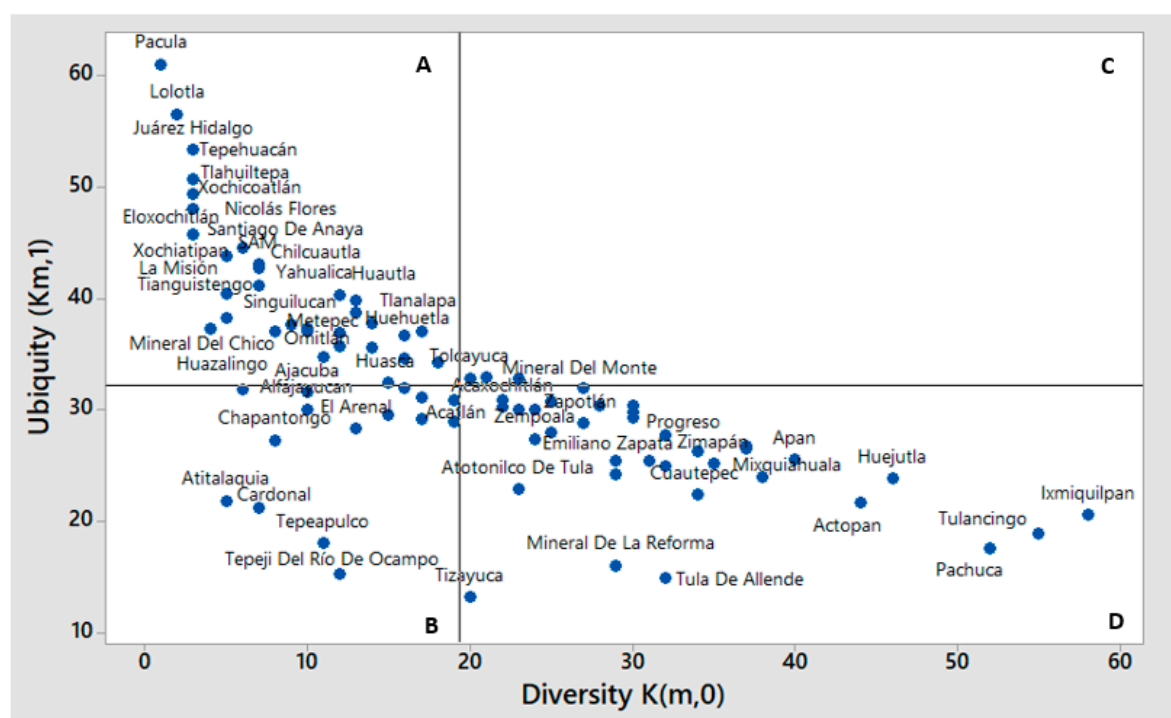

Figure 2. Diversity and ubiquity of tourism-specific products (TSPs) in Hidalgo. Source: Own calculation and elaboration (MATLAB).

Among the regions of quadrant "D", the following stand out:

(1) **Pueblos con Sabor** (*Towns with Flavor*): Seeks to potentiate the theme of gastronomic tourism in Zempoala, Tulancingo, Acaxochitlan, Calnali, Huejutla, and Actopan. Nevertheless, Omitlan was not detected in this quadrant.

(2) **Pueblos Mágicos** (*Magic Towns*): Mineral Del Monte, Huichapan, and Tecozautla. (Huasca de Ocampo and Real del Chico were not detected within quadrant "D".)

(3) **The tourism offer of the Corredor de los Balnearios** (*Water Parks Corridor*): Ixmiquilpan, Actopan, Huichapan, Tecozautla, Atotonilco de Tula, and Tula de Allende. (Tasquillo, Cardonal, Chilcuautla, Ajacuba, and Santiago de Anaya were not detected in this quadrant).

√　　　Rural/Indigenous Communities: This is a tourist scenario dominated by projects that occur as the result of the initiatives of indigenous and agricultural communities. The development and permanence of these ventures have to do, in most cases, with the sense of what the community is; that is, with the maintenance of forms of political and cultural resistance, forms of organizational and social participation, identity processes, and, of course, internal strategies for the disposition of resources that allow the development and consolidation of their tourism projects [17].

