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Spatial Analysis of Academic Competence Level of Countries Regarding Tourism - Recreation Planning and Geographical Information Systems Relationship

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Abstract
This study examines the spatial relationship between tourism and recreation planning and Geographical Information Systems (GIS) while evaluating academic competence across different countries. Using a systematic literature review, original research papers published after 2010 with at least three citations were analyzed. The data were organized based on the countries of publication and authorship, creating a spatial database that enabled the analysis of the most cited publications on the tourism planning and GIS relationship. The data were then transferred into a GIS environment to produce maps to visualize the geographical distribution of GIS applications in tourism and recreation planning. The study's findings highlight that GIS is most effectively used as a strategic tool in tourism planning in certain countries, revealing a concentration of expertise in these regions. The results emphasize the significance of GIS technology in the field and offer strategic recommendations for its broader use. This research not only provides a valuable foundation for future studies on integrating GIS in tourism and recreation planning but also highlights its potential to enhance planning processes in the future.
Keywords: *Tourism Planning, Recreation Planning, Geographic Information Systems, Spatial Analysis, Academic Competence*

1. Introduction

The systematic literature review method has come to the fore as a preferred methodology to reach reliable results in academic studies, especially in recent years. With this method, existing research are meticulously examined within the framework of the target topics, and the reliability of the findings is increased. In this research, first, studies examining the relationship between tourism and recreation planning and GIS were identified through the relevant databases, and the publication countries and their academic contributions were analyzed in detail. The focus was on original research published after 2010 that met specific criteria, such as having at least three citations.

The research data were arranged and organized according to the country of publication and the country of authors to create a database suitable for performing spatial analyses, developing maps, and analyzing the impact of GIS on tourism and recreation planning. The spatial analyses revealed that the countries where GIS supported tourism planning had more academic implications. The findings of this study provide valuable insights into the levels of academic competence in different countries regarding the use of GIS in tourism and recreation planning. The results also showed the regional differences in the use of GIS as an asset in tourism planning, which is one of the focal points of this study. The effectiveness of GIS use, especially in some countries, put forward as a result of this study can also be linked to the intensity of innovative approaches and technological adaptations in this field, which pave the way to develop new policies and strategies to encourage the adoption of GIS-based processes. These outputs guide future studies and make important contributions to understanding better the role of GIS in tourism and recreation planning.

The developed maps were used as a means to visualize the spread of GIS in tourism and recreation planning and to identify the most active countries in this field. In other words, the maps illustrated the countries where GIS is applied more intensively and how the geographical location of these countries shapes their academic impact. The competency map produced on the use of GIS in tourism and recreation planning shows the regions where academic studies are concentrated and why these regions are prominent in this field. In particular, country-based GIS technology utilization methods and the problems addressed in tourism planning are among the significant outputs of this research. By highlighting the research gaps in this area, particularly in Africa, Central Asia, and some European regions, this study enables future research to focus on these regions. To this end, this study extends the theoretical framework in the literature on tourism and GIS integration to provide new perspectives on how this field is developing globally. Identifying the gaps in the literature and discussing the reasons for these gaps provides an essential reference for researchers.

The findings of this paper are also critical for understanding the advantages of GIS in tourism planning and how this technology has been adapted in different geographical regions. In particular, it emphasizes how GIS can be used in tourism planning as a strategic tool not only for managing geographic information but also for developing and implementing sustainable tourism policies. The findings emphasize the importance of considering the role of GIS in tourism and recreation planning from a broader perspective. In this context, how GIS can go beyond being only a technical tool and play an integrated role in decision-making processes in tourism planning is evaluated.

There is no doubt that GIS capabilities make tourism and recreation planning more effective and efficient. From this perspective, this study analyses the worldwide academic research on the integration of tourism planning and GIS for the first time in such a comprehensive manner in terms of geographical distribution. The number of similar studies is scarce, and analyzing the relationship between tourism planning and GIS through a spatial database is one of the novelties of the study. Also, strategic recommendations on the efficient use of GIS in the tourism sector are supposed to contribute to the dissemination of this technology in tourism planning. The findings of the study are expected to guide policymakers and industry professionals in encouraging the more widespread use of GIS in tourism planning.

Especially in developing countries, such analyses can provide a clearer picture of the steps needed for more effective use of GIS. In addition, the widespread use of GIS in tourism and recreation planning can be an essential guide for academics and practitioners working in this field. The findings of the study provide important information on the training and capacity-building activities required to increase the effective use of GIS in tourism planning. This will help to develop policies to overcome the lack of training and technical infrastructure, especially in developing countries. With these unique aspects and contributions, the study fills an important gap in the literature on tourism planning and GIS integration. It provides a solid foundation for future research in this field.

