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Review

Tourism Forecasting of "Unpredictable" Future Shocks: A Literature Review by the PRISMA Model

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Abstract: This study delves into the intricate process of predicting tourism demand, explicitly focusing on econometric and quantitative time series analysis. A meticulous review of the existing literature is carried out to comprehensively understand the various methods for forecasting "unpredictable" shocks of tourism demand on an ex-ante basis. The PRISMA method has been implemented. Drawing on scholarly research, this study pinpoints the critical challenges in accurately predicting tourism demand, making it a valuable resource for tourism professionals and researchers seeking to stay on top of the latest forecasting techniques. Moreover, the study includes an overview of published manuscripts from the current decade, with mixed results from the 32 manuscripts reviewed. The study concludes that virtual tourism, augmented reality, virtual reality, big data, and artificial intelligence all have the potential to enhance demand forecasting in time series econometrics.

Keywords: economic methods; PRISMA; time series; proactive tourism demand

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1. Introduction

Planning a vacation can be an exciting but also overwhelming experience. One crucial aspect to consider is the demand for tourism in the desired destination. The utilization of economic, econometric, and time series analysis has the potential to provide significant contributions in predicting tourism demand amidst present unforeseen disruptions, thus facilitating informed travel arrangements that take into account the current situation (Zhang et al. 2022). Are we facing the new normal, as a metaphor? (Rowen 2020). A significant historical overview can offer a means for econometricians to use trends and cycles in econometric modeling for ex-ante predictions, without overlooking obstacles, minimums and maximums.

So, we can say that previous data offer us a comparison of past events and future well-being, and could be modeled in an econometric time series environment, as proposed by Gričar et al. (2021). By implementing systematic time series modeling, we can isolate unpredictable events from past events, which allows for present and future shocks to be predicted, e.g.,

$$Y_{t-1}|Y_0|Y_{t+1}, \quad (1)$$

where Y is an event, t is time, -1 is past, 0 is present and $+1$ is future. Past observations play a critical role in accurately predicting future events, and time series data are a valuable tool in this process. Supporting evidence from relevant sources or past incidents can confirm our predictions. However, we have concerns about time series forecasting, as it is often reactive rather than proactive. In this review, we focus on tourism demand forecasting and the various factors that influence it. By utilizing the correct variables and methodologies, tourism can prepare for unforeseeable events. Experience, knowledge, and intuition are essential in achieving this. Additionally, it is crucial to think outside the box and explore unconventional tools like AI. This review concludes with important implications for managers. The new tourism economy, e.g., freelancers and Non-Fungible

Tokens (NFTs), are essential, adding determinants to be used in tourism demand and forecasting (Umar et al. 2021).

Tourism has emerged as a dynamic and multifaceted industry that significantly contributes to the economy. The tourism sector has witnessed remarkable growth in recent years, accompanied by an increasing demand for accurate forecasting techniques to aid in strategic planning and resource allocation (Frechtling 2012). This study is motivated by the desire to consolidate and synthesize the most recent research articles that delve into the intersection of time series econometrics and tourism economics, explicitly focusing on forecasting issues. Time series analysis is particularly promising in this context, as it leverages historical data to project future trends, aligning with the notion that the past holds valuable insights for predicting the future (De Choudhury et al. 2013; Zeng and Khan 2019).

The primary objective of this research is to conduct a comprehensive review of the most recent scholarly works that address the challenges and advancements in tourism demand forecasting, particularly in the European context. To achieve this goal, we have undertaken an extensive search of academic manuscripts using keywords such as "time series", "tourism economics", and "tourism demand" in conjunction with the geographical filter "Europe". While numerous authors have explored the topic of tourism demand forecasting, a notable gap in the literature pertains to recent research efforts that challenge traditional assumptions about the predictability of long-term tourism demand. Additionally, there appears to be a lack of contemporary investigations into the applicability of stochastic models in light of the evolving dynamics in the tourism sector.