√　　　The Otomi region of Hidalgo: Ixmiquilpan and San Salvador within quadrant D. (Nicolas Flores, Cardonal, Tasquillo, Chilcuautla, and Santiago de Anaya were not detected in this quadrant.)

√　　　The Huasteca region: San Felipe Orizatlan and Huejutla De Reyes. While, Jaltocan, Tlanchinol, Tehuacan de Guerrero, Calnali, Huazalingo, Atlapexco, Yahualica, Huautla, Xochiatipan, and Tianguistenco were not detected within quadrant "D".

√　　　North Sierra: Acaxochitlan. While, San Bartolo Tutopepec, Huehuetla, and Tenango de Doria were not detected within quadrant "D".

(4) **Others detected:** Mineral De La Reforma, Pachuca, Tulancingo De Bravo, Cuautepec, Zacualtipan, Mixquiahuala, Progreso, Emiliano Zapata, Apan, Tlahuelilpan, Zimapan, Atotonilco El Grande, Tlaxcoapan, Francisco I. Madero, Zapotlan, Chapulhuacan, Jacala, and Molango.

4.2. Statistical Results

Following Hartmann, a set of simple linear regressions was used to analyze the impacts of the different types of TSP diversification on social sustainability (having, as a proxy, the human development index) and the per capita income [4]. The data on TSPs, the HDI, and the per capita income for 2014 allowed us to perform the analysis, which included all 84 municipalities.

The dependent variables used in the cross-sectional analysis were the HDI and INCOME from the year 2014, while the explanatory variables were the entropy, HHI, the number of RCAs, and the average ubiquity.