2. Method

This study is based on a systematic literature review. The systematic literature review (SLR) method is a rigorous and structured approach used to synthesize existing research on a particular topic. This methodology is defined by its transparent, repeatable, and scientific approach, designed to reduce bias and enhance the reliability of results. As outlined in Kitchenham's (2004) guidelines, the systematic literature review (SLR) process can be broken down into three main stages: planning, conducting, and reporting. During the planning stage, a clear research question is formulated, and suitable databases and keywords are chosen for the literature search (Sop, 2020a; Faisal et al., 2021). The next stage, conducting, involves applying systematic review techniques and identifying relevant studies, taking into account both practical and methodological aspects (Sop, 2020b; Samara et al., 2020; Sulistyowati & Ahmar, 2023). Lastly, the reporting stage aids evidence-based decision-making by focusing on synthesizing the findings in a clear and reproducible manner (Jacobs et al., 2019; Choo, 2023).

The literature review in this study focused on academic works (original research papers) published after 2010. Since this study aims to examine the countries where the relationship between tourism and recreation planning and GIS has more academic impact worldwide, a comprehensive search was conducted in electronic databases with the keywords "tourism planning and GIS", "recreation planning and GIS" and "tourism technology and GIS". In order to ensure that the works included in the study have a specific scientific impact, publications that have received at least 3 were taken into consideration, and review articles were totally excluded to increase the validity and reliability. In addition, works indirectly related to the research content or did not comprise GIS use in tourism and recreation planning were excluded from the scope of the study. After a while, the selected keywords stopped appearing in the search results list. At this point, when the specified keywords were not found in 10 consecutive articles in the list, the search was terminated.

The data collection process was carried out between 01.08.2024 and 23.08.2024, and the articles with the target keywords meeting the criteria were included in the study. The systematically detected studies were organized in a table based on the title of the work, the name of the work, the country of the work, and the countries (institutions) of the authors. The publications were classified according to the countries of the authors and the countries of the research implementation, followed by the development of a spatial database. This classification process has been particularly critical for creating an academic competence map on the relationship between tourism and recreation planning and GIS worldwide.

The spatial database constitutes one of the most critical components of the study. The data were transferred into the GIS environment to perform comprehensive spatial analyses. These analyses were carried out in order to detect the countries from which the most cited studies on the relationship between tourism and GIS originated and to geographically map the academic activity in these fields. The maps created using GIS enabled a clearer discussion of the spatial distribution of the data and global academic activity. As a result of these spatial analyses, the geographical distribution of academic contributions on the relationship between tourism planning and recreation planning and GIS worldwide was examined, and the countries where this distribution is concentrated and where there are gaps were revealed in detail. In

light of these findings, the discussions on the maps provide an important basis for understanding global academic activity in the field of tourism and GIS and for identifying strategic directions for future research.

3. Findings

In this study, the worldwide distribution of research in the fields of tourism and GIS and the countries showing academic activity in these fields were determined. Within the scope of the study, five main topics were addressed: Tourism and GIS Based Route Planning, Tourism Planning and GIS, Tourism Management and GIS, Recreation Planning and GIS, and Tourism Technology and GIS. As a result of the systematic literature review, a total of 180 articles were examined in accordance with the specified criteria, and the country-based distribution of these articles was analyzed. The results showed that 48 articles have been published in the field of Tourism and GIS Based Route Planning, and countries such as China, USA, Iran, and Turkey are leading in this field. In the field of Tourism Planning and GIS, 38 articles were identified led by China and Turkey. 38 articles were found in the field of Tourism Management and GIS, with leading countries of China, Australia and Turkey, respectively. Studies on Recreation Planning and GIS were limited to 17 articles worldwide, which revealed a severe deficiency in this field. The number of articles on Tourism Technology and GIS was found to be 39, and China and Italy were identified as the leading countries in this field. Within the scope of these analyses, the distribution of academic publications on Tourism and GIS based Route Planning was first analyzed. In this context, the main themes addressed primarily are Tourism and GIS Based Route Planning, Tourism Planning and GIS, Tourism Management and GIS, Recreation Planning and GIS, Tourism, Technology and GIS.