In the subsequent sections of this paper, we will delve into the details of our literature review, summarizing the key findings from recent studies, identifying gaps in the existing body of knowledge, and shedding light on emerging trends in the field of tourism demand forecasting. The subsequent objective is to provide valuable insights to those in the tourism industry and academia by analyzing and synthesizing the literature. We aim to offer a nuanced comprehension of the current challenges and opportunities in anticipating tourism demand, not only for the expected future but for unforeseeable events as well. This research endeavors to investigate how managers and researchers handle such situations. Though time series analysis is frequently used, predicting unexpected shocks is still challenging. Consequently, various skills are necessary, including expertize in selecting variables, comprehensive and specialized knowledge, intuition, a thorough understanding of the field, and the utilization of AI. Ultimately, our research seeks to enhance the accuracy and effectiveness of tourism forecasting methods, aligning them with the evolving dynamics of this critical sector.

The paper is structured as follows: First is a detailed explanation of the research methodology, including the selection criteria for relevant articles. Next, the third section presents the systematic review process and critical trends discovered from recent research on time series econometrics and tourism demand forecasting. The fourth section examines these results critically, offering interpretations and contextualization. Lastly, the Conclusion summarizes the main takeaways from the study, highlighting its contribution to the field, suggesting future research directions in tourism demand forecasting and considering the implications of the findings.

2. Materials and Methods

As previously noted, there is a shortage of current research on time series data in the tourism industry and forecasting (Onder and Wei 2022; Chen et al. 2019; Wu et al. 2023), particularly in Europe (Song et al. 2019; Bufalo and Orlando 2023). As such, this study plays a crucial role in offering an overview of the importance of tourism demand (Archer 1980) and how it can be effectively managed during times of recession or unforeseen shocks (Li et al. 2023) with an option of inclusive artificial intelligence models (Li et al. 2024).

Managers, policies, and tourists must understand the significance of predicting demand before times of uncertainty. This can bring in revenue and benefit all parties involved. Considering how many researchers have informed stakeholders about approaching pan-

demics, high inflation rates, recessions, and wars is essential. These situations must be analyzed and predicted beforehand, not after the fact (Gričar and Bojnec 2022), as is commonly found in the tourism literature, which is surprising (Gössling et al. 2021). The main research question in the present study is: When predicting tourism demand, what insights can be gained from analyzing time series data? For instance, it can help forecast a rise in virus infections beforehand (Gricar 2020) or an unprecedented shock evident a year prior (Zrinić Terlević 2021). Overall, understanding how scholars approach this issue is critical and will be analyzed using a systematic literature review in this study.

Conducting a comprehensive meta-analysis of tourism demand and forecasting every decade is customary. This practice has been established by experts such as Witt and Witt (1995), Song and Li (2008) and Peng et al. (2014). To assemble a robust dataset for the meta-analysis, we conducted an exhaustive search across the academic database Google Scholar. The investigation was guided by specific keywords, including "time series", "tourism economics", and "tourism demand" in conjunction with the geographical filter "Europe". Upon conducting the initial search, a significant amount of articles were found.

A systematic data extraction process was carried out for each included study using a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram. We extracted pertinent information, including the publication year, sample size, forecasting models employed, key findings, and location in Europe. This meticulous data extraction process allowed us to compile a comprehensive dataset for subsequent analysis. We established a set of inclusion and exclusion criteria to ensure the relevance and quality of the studies included in the meta-analysis. Only articles published in peer-reviewed journals and written in English were considered. Additionally, studies were included if they focused on time series forecasting techniques in the context of tourism demand, with a specific geographical focus on European destinations.

By employing this rigorous data collection and analysis approach, our meta-analysis aims to provide a comprehensive overview of the state of the art in time series forecasting for tourism demand within the European context. The results are presented in systematic tables. Overall, the investigation employs the widely recognized PRISMA method, meta-analysis, and ABC framework to systematically align the working sheet with the research objectives, and effectively address the research question. To effectively complete this task, the following steps should be taken:

1. Gain an understanding of how to properly manage tourism data;
2. Identify the type of information contained within the data and what insights can be gleaned from them;
3. Address recent unforeseen events that were deemed unpredictable and were documented in reputable scientific journals as such;
4. Use the data to derive explanations for some of these occurrences. For this, it is imperative to review a plethora of articles that have attempted to analyze time series data but failed to adequately predict future unforeseen events;
5. Conduct a literature review with this objective in mind, utilizing the Google Scholar site and confirmed by the Scopus database to assess the quality of the journals;
6. Present the findings of the review in tables for clarity, and thoroughly discuss implications. Overall, ex-ante forecasting is crucial in tourism, weather, and sciences, requiring appropriate methodology and data.