In this part, we initially highlighted the results of the diversity calculations (Equations (3), (5)–(7)), which allowed us to have a range of measurements regarding the variety or diversity of the TSPs. These results were mapped depending on the intensity of diversity, as shown in Figures 3 and 4.
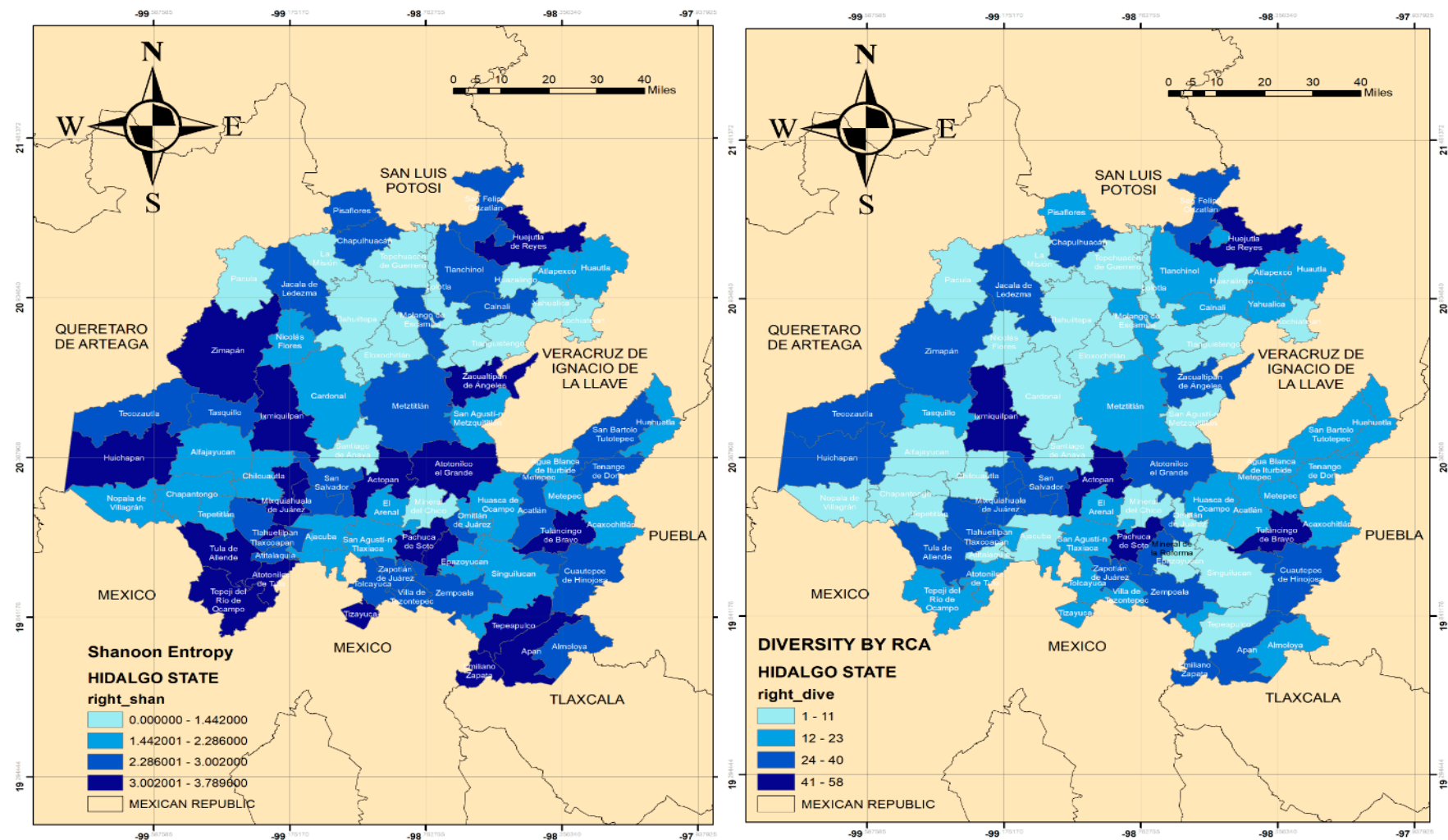
Figure 3. Maps of the different diversity metrics of tourism-specific products "Shannon's entropy and diversity by revealed comparative advantage (RCA)". Source: Own calculation and elaboration (ArcMap).
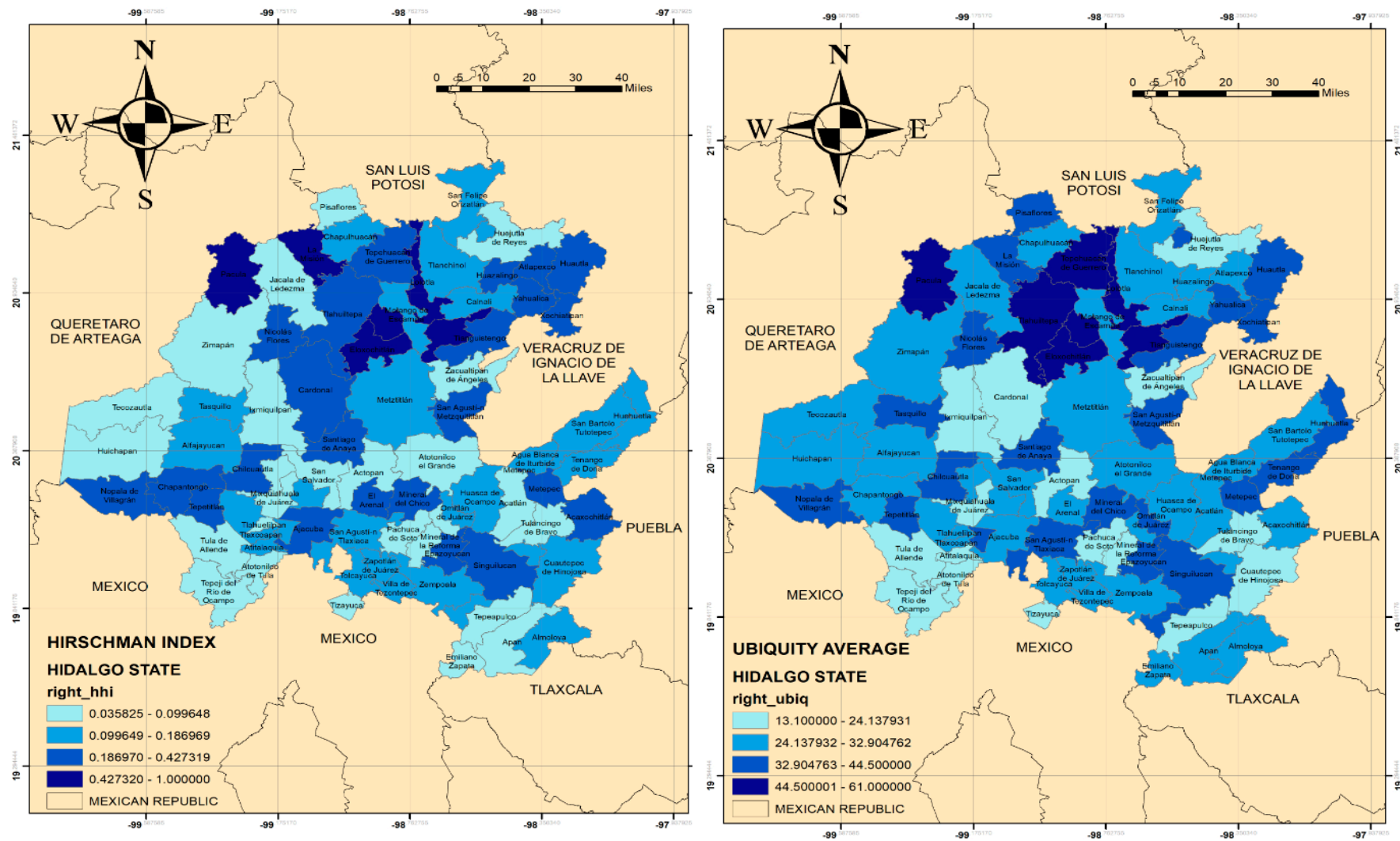
Figure 4. Maps of the different diversity metrics of tourism-specific products "Hirschman index and ubiquity". Source: Own calculation and elaboration (ArcMap).