Figure 1 shows the distribution of the number of authors according to countries on Tourism and GIS Based Route Planning. According to the criteria determined within the scope of this study, a total of 347 authors were listed. The results demonstrate that China, a country with a rich history and a dense population, is the leading country with a total of 99 authors. The USA (67) was ranked second reflecting its continental state characteristic. Iran (45) was ranked third with its rich historical and political past at the transition point between East and West. Australia, one of the oldest continents, has 35 authors, and Malaysia, an island state in a tropical region with rich ecological diversity, has 34 authors. Spain with its history and rich nature (32), Turkey, the cradle of civilizations (29), the United Kingdom with its historical and natural beauties (26), Italy (24), India (20) Indonesia (16), Czech Republic (16), Portugal (13), Japan (11), Finland (11), Israel (9), Romania (9), Jordan (7), Switzerland (6) followed. The following countries also demonstrated noteworthy contributions to the field: Germany (5), Serbia (5), Lebanon (5), Hungary (5), Netherlands (4), Canada (4), Mexico (4), Estonia (4), Greece (3), Sudan (3), South Africa (3), Algeria (3), Austria (3), Kenya (3), Denmark (3), Albania (2), Bangladesh (2), Brazil (2), Egypt (2), Ethiopia (2), France (2), Poland (2), Singapore (2), Iceland (1), Lithuania (1), Montenegro (1), Morocco (2), Nepal (1), Nigeria (1), Norway (1), Sri Lanka (1), Sweden (1), Uzbekistan (1) and Croatia (1). It is notable that there is a prominent absence of studies on this research topic in Eastern European countries, Russia, the majority of Africa, and a significant portion of Central and South America. These include Iraq, Syria, Saudi Arabia, Yemen, Somalia, Afghanistan, Pakistan, Central Asian countries, some South Asian countries, New Zealand, Madagascar, Greenland, and Antarctica. These regions encompass a range of geological and geomorphological formations, as well as habitats of significant biodiversity. The absence of studies in areas where natural conditions are challenging and in politically and militarily troubled regions is also a striking factor.

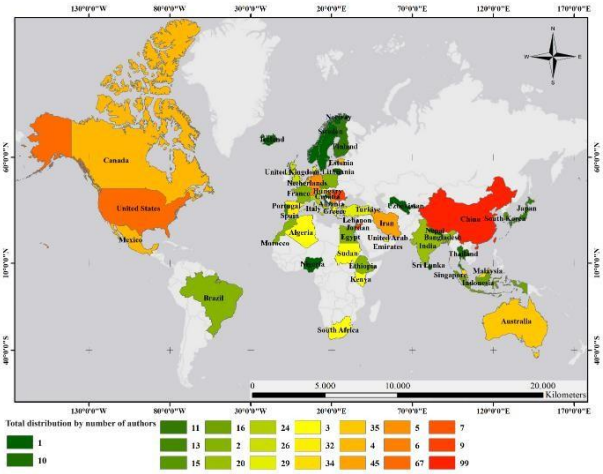

Figure 1. Countries of the authors who contributed to the analyzed studies

Considering the number of authors who have worked on Tourism and GIS Based Route Planning, the data obtained are mapped in Figure 2. The highest number of contributions originates from Iran (22), which is different from the general total. Subsequently, China (21), the USA (18), Spain (11), Malaysia (6), India (5), Canada (4), Italy (4), Portugal (4), Greece (3), Jordan (3), South Africa (3), and South Korea (3) are the following countries of authors that have contributed to publications. These are followed by Austria (2), Denmark (2), Finland (2), Israel (2), Germany (1), Egypt (1), Ethiopia (1), Bangladesh (1), Czech Republic (1), Sri Lanka (1), United Arab Emirates (1) and Uzbekistan (1). In other countries, no authors were identified who had conducted studies on this subject according to the established criteria. The findings of the study have revealed a significant gap in research activity in this field on a global scale.

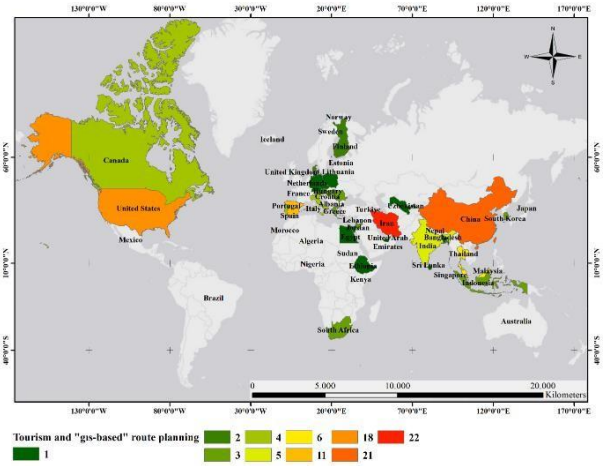

Figure 2. Distribution of the reviewed literature on tourism and GIS based route planning according to contributing authors