3. Results

This section explores the depths of knowledge on the subject of tourism demand in Europe through a thorough examination of the literature since the 2020s, utilizing pertinent search terms such as "tourism economics", "time series", and "tourism demand". This section delves into the outcomes of our systematic review and meta-analysis on tourism demand forecasting methods. The comprehensive examination of 68 key research papers from 2020 to 2024 comprised our literature review. To provide a clear and organized presentation of our results, we have employed several analytical tools and visual aids.

Firstly, we present the PRISMA diagram, offering a graphical representation of the study selection process, from the initial identification to the final inclusion of relevant papers. This diagram provides transparency and insight into our rigorous review methodology.

The study presents the findings in an organized and convenient manner. Tables are organized in a way that categorizes and organizes the results, making it easy for readers to explore the critical patterns, trends, and insights from the literature selected. The introduced categories and codes act as a structured framework to interpret the data systematically. These tools and organizational strategies enable a comprehensive understanding of the various dimensions of tourism demand forecasting methods and their evolution over time. The research findings are therefore presented clearly and concisely, synthesizing and interpreting the information gathered through this extensive review process.

3.1. PRISMA Diagram

The systematic review covered a vast amount of the academic literature, consisting of 5120 articles published until 2024, as shown in Figure 1 (the PRISMA diagram). The observation shows a surge in scholarly activity in recent years, with 1900 articles emerging between 2020 and 2024, indicating a growing interest in tourism demand forecasting. However, we ensured the integrity and efficiency of our analysis by implementing a meticulous screening process. In total, 3220 articles were excluded that had already been scrutinized in a seminal study by Sond et al. in 2019, and 1822 that had not undergone rigorous peer-review. This quality control mechanism narrowed our selection to a final cohort of 78 articles that formed the basis of our analysis, as presented in Figure 1.

Furthermore, ten literature records were excluded due to not concerning Europe. These 68 articles represent the culmination of our screening process and helped us uncover valuable insights, patterns, and trends that illuminate the evolution of tourism demand forecasting methods over time. Nevertheless, 29 articles have been observed and commented on in the paper at the end. Additionally, two studies were added to the fourth section and one newspaper article in the previous section. Overall, 32 relevant documents are included in the literature review matrix.

3.2. Screening Results

Google Scholar's website offers a concise overview of the processed research. Through an automated process, manuscripts that did not meet the predefined eligibility criteria based on specific keywords are meticulously filtered out. The resulting presentation in Table 1 is a concise compilation of articles that align with our research objectives, which are thoughtfully organized and sorted to prioritize for relevance.

In the comprehensive exploration of tourism demand forecasting and its evolution over time, many studies have contributed valuable insights and trends. Krajňák (2021) conducted a systematic review of the effects of terrorism on tourism demand, revealing that, with some exceptions, terrorism typically negatively impacts tourism demand. Abdou et al. (2021) analyzed 145 papers from 1979 to 2020, finding that forecasting models have diversified, merged, and improved accuracy with the emergence of AI and hybrid models in recent years. Rossello Nadal and Santana Gallego (2022) discussed the revival of gravity models in tourism demand modeling, highlighting GDP, population, and distance as crucial determinants of tourist flows. Song et al. (2023) conducted an evaluative survey of current tourism demand studies, identifying potential flaws and emerging research areas.