Each of the measures mapped in Figures 3 and 4 considers different dimensions of diversity, such as the variety, balance, and quality of tourism-specific products in which economies can reach a level of competitiveness and comparative advantage within the state.

Looking at the diversity regressors calculated above, it is possible to compare eight different linear regressions. The method is simple, but it provides robust results. First, the economic diversification of the TSPs (under any of its metrics) is statistically significant, both in terms of INCOME and HDI, regardless of the indicator of diversification of the TSPs used (see Table 1).

Table 1. Empirical effects of economic diversification in the specific products of tourism on social sustainability.

SET OF SIMPLE LINEAR REGRESSION	DEPENDENT VARIABLES					
	HUMAN DEVELOPMENT (2014)			INCOME PPP per Capita (2014)		
N = 84 Municipalities	STAND COEFF. Beta	t	Sig.	STAND COEFF. Beta	t	Sig.
DIVERSITY BY RCA	0.506	5.317	0.000	0.467	4.778	0.000
UBIQUITY AVERAGE	−0.599	−6.773	0.000	−0.661	−7.972	0.000
SHANNON ENTROPY	0.609	6.959	0.000	0.629	7.333	0.000
HIRSCHMAN INDEX	−0.509	−5.358	0.000	−0.491	−5.108	0.000

Source: Own elaboration (STATA 14).

As expected, the diversity calculated by RCA and Shannon's entropy has a positive impact on the dependent variables, while the average ubiquity and Hirschman index (HHI) have negative sensitivity values (inverse to HDI and INCOME). This is due to the nature of the variables in question; that is, the value of the HHI varies between 0 and 1; therefore, the lower the value is, the more balanced and less concentrated the activities will be. Similarly, the average ubiquity reflects the number of places that perform TSPs, so the lower the ubiquity is, the less standard the TSPs are.

On the other hand, as can be seen in Table 2, it is surprising how the economic diversification of the TSPs moderately explains both human development and the per capita income.

Table 2. Explanatory power of economic diversification in the specific products of tourism on social sustainability.

Coefficients of Determination (R^2) N = 84 Municipalities	HUMAN DEVELOPMENT (2014)	INCOME per Capita (2014)
DIVERSITY BY RCA	0.256	0.218
UBIQUITY AVERAGE	0.359	0.437
SHANNON'S ENTROPY	0.371	0.396
HIRSCHMAN INDEX	0.259	0.241

Source: Own elaboration (STATA 14).

The variations of the HDI (0.37) are better explained by Shannon's entropy, while the average ubiquity is the best diversity regressor to explain the Income (0.43).

Previous studies in international contexts have found that a significantly higher coefficient of determination (R^2) for all linear regression models explain the HDI [4]. However, this research at the sub-state level shows a very similar coefficient of determination both for linear regression models that explain the HDI and for those using the per capita income as the dependent variable. This might be due to the fact that the HDI includes income, and at the sub-state level, this determining or conditioning element is essential for determining the level of HDI.