The results related to the number of authors working on Tourism Planning and GIS are mapped in Fig 3. China (33) has maintained its leadership with the highest number of authors working on this subject, as in the general average. Malaysia (19), Turkey (16), India (15), Iran (14), the United Kingdom (10), Australia (7), Spain (7), Portugal (6), South Korea (6), the Czech Republic (6), the USA (5), Japan (5), Jordan (4), Thailand (4), Kenya (3), Finland (3), Algeria (3), United Arab Emirates (2), Netherlands (2), Morocco (2), Austria (1), Bangladesh (1), Croatia (1), Egypt (1), Ethiopia (1), France (1), Indonesia (11), Italy (2), Lithuania (1) and Norway (1) follow the others. In other countries, no author contribution was detected. This again underlines the gap in this field worldwide.

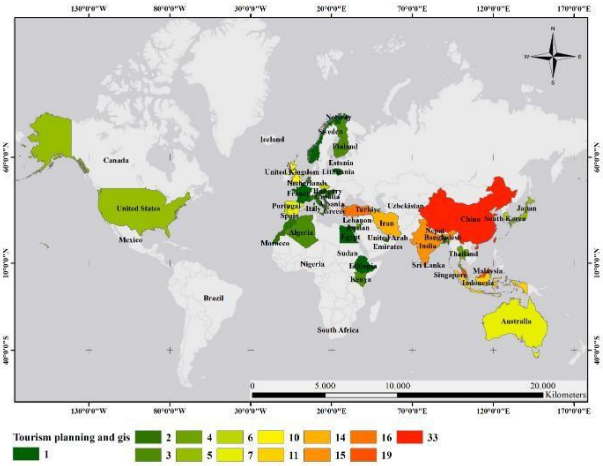

Figure 3. Distribution of the reviewed literature on tourism planning and GIS according to contributing authors

Considering the number of authors who have worked on tourism management and GIS, the data obtained are mapped in Figure 4. Australia (19) has come to the forefront with the number of authors who have worked on this subject. This is followed by China (16), USA (16,) Turkey (12) and Iran (8). Other contributing countries are Finland (6), Lebanon (5), Germany (4), United Kingdom (4), Spain (4), Mexico (4), Brazil (2), Cyprus (2), Czech Republic (3), Serbia (2), Albania (2), Denmark (1), Iceland (1), Israel (1), Japan (1), Netherlands (2), Nigeria (1), Sweden (1) and Switzerland (1). However, no author has conducted a study on this subject according to the criteria determined in countries other than these countries. It has been revealed that there is a significant gap in this field worldwide.

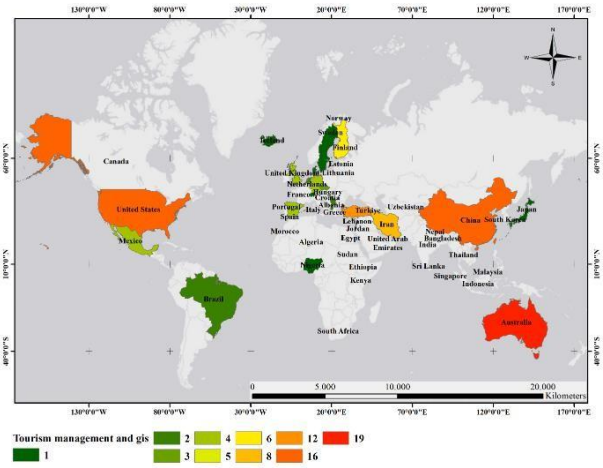

Figure 4. Distribution of the reviewed literature on tourism management and GIS according to contributing authors

Considering the number of authors who have worked on Recreation Planning and GIS, the results are presented in Figure 5. While the USA (13) stands out with the number of authors working on this subject, Australia (9), South Korea (6), Switzerland (5), Spain (4), Malaysia (4), China (3), the Czech Republic (3), Portugal (3), Sudan (3), United Kingdom (2), Israel (2), Japan (2), Turkey (1), France (1) and Iran (1) managed to enter the list. In other countries, there are no authors revealing that there is a significant gap in this field worldwide.

