The Tourism Industry Amid Global Crises: Exploring the Role of Sustainability and Innovation

LUQI YANG

UNIVERSITAT ROVIRA i VIRGILI

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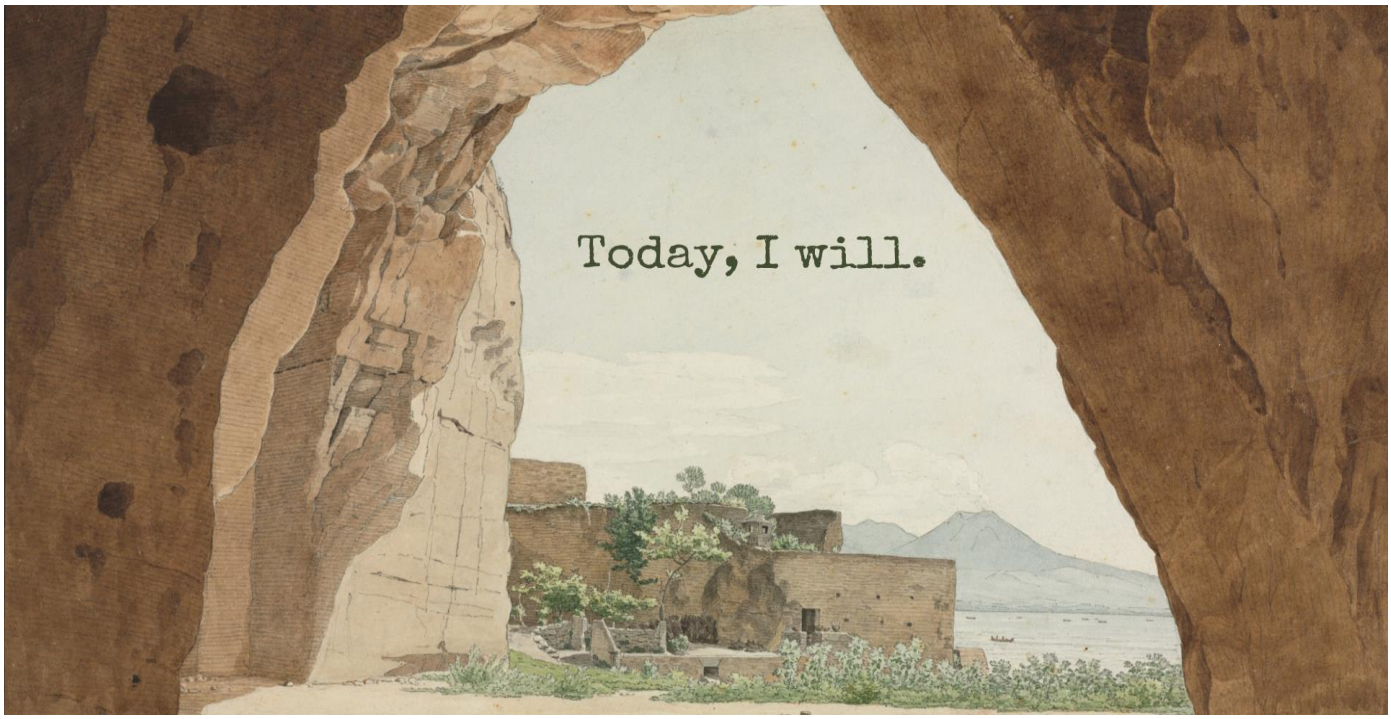

DOCTORAL THESIS
2024

DOCTORAL THESIS

The Tourism Industry Amid Global Crises: Exploring the Role of Sustainability and Innovation

Luqi Yang

Ph.D. Program in Tourism and Leisure

Department of Business Management

Faculty of Tourism and Geography

Universitat Rovira i Virgili

Supervised by

Dr. Ana Beatriz Hernández-Lara

Dr. Xiaoni Li

UNIVERSITAT
ROVIRA i VIRGILI

Department of Business Management

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UNIVERSITAT ROVIRA i VIRGILI

FAIG CONSTAR que aquest treball, titulat "La Indústria Turística enmig de les Crisis Globals: Explorant el Paper de la Sostenibilitat i la Innovació", que presenta Luqi Yang per a l'obtenció del títol de Doctor, ha estat realitzat sota la nostra direcció al Departament de Gestió d'Empreses d'aquesta universitat.