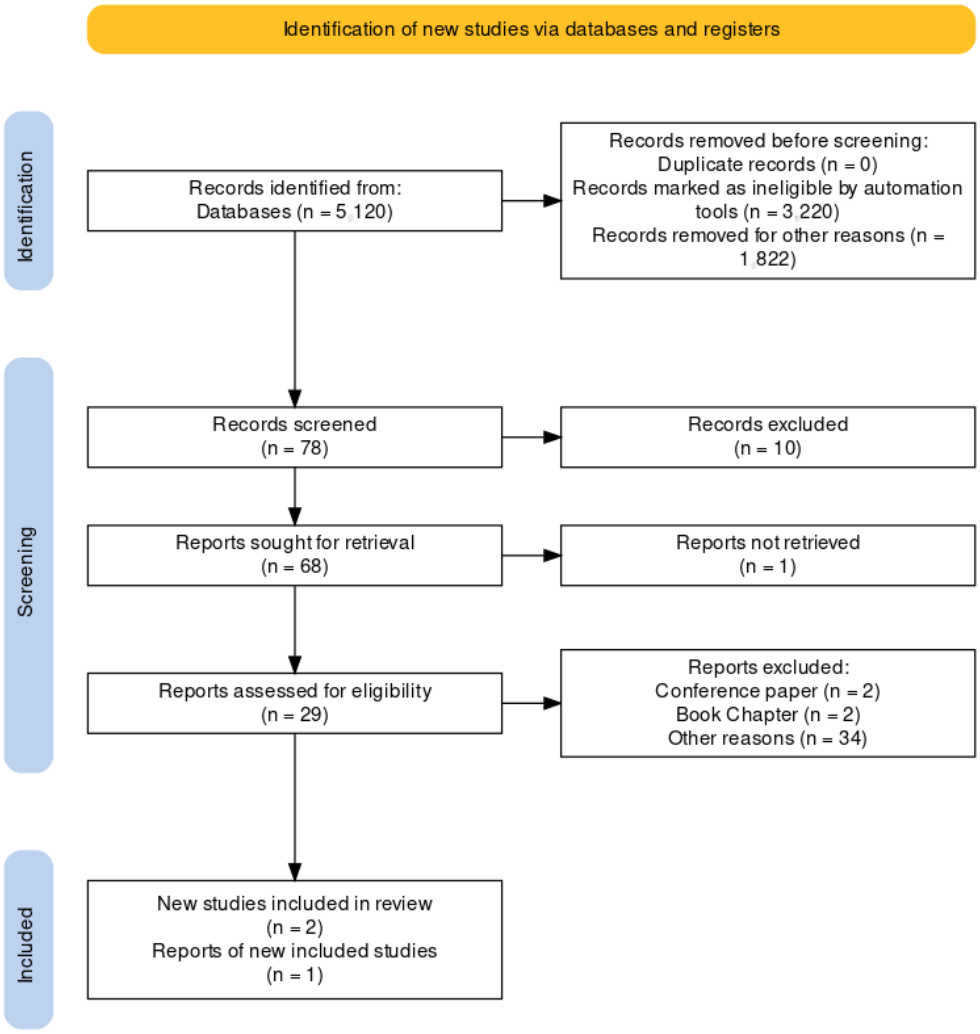

Figure 1. PRISMA diagram. Source: Authors' compilation using software designed by Haddaway et al. (2022).

Ahmad et al. (2020) conducted a citation-based systematic literature review on the tourism–growth nexus, identifying influential journals, authors, and articles, while Li et al. (2021) examined the use of internet data in tourism forecasting, revealing the dominance of time series and econometric models. Eusébio et al. (2021) conducted a systematic review of the impact of air quality on tourism demand, emphasizing the need for further empirical applications. Calero and Turner (2020) explored the role of tourism in regional development, tracing the evolution of regional tourism research. Gričar et al. (2021) employed econometric forecasting to predict shocks affecting international tourist arrivals, while Li and Jiao (2020) offered a general overview of the tourism forecasting literature and future trends. Finally, Liu et al. (2022b) conducted a systematic literature review on tourism's economic impact, emphasizing the need for cutting-edge economic methods and data in assessing its financial contributions. These studies collectively contribute to a richer understanding of tourism demand forecasting and its multifaceted dimensions, offering valuable insights and paving the way for future research in this evolving field.

Our approach aligns with the systematic review in its research methodology, explicitly employing the meta-analysis technique. Within the systematic review methodology, we first classify the articles under the A category of the PRISMA method. We have meticulously synthesized a wealth of the literature through periodic reviews and meta-analyses to provide a comprehensive and well-informed analysis. The next step, shown in Table 2, is the forecasting of the evolution of tourism demand.

Table 1. Tabular display of results that dealt with meta-analysis.