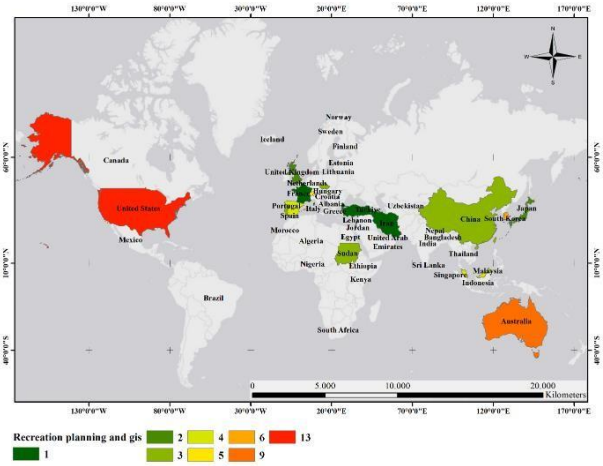

Figure 5. Distribution of the reviewed literature on recreation planning and GIS according to contributing authors

The number of authors working on Tourism, Technology and GIS are presented in Figure 6. While China (26) is at the forefront in this field, Italy (18) has started to make its presence felt. This is followed by the USA (15), the United Kingdom (10), Romania (6), Spain (6), Malaysia (5), Estonia (4), Israel (4), Czech Republic (3), Serbia (3), Indonesia (2), Japan (3), Singapore (2), Montenegro (1), Nepal (1) and Poland (1). In other countries, no authors were identified who had conducted studies on this subject according to the established criteria. The findings of the study have revealed a significant gap in research activity in this field on a global scale.

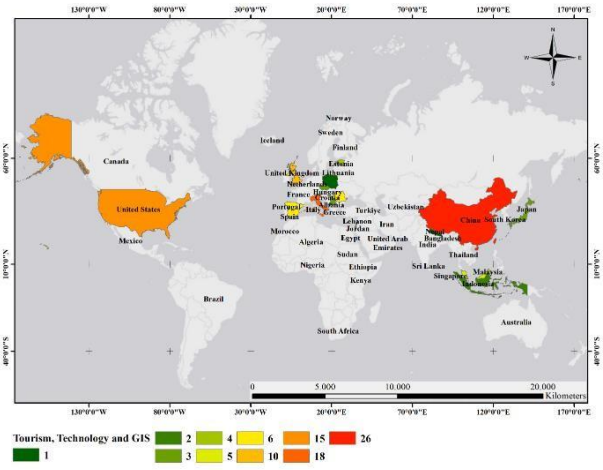

Figure 6. Distribution of the reviewed literature on tourism, technology and GIS according to contributing authors

In the second stage of the study, the countries where studies were carried out worldwide are mapped (Figure 7). It was determined that studies were conducted using data from 180 countries in total. When the general distribution of the articles is analyzed, China is in the leading position with 24 articles, followed by the USA (19), Iran (13), Turkey (11), Spain (11), Australia (11), the United Kingdom (8), Italy (7), Malaysia (6), Indonesia (5), South Korea (5), the Czech Republic (5), Thailand (3), India (3), Portugal (3), Finland (2), France (2), Germany (2), Greece (2), Mexico (2), Nepal (2), Poland (2), Romania (2), Serbia (2), Israel (1), Hungary (1), Iceland (1), Japan (1), Jordan (2), Kenya (1), Lebanon (1), Singapore (1), Solomon Islands (1), South Africa (1), Sri Lanka (1), Switzerland (1), United Arab Emirates (1), Uzbekistan (1), Vietnam (1), Netherlands (1), Nigeria (1), Albania (1), Algeria (1), Bangladesh (1), Brazil (1), Canada (1), Cayman Islands (1), Cyprus (1), Denmark (1), Estonia (1) and Ethiopia (1).

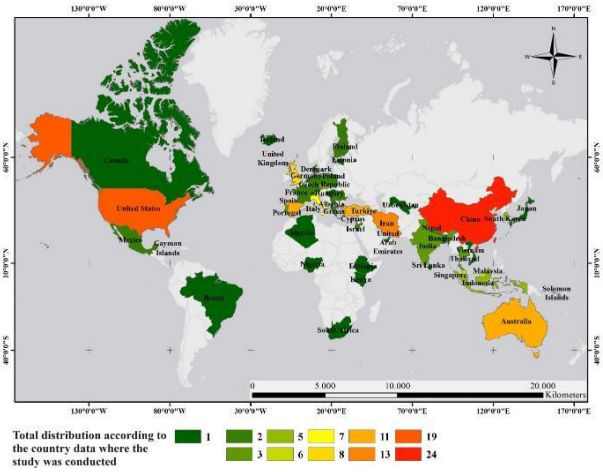

Figure 7. Distribution of the countries where the literature studies were carried out