Furthermore, our analysis allows us to test several hypotheses:

H1: This hypothesis is accepted. There is a significant relationship between the economic diversification measured by all the metrics of diversity (DIVERSITY BY RCA, UBIQUITY AVERAGE,

SHANNON ENTROPY, and HIRSCHMAN INDEX) of TSPs on human development as a proxy of social sustainability because Sig. = 0.000 in all the cases. This reinforces the premise that "while diversification provides more alternatives and increases the demand for higher human capacities, human development is essential for the production of the capabilities of a territory to innovate and diversify" [4].

H2: This hypothesis is rejected. In this case, economic diversification of TSPs measured by all the metrics of diversity (DIVERSITY BY RCA, UBIQUITY AVERAGE, SHANNON ENTROPY, and HIRSCHMAN INDEX) is not more essential for human development as a proxy of social sustainability than for income per capita. The results show that, for instance, DIVERSITY BY RCA has a higher R^2 on human development (0.256) than on INCOME (0.218), and the HIRSCHMAN INDEX has a similar behavior. However, UBIQUITY AVERAGE and SHANNON'S ENTROPY have a lower R^2 on human development. It implies that economic diversification in terms of the growth of tourism-related activities may not necessarily lead to a greater balance in the economic income distribution, significantly new social choices, or more creative jobs. On the other hand, economic diversity of TSPs measured in terms of a high level of balance between the activities of an economy does not necessarily mean that the economy has a great variety of tourism related activities, providing well paid and creative jobs.

H3: This hypothesis is accepted. The regions with greater average diversity and lower average ubiquity (quadrant D) concentrate the dominant trends in the tourist development of the region. The algebraic results show that quadrant D has diversified municipalities with "exclusive" TSPs, but that exclusivity does not exclude the tourist trends of the region. This implies that the TSPs with low ubiquity come not only from massive tourist destinations, but also from tourism with a social focus (generated both in rural and urban areas, from ejidal communities, community cooperatives, etc.), and from the different varieties of cultural tourism.

The implications for a sustainable development policy from the social approach are direct: The diversification of TSPs is crucial for economic growth, but also for social sustainability and this, within the context analyzed, is very important because in tourism development, politics, from a social perspective, should assess the impacts on the natural environment as well as on cultural identities and should even evaluate the possibility of integrating other productive activities into tourism in order to avoid specialization of the territory (to promote diversification). This is in addition to the fact that, under the social approach point of view, tourism is currently considered one of many means to overcome the socioeconomic gap; that is, a way for the evolution of some societies in situations of poverty and marginalization that maintain control of important natural and cultural resources that could be used for the tourism sector [17].

Note in Figure 5 that the highest rates of diversification of the TSPs (estimated with Shannon's entropy) are concentrated in the municipalities of Ixmiquilpan, Tula de Allende, Pachuca, and Tulancingo de Bravo. In parallel, high HDI values coincide with these municipalities. This allows us to reinforce the premise that the economic diversification of specific tourism activities leads to changes in the alternatives available in the economy of Hidalgo, determining the number, type, and quality of labor alternatives, consumer goods, and lifestyles that permeate social sustainability in the different regions.

Additionally, it should be noted that the head and tail values are ideal for data with heavy tail distributions (as in the case of the diversity measured with Shannon's entropy and the HDI), such as exponential decay or lognormal curves. This type of classification is done by dividing the values into big (head) and small (tail) around the arithmetic mean. The division procedure is repeated continuously until the specified number of containers is reached or until there is only one remaining value. This method, more than others, helps to reveal the underlying scale pattern of smaller values rather than large ones.