Author(s)	Data	Title	SNIP
Krajňák (2021)	45	The effects of terrorism on tourism demand: A systematic review	1.758
Abdou et al. (2021)	145	Tourism demand modelling and forecasting: A review of literature	0.375
Rossello Nadal and Santana Gallego (2022)	143	Gravity models for tourism demand modelling: Empirical review and outlook	3.267
Ahmad et al. (2020)	100	Systematic literature review of tourism growth nexus: An overview of the literature and a content analysis of 100 most influential papers	3.267
Li et al. (2021)	several	Review of tourism forecasting research with internet data	3.643
Eusébio et al. (2021)	26	The impact of air quality on tourism: a systematic literature review	0.634
Calero and Turner (2020)	several	Regional economic development and tourism: A literature review to highlight future directions for regional tourism research	1.758
Gricar et al. (2022)	1	Insight into Predicted Shocks in Tourism: Review of an Ex-Ante Forecasting	0.476
Li and Jiao (2020)	several	Tourism forecasting research: a perspective article	2.130
Liu et al. (2022b)	several	Toward an accurate assessment of tourism economic impact: A systematic literature review	0.857

Notes: SNIP—Source Normalized Impact per Paper for 2022 (Scopus 2023).

Table 2. Tabular display of results that dealt with methods.

Author(s)	Methodology	Title	SNIP
Cao (2022)	Vector autoregressive models	Econometric modelling and forecasting of tourism demand	
Al Jassim et al. (2022)	Data sources	A review of the methods and techniques used in tourism demand forecasting	
Dowlut and Gobin-Rahimbux (2023)	Deep learning techniques	Forecasting resort hotel tourism demand using deep learning techniques–A systematic literature review	1.332
Wickramasinghe and Naranpanawa (2022)	Computable general equilibrium	Systematic literature review on computable general equilibrium applications in tourism	1.758
Mulet-Forteza et al. (2021)	Intellectuality of European institutions	Research progress in tourism, leisure and hospitality in Europe (1969–2018)	
Hu et al. (2022)	Surveys	Emerging Research Trends on Residents' Quality of Life in the Context of Tourism Development	1.531
Liu et al. (2022c)	Mixed-frequency models	Ex ante tourism forecasting assessment	3.062
Verma et al. (2022)	Quantitative (science mapping) and qualitative (intellectual structure mapping)	Past, present, and future of virtual tourism-a literature review	3.087
Papavasileiou and Tzouvanas (2021)	Kuznets-curve	Tourism carbon Kuznets-curve hypothesis: A systematic literature review and a paradigm shift to a corporation-performance perspective	3.062
Zhang (2022)	Econometrics	A meta-analysis of econometrics studies of tourism and low-carbon development	2.312

Notes: SNIP—Source Normalized Impact per Paper for 2022 (Scopus 2023).

The second part of the review, encompassing a diverse set of studies utilizing methods akin to the ABC framework from the field of management focused on systematically reviewing tourism models designed to predict future events based on Equation (1).

Cao (2022) thoroughly examined vector autoregressive (VAR) models and their applications in tourism demand research, showcasing the versatility of VAR models in capturing interrelationships between tourism and economic variables. Al Jassim et al. (2022) assessed studies on forecasting tourism demand, emphasizing the importance of integrating diverse data sources and inspiring future research. Dowlut and Gobin-Rahimbux (2023) explored deep learning techniques for occupancy rate prediction in the hospitality industry, highlighting the adoption of Long Short-Term Memory (LSTM) models and underscoring the significance of hybrid models for enhanced accuracy. Wickramasinghe and Naranpanawa (2022) provided a systematic quantitative review of computable general equilibrium (CGE) applications in tourism, emphasizing the importance of addressing research gaps, especially in poverty, inequality, gender, and environmental impacts.

Additionally, Mulet-Forteza et al. (2021) presented a bibliometric overview of tourism, leisure, and hospitality articles, identifying publication trends and offering insights for future research. Hu et al. (2022) conducted a systematic review of residents' quality of life concerning tourism development, revealing patterns and suggesting future directions for research. Liu et al. (2022c) conducted a comprehensive study of mixed-frequency models for tourism forecasting, showcasing their effectiveness in improving accuracy and reducing forecast failure risk. Verma et al. (2022) bridged the knowledge gap by reviewing the integration of virtual and augmented reality in tourism, highlighting the transformation of the virtual tourism experience. Papavasileiou and Tzouvanas (2021) debated the carbon Kuznets curve hypothesis, conducting a systematic literature review on the role of tourism and introducing a novel tourism corporate/performance orientation to the thesis. Zhang (2022) employed meta-analysis to examine the effects of tourist arrivals and tourism receipts on carbon emissions and energy use, shedding light on their significant positive impacts and moderators. These studies collectively contribute to a deeper understanding of tourism forecasting models and their applications, providing insights for future research and policy development.