The distribution of the articles on Tourism and GIS Based Route Planning according to the countries is shown in Figure 8. According to the results, the country with the most data in this field is the USA (7), followed by Iran (6), China (5), Spain (4), Malaysia (2), Indonesia (2), Bangladesh (1), Canada (1), Cayman Islands (1), Czech Republic (1), Denmark (1), Ethiopia (1), Finland (1), Greece (1), Hungary (1), India (1), Israel (1), Italy (1), Jordan (1), Poland (1), Portugal (1), Romania (1), South Africa (1), South Korea (1), Sri Lanka (1), Thailand (1), United Arab Emirates (1) and Uzbekistan (1). In other countries, no articles were found to meet the specified criteria. The fact that a total of 48 countries' data were used clearly reveals that research activities in this field are insufficient worldwide and that there is a significant research gap.

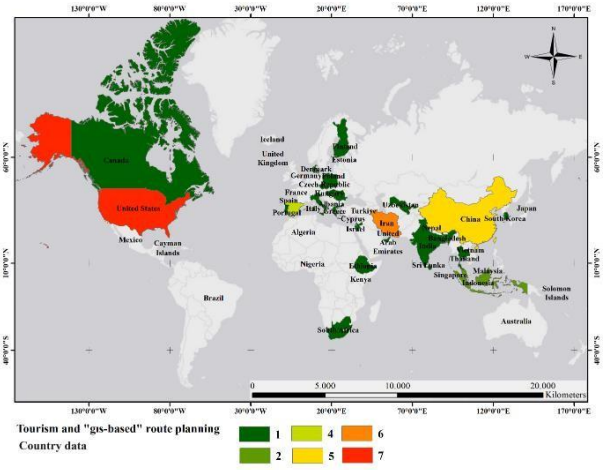

Figure 8. Distribution of the countries where the reviewed literature on tourism and GIS based route planning was conducted

The distribution of academic studies on Tourism Planning and GIS on the basis of countries is presented in Figure 9. According to the results, China (5), Turkey (5) and Iran (4) are the countries where the most data are used in this field. This is followed by Australia (3), Malaysia (3), Indonesia (2), India (2), Spain (2) and the United Kingdom (2). In addition, countries such as the Czech Republic (1), Jordan (1), Kenya (1), Nepal (1), Portugal (1), Solomon Islands (1), South Korea (1), Thailand (1), Vietnam (1) and Algeria (1) also produced a certain number of studies. No studies meeting the specified criteria were identified in other countries. The identification of only 38 articles using data from 38 countries in total indicates that the number of academic studies in this field is limited and that there is a significant research gap worldwide. The absence of studies in almost all of the New World, except for two countries in Africa, the majority of countries in Europe, and the northern half of the Asian continent clearly demonstrates an important deficiency in the relationship between tourism planning and GIS.

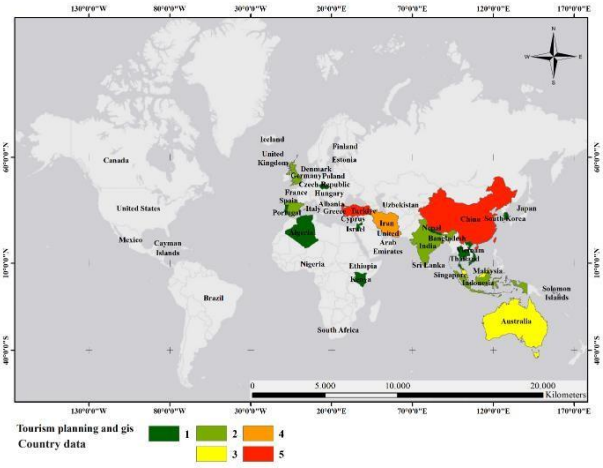

Figure 9. Distribution of the countries where the reviewed literature on tourism planning and GIS was carried out

The distribution of academic studies on Tourism Management and GIS on the basis of countries is illustrated in Figure 10. The countries with the highest number of studies in this field are China (6) and Australia (6), followed by Turkey (5), the USA (4), Iran (2), Spain (2) and Mexico (2). In addition, countries such as Albania (1), Brazil (1), Cyprus (1), the Czech Republic (1), Finland (1), Germany (1), Iceland (1), Lebanon (1), Nigeria (1), Serbia (1) and the United Kingdom (1) have made limited contributions in this field. However, no articles were found in other countries that fulfill the specified criteria. The study, which utilizes data from a total of 38 countries worldwide, clearly reveals that the relationship between Tourism Management and GIS has not been sufficiently studied in the academic field and that there is a serious research gap. Despite the geographical spread of the countries on the map, the inadequacy of the study at the global level shows that there are significant deficiencies in the literature in this field.