HAGO CONSTAR que el presente trabajo, titulado "La Industria del Turismo en medio de Crisis Globales: Explorando el Papel de la Sostenibilidad y la Innovación", que presenta Luqi Yang para la obtención del título de Doctor, ha sido realizado bajo nuestra dirección en el Departamento de Gestión de Empresas de esta universidad.

I STATE that the present study, entitled "The Tourism Industry Amid Global Crises: Exploring the Role of Sustainability and Innovation", presented by Luqi Yang for obtaining the degree of Doctor, has been carried out under our supervision at the Department of Business Management of this university.

Vila-seca, July 15th 2024

Doctoral Thesis Supervisor/s

Ana Beatriz Hernandez Lara - DNI 31863206H (TCAT)
Firmado digitalmente por Ana Beatriz Hernandez Lara - DNI 31863206H (TCAT)
Fecha: 2024.07.16 17:09:19 +02'00'

Ana Beatriz Hernández-Lara

Xiaoni Li - DNI X7417214J (TCAT)
Firmado digitalmente por Xiaoni Li - DNI X7417214J (TCAT)
Fecha: 2024.07.17 04:24:35 +02'00'

Xiaoni Li

Preface

Ever since I was a child, my mother advised me to read every book, or magazine or manga, or whatever I like – in knowing the world, in understanding what happened, in accumulating different ideas, and finding the small world that I am really interested and enthusiastic in.

This habit lasted before I was enrolled to a local high school, the accumulation of curiosity became several keywords in my mind – “romance”, “love”, “enjoy”, “learning”, and also many other good words, that would motivate me to grow up as an independent and optimistic person.

After high school, I got the entrance to a quite famous university in China, chose my favorite area – Business English, and studied in the university of over 2500 kilometers far away from my hometown in 2014. I was able to learn English, communicate with foreigners, learn about their cultures, habits and formal negotiations in a systematic way, which played a fundamental role for me to open my eyes to the outside world and my educational experiences in Spain.

After I obtained my bachelor’s degree in 2018, I was lucky to be involved in a local Spanish language school– to meet new friends there, to enjoy the real life in Spain and to test what I have learned from books – to make it either true, or shocked my stereotype, or encourage me to accept a new interesting world.

After learning Spanish in Salamanca for nine months, I was admitted to the *University of Barcelona, CETT, School of Tourism, Hospitality and Gastronomy* and studied the major of hotel management in the year of 2019 to 2020. Not like my old thinking that we are just to serve the customers, we are also able to contribute to ourselves in attending design projects, in communicating with superior and experienced managers, in learning about the whole procedure in how to make a budget, to control the quality and quantity, and what’s most important – to make everyone feel happy. I saw one of my professors, a past top manager from a five-star hotel, sit with her old friend and subordinate in the canteen and talked freely and happily about daily life. That was when I thought that this industry is interesting and equal to everyone – whoever a new starter, a student, a staff or a top executive.

In the summer of 2020, I could be enrolled as a member of the doctoral tourism and leisure program and meet the ever-best supervisors Ana Beatriz Hernández-Lara and Xiaoni Li there for a whole period of my four years of studies– to devote to the tourism research and would also, I am for sure, would be the start of my professional life to go on this path in the future.

The thesis is the result of my six years studying experience in Spain and the conjoint efforts from all my beloved professors, the university, my parents and my intimates.

I would really appreciate it if you liked it.

Acknowledgements

This doctoral thesis would not have been possible and fulfilled without the sufficient endeavors and supports of several individuals who in one way and another contributed their valuable time and efforts in the improvement and completion of this research. It is my great pleasure to express my thankfulness to all of them.