In the third segment of the review (Table 3), denoted as part C, the focus shifted to systematically examining the intersection of tourism with artificial intelligence (AI), economic growth and/or CO_2 emissions.

Binesh et al. (2021) conducted a comprehensive meta-analysis of hotel revenue management literature, identifying key themes, methodological approaches, and geographical trends while highlighting research gaps and avenues for future investigation. Bhuiyan et al. (2021) delved into the multifaceted consequences of disasters and pandemics, notably COVID-19, on tourism, economies, and mitigation strategies, synthesizing a wealth of research findings and providing directions for future exploration. Sun et al. (2022) scrutinized the tourism–carbon emissions nexus by reviewing environmental Kuznets curve studies, revealing conflicting results across regions and emphasizing the need for a refined understanding of the mechanisms involved.

Moreover, Steiger et al. (2022) systematically analyzed climate change's impacts on mountain tourism, identifying knowledge gaps, geographical biases, and areas requiring further research for effective climate adaptation strategies. García-Madurga and Grilló-Méndez (2023) comprehensively synthesized the existing literature on AI in tourism, highlighting key themes, strengths, limitations, and emerging research areas within this context, providing valuable insights for practitioners and academics. Han and Bai (2022) explored the evolving landscape of pricing research in marketing, hospitality, and tourism, employing sophisticated bibliometric analyses to identify trends and suggest potential research directions. Leal et al. (2020) addressed the transparency and sustainability issues in online tourism crowdsourcing platforms, proposing an accountable and responsible processing pipeline for data streams that can enhance sustainable tourism practices. Kong et al. (2023) reviewed AI research in the hospitality and tourism industry, tracing its growth

over the years, categorizing research clusters, and revealing shifts in research focus, thus serving as a valuable resource for future investigations.

Table 3. Tabular display of results that dealt with AI and economic or CO_2 growth.

Author(s)	Data/Methodology	Title	SNIP
Binesh et al. (2021)	Meta-analysis: 76	A meta-analysis of hotel revenue management	0.794
Bhuiyan et al. (2021)	Meta-analysis: 100	A review of research on tourism industry, economic crisis and mitigation process of the loss: analysis on pre, during and post pandemic situation	1.198
Sun et al. (2022)	Environmental Kuznets Curve studies: 81	Does tourism increase or decrease carbon emissions? A systematic review	2.742
Steiger et al. (2022)	Meta-analysis: 276	Impacts of climate change on mountain tourism: a review	3.148
García-Madurga and Grilló-Méndez (2023)	AI in tourism	Artificial intelligence in the tourism industry: an overview of reviews	1.018
Han and Bai (2022)	Marketing	Pricing research in hospitality and tourism and marketing literature: a systematic review and research agenda	2.074
Leal et al. (2020)	ARIMA, neural networks and hybrid models in time series	Responsible processing of crowdsourced tourism data	3.148
Kong et al. (2023)	Meta-analysis: 491	30 years of artificial intelligence (AI) research relating to the hospitality and tourism industry	2.074
Buturac (2021)	Mixed data and methodology	Measurement of economic forecast accuracy: A systematic overview of the empirical literature	0.476

Notes: SNIP—Source Normalized Impact per Paper for 2022 (Scopus 2023).

Finally, Buturac (2021) conducted a systematic literature review of measures of economic forecast accuracy, offering insights into methodological developments, limitations, and the potential for future advancements in assessing economic forecast accuracy. These studies provide valuable insights into the relationship between AI, tourism, and financial or environmental factors. They offer guidance for future research in tourism forecasting and combined econometric time series models.

Our comprehensive analysis in Tables 1–3 encompasses 29 articles strongly correlating with the primary keywords, particularly forecasting. Papers that did not meet our criteria, such as book chapters or conference papers not indexed in substantial databases aside from Google Scholar, or those that did not concentrate on the European context, were appropriately excluded. Table 4 categorizes included articles, with Category A being the most pertinent to our research field and Category C being the least relevant.

Table 4. Development of codes by categories.