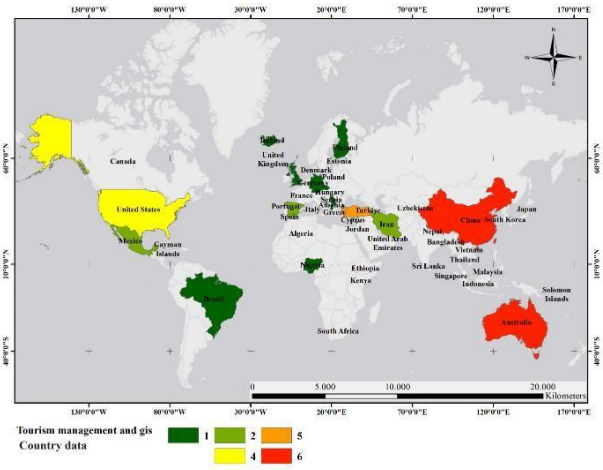

Figure 10. Distribution of the countries where the reviewed literature on tourism management and GIS was conducted

The distribution of the authors who contributed to the studies on Recreation Planning and GIS according to their countries is presented in Figure 11. The USA ranked first with 3 articles, followed by Australia (2), South Korea (2), China (2), Turkey (1), France (1), the Czech Republic (1), Iran (1), Portugal (1), Spain (1), Switzerland (1) and Thailand (1). It was determined that no articles were published on this subject in other countries. Studies on Recreation Planning and GIS were carried out using data obtained from a total of 17 countries worldwide. This is the area with the least number of studies among the research topics. This situation shows the serious deficit in this field.

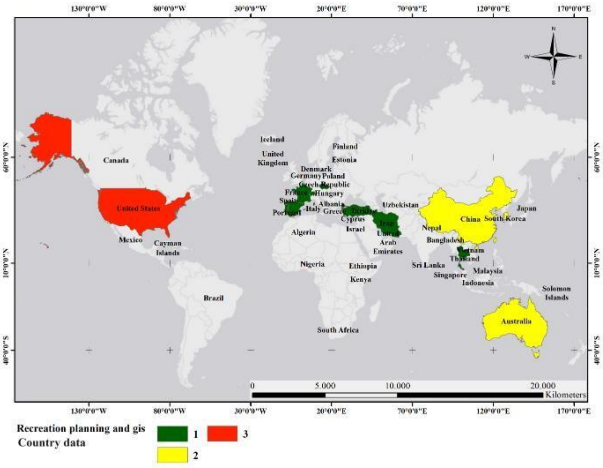

Figure 11. Distribution of the countries where the reviewed literature on recreation planning and GIS was carried out

The distribution of the authors who contributed to the studies on Tourism, Technology and GIS according to their countries is presented in Figure 12. China (6) and Italy (6) are the countries with the highest number of studies in this field, followed by the United Kingdom (5), the USA (5), Spain (2), the Czech Republic (1), Estonia (1), France (1), Germany (1), Greece (1), Indonesia (1), Japan (1), Malaysia (1), Nepal (1), Netherlands (1), Poland (1), Romania (1), Serbia (1), Singapore (1) and South Korea (1). In other countries, no articles were found to meet the specified criteria. The fact that studies have been carried out with data obtained from only 39 countries worldwide in this field clearly reveals that there is a serious lack of research in the field of Tourism, Technology and GIS despite the rapidly developing technology.