Moreover, Figure 5 show us that lowest levels of human development are always consistent with the lowest levels of diversification counted by Shannon's entropy.
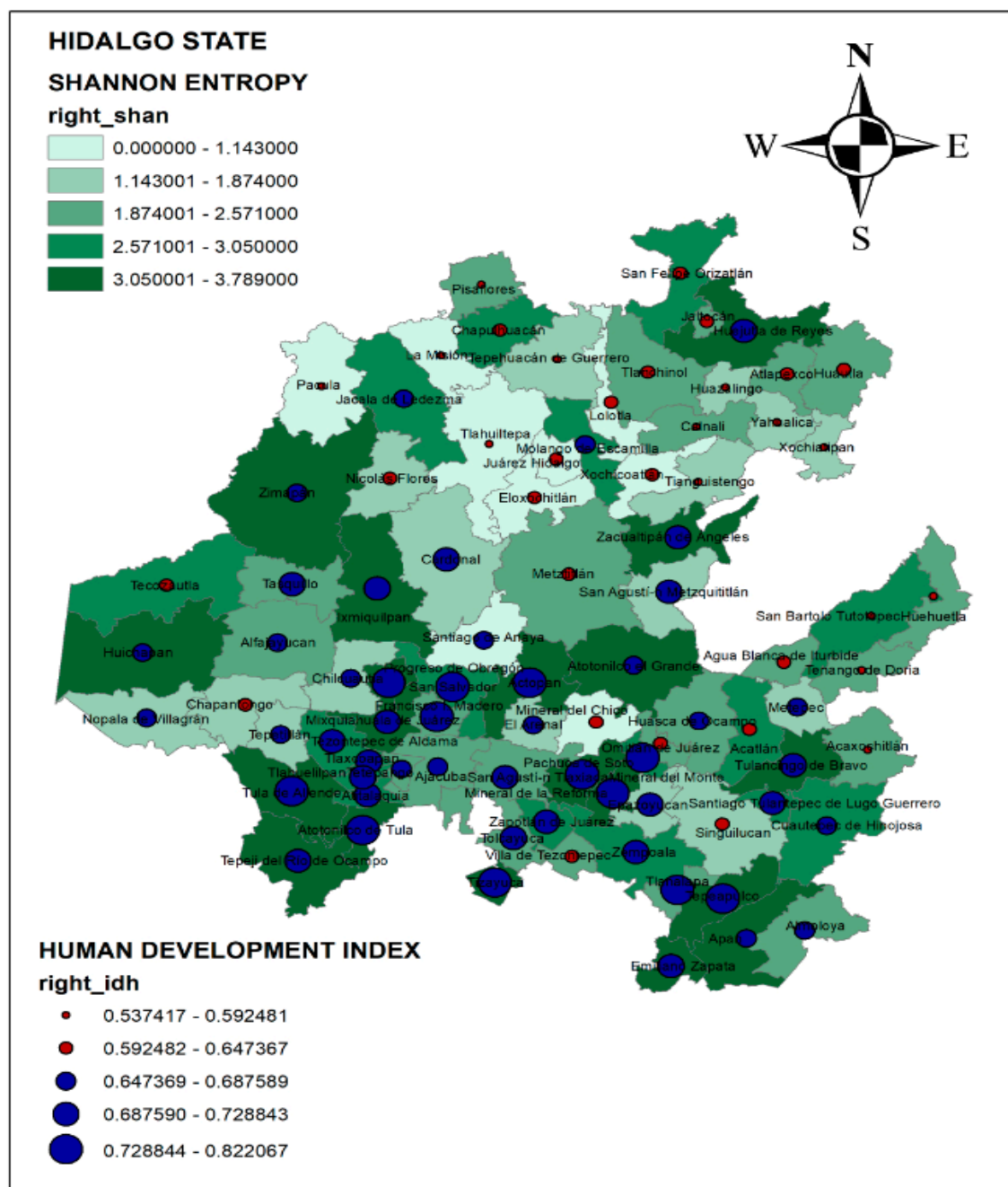
Figure 5. Map of human development vs. diversity in the specific products of tourism calculated by Shannon's entropy. Source: Own elaboration (ArcMap).

5. Discussion and Conclusions

The present investigation was conducted to map the locations of municipalities in terms of the ubiquity and diversity of tourism-specific products to estimate various measures of tourism activity diversification and to identify the explanatory power of the variety of TSPs on human development as a proxy for social sustainability.

For this purpose, we decided to adopt a quantitative method, namely the reflection method (RM) [23], using data collected from [22]. Using the algebraic operations, we mainly identified, in the first place, the municipalities located in quadrant "D" that show greater average diversification with lower average ubiquity; in these regions, there are several municipalities that belong to

the so-called "towns with flavor" or "magic towns", which offer the corridor of water parks and rural/indigenous communities.