Category	Code	Authors
A	Meta-analysis	Listed in Table 1
B	Forecasting methods	Listed in Table 2
C	AI and growth	Listed in Table 3

In total, Google Scholar provided us with 68 manuscripts. After careful consideration, we have narrowed our list to 29 articles relevant to our research on tourism demand forecasting. During this step, researchers incorporate time series econometrics within the context of their modeling. This is done to improve the accuracy of the model and ensure that it accounts for changes over time.

4. Discussion

The selected 29 articles obtained through Google Scholar represent a valuable foundation for studying tourism demand forecasting in the European context using time series econometrics. These articles encompass a diverse range of methodologies, approaches, and findings, offering a comprehensive overview of the research landscape in this domain. The decision to focus specifically on European tourism demand forecasting is noteworthy, as it aligns with the European continent's unique economic and environmental dynamics.

One key observation derived from the literature review is the evolution and diversification of forecasting methods employed in tourism demand studies. While time series econometrics remains a prominent approach, there is evidence of its integration with other techniques, such as AI and machine learning models (Essien and Chukwukelu 2022). This reflects the growing complexity of tourism demand dynamics and the need for more accurate and adaptable forecasting tools. The combination of various methodologies signals a broader shift toward a holistic and multidisciplinary approach in accurately addressing the challenges of predicting tourism demand.

Another notable finding relates to the variability in results and conclusions across the reviewed articles. Tourism demand forecasting is inherently sensitive to numerous factors, including economic conditions, political events, and environmental changes. Consequently, the context-specific nature of these forecasts has led to outcome variations. This variability underscores the importance of considering regional nuances and employing localized models to enhance the accuracy of predictions, especially within the diverse European landscape. Noting the previous in predicting future shock(s) is essential in time series analysis regarding stochastic linearities (Claveria and Torra 2014; Dong et al. 2023).

Furthermore, categorizing articles, with Category A representing the most relevant and Category C the least prominent, provides a clear hierarchy of the literature's alignment with the research objectives. This categorization streamlines the selection process and highlights the research gaps and areas that warrant further investigation. Focusing on Category A articles closely aligned with the core research objectives, this study aims to contribute to a refined understanding of European tourism demand forecasting and foster the development of more effective forecasting models tailored to the region's specific dynamics (Zekan et al. 2022). There appears to be a shortage of scholarly forecasts regarding the future of tourism. Additionally, very few studies on ex-ante prediction seem to exist (Liu et al. 2022a). This may be attributed to a lack of enthusiasm on the part of academic journals or a scarcity of experts in forecasting and time series analysis, which can be rather demanding when utilizing econometric techniques accompanied by machine learning (Pérez-Pons et al. 2022).

5. Conclusions

This comprehensive review examined a vast body of the academic literature, including 5120 articles published before September 2023. The analysis revealed a significant increase in scholarly activity from 2020 to 2024, indicating a growing interest in predicting tourism demand. After a thorough screening process, 3220 articles previously analyzed in seminal studies and 1822 articles lacking rigorous peer review were excluded, resulting in a final cohort of 78 papers at the core of our analysis. Additionally, ten literature records were excluded for not being about Europe. These 68 articles, representing the culmination of our screening process, provided valuable insights into the evolving landscape of tourism demand forecasting methods. Moreover, this paper has discussed 29 additional articles, including two studies in the fourth section, and cited one newspaper article. Drawing from 32 relevant documents, this comprehensive review sheds light on key trends and developments in tourism demand forecasting. Overall, after analyzing 29 relevant articles in the renowned Scopus database and 3 additional articles to support section four, this study concludes that ex-ante forecasting is of paramount importance.

In conclusion, this comprehensive review of 29 articles selected from Google Scholar and shown in the third section has shed light on the multifaceted landscape of tourism de-

mand forecasting, mainly focusing on time series econometrics within the European context. The articles examined in this study provide a valuable knowledge repository, reflecting the ongoing evolution of methodologies and approaches in tourism demand forecasting.

One central observation derived from this review is the increasing diversification of forecasting methods, which have evolved to accommodate the intricate and dynamic nature of tourism demand. While time series econometrics remains a fundamental tool, integrating artificial intelligence and machine learning models highlights the industry's readiness to embrace more sophisticated forecasting techniques.