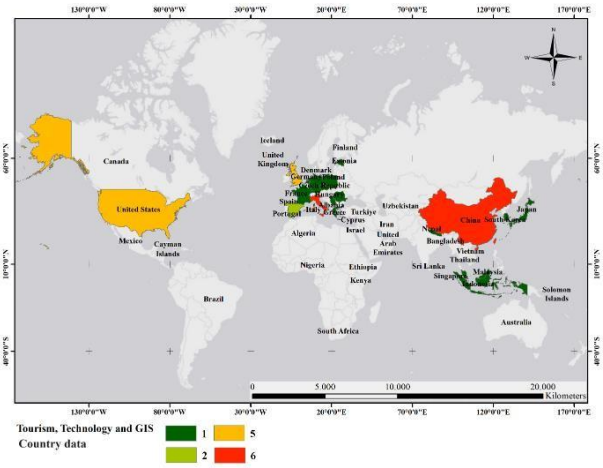

Figure 12. Distribution of the countries where the analyzed literature on tourism, technology and GIS was conducted

The data obtained shows the global distribution of academic studies in the field of tourism and GIS, and which countries are more active in this field. This provides an important reference point for future research in these fields.

4. Conclusion

This study comprehensively analyzed the worldwide academic diffusion of the relationship between tourism planning and management and GIS and the geographical distribution of research in this field. The findings show that the integration of tourism and GIS has been the subject in a limited number of studies on a global scale and that there is a significant research gap in this field. The theoretical and practical

implications of the study are given below.

Theoretical Implications: This study provides significant theoretical contributions to the current understanding of the integration between tourism planning and GIS in academic literature. By conducting a comprehensive analysis of the global diffusion of research in this area, the study clearly maps the geographical distribution of research activities. The findings highlight that only a limited number of countries, such as China, the USA, Turkey, Australia, and Italy, have made substantial contributions to this field, while many regions show little to no research on this topic. This global imbalance reveals a significant research gap, which the study addresses by identifying where tourism and GIS integration have received more attention and where serious gaps remain. These insights provide a valuable foundation for guiding future research directions, encouraging scholars to explore underrepresented regions and contribute to filling the identified gaps in this field.

Practical Implications: On a practical level, the study offers crucial insights for researchers, policymakers, and professionals in the tourism industry. By identifying the regions where the application of GIS in tourism planning and management is limited, the research highlights the opportunities for expanding the use of this technology in those areas. The findings can serve as a roadmap for developing strategic initiatives, such as training programs and capacity-building efforts, to promote the effective use of GIS in tourism. Additionally, the study emphasizes the need for targeted actions to raise awareness about the benefits of GIS as a tool for improving tourism planning and management, thereby helping decision-makers and industry professionals enhance their practices. Overall, this research lays the groundwork for more widespread and strategic applications of GIS in tourism, contributing to both academic progress and real-world impact.

5. Discussion and Suggestions

The findings of this study revealed that the relationship between tourism planning, management and GIS has not been sufficiently analyzed at the global level and that there is a significant research gap in this field. Studies concentrated in certain countries show that this field has an unbalanced distribution globally. This situation leads to important discussions both theoretically and practically.

The findings of the study show that the integration of tourism and GIS is concentrated in certain countries around the world, while many other countries lack research activities in this field. This suggests that the potential benefits of GIS in tourism planning are not evenly spread across the world. There is a serious lack of utilization of such technologies, especially in developing countries. This may be due to the lack of adequate training, resources and technical infrastructure. Therefore, future research should focus on addressing these gaps and develop strategies on how GIS can be applied more broadly in tourism planning.

It is also important to focus on regions where the integration of tourism planning and GIS has not been implemented or is under-researched. Particularly in Africa, Central Asia, and some European and Asian regions, research in this area needs to be increased. Identifying potential benefits in these regions and conducting strategic research on how GIS technologies can be integrated into tourism planning can contribute to addressing the gaps. In order to use GIS effectively in tourism planning, individuals specialized in this field should be trained. Universities, professional organizations, and governments should develop training programs on using GIS technologies in tourism planning and management and should focus on capacity-building activities in this field.

The technical infrastructure required for the widespread use of GIS in tourism planning needs to be developed. The lack of technical infrastructure in developing countries prevents the effective use of GIS.

Therefore, creating the necessary infrastructure in these countries and increasing investments can contribute to the widespread use of GIS in tourism planning. In order for GIS to find a wider usage area in tourism planning, international cooperation, and information sharing should be increased. In particular, knowledge transfer and technology sharing between leading countries and developing countries in this field can contribute to the wider use of GIS in the tourism sector. This study provides an important roadmap for future research by identifying current research gaps in tourism planning and GIS integration. Future research can focus on addressing these gaps and investigate how GIS technologies can be used more effectively in tourism planning. In addition, this study can guide the development of policies for the widespread use of GIS in the tourism sector and academic research in this field.

In conclusion, the findings and recommendations of this study provide important contributions to the academic literature and practical applications on tourism planning and GIS integration and shed light on future research in this field.

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Appendix

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