First and foremost, I would like to express my sincere gratitude to my supervisors, Ana Beatriz Hernández-Lara and Xiaoni Li. I am indebted to my supervisor Ana, who has guided and fully supported me through all the stages of my doctoral studies, in providing patient instructions, suggestions and help me with all the article submission and publication procedures, participating relevant seminars, courses, and obtaining the opportunity for a research visit in Rome. She has spent countless hours efforts on supporting my studies and thanks a million for all your efforts.

I would also like to thank Xiaoni Li, who has completely supported my research and has provided vital guidance to my personal life in solving my dilemmas. I am so appreciative for her devotion to spare precious time in instructing me in improving all the manuscripts before publications and preparing the final thesis. Both of them trusted me from the first time I was enrolled into the PhD program and gave positive responses and solutions to all my questions and confusions at any time. I feel so lucky to have my ever-best supervisors like them and I will cherish this experience for my whole life.

Secondly, I would like to acknowledge my professors and colleagues, from the University of Rome, Tor Vergata - when I was on an academic visit to this university. Thanks to their hospitality, heartiness and full support, I enjoyed a pleasurable studying time there, meeting new friends and attending many interesting seminars. Thanks so much for all your help in guiding and improving my research as well as providing useful guidance for my study in Rome.

Thirdly, I would like to thank my family - my parents and my grandparents, who have devoted all their patience, encouragement, financial and emotional assistance to me through all the stages of my PhD. I am also indebted to my friends Jiazhong Li, Luyu Cai and my fiance Quan Tang, who have encouraged me anytime and would always give me warm hugs and conciliation when I feel frustrated and sad. Thank you so much!

Finally, I cherish all the resources, support and professional guidance from the university – Universitat Rovira i Virgili, Department of Business Management, and Faculty of Tourism and Geography.

Academic outputs

This doctoral thesis is constructed based on many scientific publications and results within the Doctoral Programme in Tourism and Leisure, research line of Branding and Tourism Communication, under the supervision of Universitat Rovira i Virgili, Department of Business Management, and Faculty of Tourism and Geography, from November 2020 to November 2024. I have been studying as a full-time student in the university during these four years.

Publications

This thesis includes a total number of five scientific outputs:

- two of them have been published in indexed academic journals as *International Journal of Contemporary Hospitality Management*, and *International Journal of Tourism Cities* accepted in 2022;
- one is published in *The ATLAS* - The Association for Tourism and Leisure Education and Research (ATLAS) in 2022;
- one is published in the EURAM 2024 Conference; and an extended version of it has been prepared for submission, targeting the journal - *International Journal of Hospitality Management*, and it is now under the review process.
- one is preparing for submission, targeting the journal - *International Journal of Contemporary Hospitality Management*.

Thesis chapters and main contents

This doctoral thesis entitled "*The Tourism Industry Amid Global Crises: Exploring the Role of Sustainability and Innovation*" started in 2020, when the devastating global pandemic occurred and affected severely on global economies especially the tourism industry in the last past few years. This thesis could be seen as evidence of the whole period when the COVID-19 happened, relating to how the people responded, survived, recovered and eventually restarted their lives within the tourism sector. In these backgrounds, on one hand, this thesis focused on a holistic reflection over the tourism industry and COVID-19 themes, in finding main research interests, topic domains, and future research lines, from theoretical perspectives; on the other, it investigated how the whole sector could explore possible solutions, recovery strategies and future development opportunities in dealing with the pandemic in empirical perspectives.