The variability in outcomes and conclusions across the reviewed articles underscores the contextual sensitivity of tourism demand forecasting. Economic, political, and environmental factors play pivotal roles in shaping tourism trends, meaning forecasters need to consider local nuances and adapt their models accordingly. This diversity of outcomes emphasizes the need for region-specific models and data sources to enhance forecasting precision in the European tourism stochastic linearity sector.

The categorization of articles based on relevance, with Category A representing the most pertinent contributions, offers a practical framework for future research endeavors. By focusing on Category A articles, researchers can expedite their exploration of foundational concepts and theories while identifying knowledge gaps and potential avenues for further investigation. This categorization system is a valuable resource for scholars seeking to navigate the extensive literature on forecasting tourism demand.

In sum, this review provides insights into the current state of tourism demand forecasting, and highlights its continuous evolution and adaptation to contemporary challenges.

5.1. Policy and Managerial Implications

For policymakers, these findings underscore the significance of leveraging time series econometrics, coupled with AI and machine learning techniques, as essential tools for informed decision-making. The ability to anticipate fluctuations in tourism demand allows policymakers to craft targeted strategies that optimize resource allocation, enhance destination management, and stimulate economic growth.

Similarly, managers within the tourism industry can harness the predictive power of time series econometrics to optimize their operations. By leveraging these methodologies, they can prepare them for any obstacles, e.g., shocks. This enables managers to adapt swiftly to changing market conditions, improve customer experiences, and maintain competitiveness in the dynamic tourism landscape. The recommendation for managers is straightforward: relying solely on raw data is not advisable, as many may not feel comfortable with mathematical or statistical concepts. Instead, it is suggested that managers acquire the necessary skills to interpret quantitative data accurately, enabling better decision-making. While experience and intuition are valuable assets, they may not be sufficient, as numbers can offer predictive insights into the future. To anticipate a company's short-, medium-, and long-term strategies, a hybrid model combining time series data and AI would be an invaluable tool. This model can predict almost all foreseeable events in strategic documents and support them. By allowing data to speak for themselves, the past can guide the present, and the present can forecast future outcomes. Managers have access to a wealth of unique data, which they can use to make predictions with proper methodologies. For instance, they can use data to forecast total revenues for the next year or years, optimize process costs, and more. In competitive markets, successful organizations will thrive by making accurate predictions, such as estimating higher or lower demand and predicting prices for the next season, accompanied by optimized costs. Tourists can also benefit indirectly from utilizing time series econometrics and predictive modeling in the industry for an "unpredictable" future (Equation (1)). Accurate forecasting helps destinations provide tailored experiences, anticipate peak visitation periods, and manage resources more efficiently, ultimately enhancing the overall tourist experience.

In conclusion, the fusion of AI, machine learning, and time series econometrics has emerged as a reliable and robust approach to forecasting European tourism demand. This

methodology furnishes policymakers, managers, and travelers with valuable insights to facilitate prudent decision-making, promote sustainable growth, and elevate the overall quality of the tourism industry (Doborjeh et al. 2022; Sharma et al. 2022).

5.2. Limitations and Delimitations

The limitations of this study primarily revolve around the scope and methodology employed. Firstly, while a comprehensive effort was made to select relevant articles and publications related to tourism demand forecasting using time series econometrics, the study may still be subject to potential publication bias, as specific relevant articles may not have been included in the analysis.

Secondly, the focus on Europe as a delimited context for the study, while allowing for a more in-depth examination of this region, may limit the generalizability of the findings to other global contexts.

Lastly, the study's analysis was predominantly quantitative, focusing on the frequency of keywords and themes within the selected articles. While this approach provided valuable insights into research trends, it did not delve deeply into the qualitative aspects of the articles.

Despite these limitations, the study's delimitations, such as the focus on European contexts, were essential in narrowing the scope to provide a more detailed and region-specific examination of tourism demand forecasting using time series econometrics.

5.3. Proposals for Future Research

For future research, exploring alternative techniques to retrieve articles and keywords beyond the PRISMA model could be a valuable avenue. Utilizing advanced text mining, natural language processing, or machine learning algorithms to extract relevant articles and keywords could enhance the comprehensiveness of the literature review. Investigating emerging databases and sources beyond traditional academic repositories might provide a broader perspective. These alternative approaches could offer new insights, and contribute a more comprehensive understanding of tourism demand forecasting, especially when combined with existing methodologies.

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