This implies that public policies must ensure the promotion of not only the most common tourist destinations, but also the alternative ones, assuming that they also contribute to the diversity of TSPs and that they contribute with these actions not only to the economic growth of the region, but also to gradual human development that impacts the social sustainability of the studied territory.

The foregoing conclusion is relevant if we recognize that the human development index of the state of Hidalgo is 0.723 [31], which is barely "median" and is below the national average. Also, in the studied state, 54.3% of the inhabitants suffer from some condition related to poverty (percentage of the population in multidimensional poverty, that is, with an income below the welfare line and suffering from at least one type of social deprivation [32]), while 12.3% of the people of Hidalgo live in extreme poverty [32].

The study shows that the diversification of tourism activities within the analyzed context has a statistically significant effect on social sustainability (measured by the HDI), which highlights the relevance of using tourism to promote the development of the region and seeks to mitigate, with the tourism industry and its varieties, the unfavorable conditions mentioned above [11,12,33].

At this point, it is important to make an additional reflection about the use of human development as a proxy of social sustainability and argue why this indicator is useful to highlight the impacts that diversification has on the social sustainability as a part of development.

Amartya Sen's approach laid the foundations of human development theory and proposed a different conception to measure and address development (social, economic, and environmental). His thinking surpassed the economic vision centered on having (money and merchandise), for a holistic vision centered on the being and doing of the human being (wellbeing and abilities) in which the participation of institutions plays a decisive role in development [34]. Development is defined as a process of expansion of the real freedoms enjoyed by individuals, where real freedom is represented by capacity of the person to achieve several alternative combinations of operations that allow us, in the social, economic, cultural, political, and environmental scenarios that are found, to perform valuable things for themselves and their families [35,36]. Therefore, the vision of human development theory has been embraced by the proposal of sustainable development. They share the vision of having a base of economic, social, institutional, political, and cultural resources that constitute the fundamental platform on which the constitutive and instrumental freedoms of the human being are deployed, which in turn potentiate a new type of development based on the sustainability [37].

The process of convergence between the perspective of human development and sustainable development is seen as a new theoretical paradigm focused on human beings, who make development a scenario of empowerment of the capacities and opportunities of a society that moves towards equitable development, with social integration, governance, social justice, and environmental care; with all this safeguarding the opportunities of present and future generations [5].

This study indicates positive impacts of the diversification of tourism on the social aspect of sustainable development (seen from the HDI); however, future research could focus on rural tourism and reveal its impacts within the environment. In the heads and tails maps, we found that in the map of the municipalities, the highest quartile of diversity of TSPs also coincides with the highest quartile of the HDI.

The TSPs allowed us to characterize the tourism industry in the region and thus to quantify the diversity or variety of tourism activities, assuming that the products that we create are crystals, (why is "crystal" chosen as a metaphor? A crystal is a statically organized arrangement of atoms. When we manufacture products, we create tangible and digital objects that contain the solidified or frozen concretion of a process that is much more fluid and dynamic—our imagination [32]) of imagination or static concretions of our ideas, and they represent the capabilities of the regions [34].

Second, the statistical study, although modest, allowed us to identify the explanatory power that diversification has on the HDI. We concluded that, in all cases, diversity is a statistically significant

variable that has a positive relationship with the HDI as a proxy for sustainable development. Future studies should use data panels to introduce control variables that allow sophisticated statistical analysis in national contexts where there is a greater compilation of data. Also, it would be highly recommended to compare the obtained results with some similar research results from other Mexican regions.

It is widely recognized that tourism affects the livelihoods of the communities of destination for both good and bad [11,12,33]. Therefore, in the tourism setting, the possibility that a tourist destination or product may go through a phase of decline must be considered. In our country, this can be caused by factors such as insecurity, crime, and even natural phenomena. In this context, the State of Hidalgo must contemplate the design of tourist renovation policies and instruments that allow the revitalization of the tourism subsectors through actions such as the rehabilitation of tourist spaces, the renovation of the lodging sector, and the recovery of existing public buildings, among other actions [17].

Finally, it is noted that one of the greatest contributions of this research is the provision of empirical evidence regarding the diversity of the TSPs in a specific context, because given the peculiar structure of tourism, "it is not easy to quantify the diversity and impact of the tourism sector in the economy of a country, even if it is considered one of the most important economic activities in the world" [13,25].

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