The thesis consists of four parts in five stages of research, embraced with three theoretical studies and two empirical studies. Part I (**Chapter 1**) involves the introduction and includes the general demonstration of the research background, research design in the description of the five research, main description of methodology, and the structure of the thesis. Part II corresponds to the construction of the conceptual framework of the research. In this dimension, three subsections would be combined based

on the outputs of three published theoretical papers in **Chapter 2, 3** and **4**. Part II corresponds to three theoretical papers that have been published as:

- **Chapter 2**: Yang, L., Li, X., & Hernández-Lara, A.B. (2024). Scientific collaboration and thematic analysis of the tourism industry in the context of COVID-19: a bibliometric approach. *International Journal of Contemporary Hospitality Management*, 36(2), 543-563. https://doi.org/10.1108/IJCHM-03-2022-0303
- **Chapter 3**: Yang, L., Li, X., & Hernández-Lara, A.B. (2022). A thematic analysis upon sustainable issues in the field of tourism and covid-19. *ATLAS Review*, 1, 41-49. (ISSN 2468-6719)
- **Chapter 4**: Yang, L., Li, X., & Hernández-Lara, A.B. (2024). Tourism and COVID-19 in China: recovery and resilience strategies of main Chinese tourism cities. *International Journal of Tourism Cities*, 10(2), 387-404. https://doi.org/10.1108/IJTC-04-2022-0084

Part III consists of two empirical studies, including a general description of research, theory and hypotheses development, data collection, analytical process and presentation of empirical results and discussion. Part III corresponds to two empirical papers that are already submitted to high ranked indexed journals, as:

- **Chapter 5**: Longitudinal exploration of financial performance and firm characteristics on sustainability: insights from the hospitality industry amid global crises – under review by the *International Journal of Hospitality Management*
- **Chapter 6**: Navigating global crisis: how ESG and financial performance drive environmental innovation in the tourism industry – submitting the abstract to the *International Journal of Contemporary Hospitality Management*

A short version of the fourth paper in **Chapter 5** – entitled “A longitudinal exploration of firms’ characteristics and financial performance towards sustainable and innovative practices in tourism subsectors” has been published in the EURAM 2024 Conference.

Part IV demonstrates the conclusions (**Chapter 7**), implications (**Chapter 8**), limitations and future research (**Chapter 9**) of each stage of research.

International conference and presentations

I also participated in two international conferences and published the following articles, with some of the findings also being available in the above-mentioned papers, and some of the results being adapted to this doctoral thesis.

- Yang, L., Li, X., & Hernández-Lara, A.B. (2023). Rethinking tourism under the pandemic lens: the focus on sustainability issues. Conference: Tourism in Southern and Eastern Europe 2023:

Engagement & Empowerment: A Path Toward Sustainable Tourism. https://doi.org/10.20867/tosee.07.35

● Yang, L., Li, X., & Hernández-Lara, A.B. (2024). A longitudinal exploration of firms' characteristics and financial performance towards sustainable and innovative practices in tourism subsectors. Conference: EURAM 2024 Conference: Fostering Innovation to Address Grand Challenges.

Courses and workshops

In addition, I attended many methodological courses, including data scraping, analysis, scientific writing skills, presentations, as well as research seminars held both by my home university - Universitat Rovira i Virgili to catch up with latest research interests and future collaborative relationships.

These are the doctoral days I have attended held by my home university.

● POLITUR International Workshop Webinar on "Mobilities transforming destinations. Urban and regional policies, digital regulatory mechanisms, and place prosperity and sustainability" (November 2020)

● VII Doctoral days of the PhD Program in Tourism and Leisure 2020-21 (November 2021)

● VIII Doctoral Days of the PhD Program in Tourism and Leisure 2022-23 (November 2022)

● IX Doctoral Days of the PhD Program in Tourism and Leisure 2023-24 (November 2023)

Mobility

The doctoral thesis is also endowed with a three-month research stay, from which I attended one conference, many seminars, methodological courses and prepared the fifth manuscript during the stay.

● The research stay: The Business Management and Accounting Track (BMA track), Department of Management and Law, Faculty of Economics, University of Rome, Tor Vergata.

Country and city: Rome, Italy.

Period: March 15, 2024, to June 15, 2024.

As a reviewer

I was also invited as a reviewer of indexed scientific journals, in Q1 quartile (*sustainable development*), and EURAM conference, which also benefits me in the improvement of the doctoral thesis.

List of publications

This paper contains the dissemination of the following papers resulting from the thesis.

● Scientific collaboration and thematic analysis of the tourism industry in the context of COVID-19: a bibliometric approach

Paper type: Theoretical paper

Position in the thesis: Part II, Chapter 2

Status: Published

Journals: Published in International Journal of Contemporary Hospitality Management, 29 December 2022, volume 36(2), 543-563. DOI 10.1108/IJCHM-03-2022-0303

Impact factor: Impact factor (2023) by Clarivate Analytics: 9.10; Cited score (2023) by Scopus: 16.9; JCR: Q1

● A thematic analysis upon sustainable issues in the field of tourism and COVID-19

Paper type: Theoretical paper

Position in the thesis: Part II, Chapter 3

Status: Published

Journals: Published in The ATLAS - The Association for Tourism and Leisure Education and Research (ATLAS) was established in 1991 and has currently has members in about 50 countries

Yang, L., Li, X., & Hernández-Lara, A.B. (2022). A thematic analysis upon sustainable issues in the field of tourism and covid-19. *ATLAS Review*, 1, 41-49. (ISSN 2468-6719)

● Tourism and COVID-19 in China: recovery and resilience strategies of main Chinese tourism cities

Paper type: Theoretical paper

Position in the thesis: Part II, Chapter 4

Status: Published

Journals: Published in International Journal of Tourism Cities, 12 December 2022, volume 10(2), 387-404. DOI 10.1108/IJTC-04-2022-0084

Impact factor: Impact factor (2023) by Clarivate Analytics: 3.0; Cited score (2023) by Scopus: 5.9; JCR: Q2

● Longitudinal exploration of financial performance and firm characteristics on sustainability: insights from the hospitality industry amid global crises

Paper type: Empirical paper

Position in the thesis: Part III, Chapter 5

Status: Under review

Target journal: International Journal of Hospitality Management

Impact factor: Impact factor (2023) by Clarivate Analytics: 9.90; Cited score (2023) by Scopus: 21.2; JCR: Q1

● Navigating global crisis: how ESG and financial performance drive environmental innovation in the tourism industry

Paper type: Empirical paper

Position in the thesis: Part III, Chapter 6

Status: Submitting the abstract

Target journal: International Journal of Contemporary Hospitality Management

Impact factor: Impact factor (2023) by Clarivate Analytics: 9.10; Cited score (2023) by Scopus: 16.9; JCR: Q1

Publications in Conference proceedings

● Rethinking tourism under the pandemic lens: the focus on sustainability issues

Paper type: Theoretical paper

Status: Published

Conference: Tourism in Southern and Eastern Europe 2023: Engagement & Empowerment: A Path Toward Sustainable Tourism.

● A longitudinal exploration of firms' characteristics and financial performance towards sustainable and innovative practices in tourism subsectors

Paper type: Empirical paper

Status: Published

Conference: EURAM 2024 Conference: Fostering Innovation to Address Grand Challenges.

Abstract

This doctoral thesis focuses on tourism recovery, sustainability and future development issues under the influence of global industry crisis – by taking the COVID-19 as an example. Under the devastating impact of the widespread pandemic, tourism and hospitality, as the most frustrated industries, have faced huge job losses, social inequality and career instability. In this dimension, it is of vital importance to find possible solutions to recovery, resilience and future sustainable development of the whole industry. This thesis consists of four parts, including the introduction, conceptual framework, empirical studies and the conclusion section.

Part I (Chapter 1) – the introduction provides a general overview of the tourism industry under the pandemic lens. It is developed into five stages of research – theoretical research on tourism and COVID-19, theoretical research on tourism sustainability and COVID-19, theoretical research on tourism resilience and COVID-19, empirical research on tourism sustainability and COVID-19, empirical research on tourism sustainability, innovation and COVID-19.

Part II introduces the conceptual framework of this thesis, embraced with three published theoretical papers. The first paper in Chapter 2 illustrates theoretical research on tourism and COVID-19. It focuses on the investigation of bibliometric studies of scientific collaborations and thematic development upon the tourism industry and COVID-19 topics. The current state of the art reveals interdisciplinary research interests on crisis management, tourism sustainability, stakeholder collaborations and so on. This paper also identifies underexplored topics on the social, environmental, cultural and governance dimensions of sustainable tourism as well as stresses the function of technology and innovation in helping environmental conservation, sustainable governance, and protocols.

The second paper in Part II (Chapter 3) focuses on the thematic analysis of tourism sustainability and COVID-19 topics. New growth potentials in high technologies utilization, especially the utilization of virtual tools, social media, artificial intelligence; strategic planning and management in promoting the general efficiency and stability of the whole industry are expected to gain further attention.

The third paper in Part II (Chapter 4) also focuses on the thematic analysis of tourism recovery and resilience strategies – by taking main China's mega tourism cities as example. Measures related to tourism industrial reemployment, improvement of international images, digitalization, nature and cultural heritages became important factors in the future development of China's tourism. Dark tourism, as a potential tourism recovery strategy, also obtained huge emergence, for the memory of people deceased in the pandemic and for the inheritance of national patriotism.

Part III introduces two empirical studies, with the fourth paper (Chapter 5) – panel data analysis upon sustainable performances (through ESG scores and pillars) of tourism and hospitality related companies, in discovering their relationships with corporate financial performances and how this relationship would be differentiated between tourism subsectors, when considering the moderating effect of global industrial crises. This piece of study contributes to advancing our comprehension of the

determinants influencing sustainability in the hospitality sector, with a nuanced understanding of how global industrial crises moderate these dynamics.

The fifth paper (Chapter 6) in Part III was constructed based on an empirical study on tourism sustainability and innovation – in finding the relationships between environmental innovation and tourism sustainable performances through the measures of ESG scores and pillars, financial performances, and how the relationships would be influenced under the global crisis lens. This part of study has brought about vital significance in advocating environmental innovation as a potential worthy investment and green transition opportunity, which would be of contribution in dealing with global climate change issue, improvement of innovative capabilities in environmental management, and fulfillment of stakeholder social commitment.

Part IV demonstrates the conclusions (Chapter 7), implications (Chapter 8), limitations and future research (Chapter 9) of each stage of research.

Resumen

Esta tesis doctoral se centra en analizar la recuperación del turismo, la sostenibilidad y el desarrollo futuro de este sector, teniendo en cuenta la influencia de una crisis global, que ejemplificamos a través de la COVID-19. Considerando el impacto devastador de la pandemia, el turismo y el hotelería, entre las industrias más afectadas, se han enfrentado a grandes pérdidas de empleo, desigualdad social e inestabilidad laboral. Esto explica la importancia de explicar vías que describan la recuperación, la resiliencia, y el futuro sostenible de esta industria. La tesis consta de cuatro partes: introducción, marco conceptual, estudios empíricos y conclusiones.

Parte I (Capítulo 1) desarrolla la introducción de esta tesis, donde se proporciona una visión general de la industria del turismo desde la perspectiva de la pandemia. Se desarrolla en cinco etapas de investigación: investigación teórica sobre el turismo y la COVID-19, investigación teórica sobre sostenibilidad del turismo y la COVID-19, investigación teórica sobre resiliencia del turismo y la COVID-19, investigación empírica sobre sostenibilidad turística y la COVID-19, investigación empírica sobre sostenibilidad turística, innovación y la COVID-19.

La Parte II presenta el marco conceptual de esta tesis, desarrollado en los tres artículos teóricos publicados. El primer artículo del Capítulo 2 ilustra la investigación teórica sobre el turismo y la COVID-19. Este artículo lleva a cabo un análisis bibliométrico para explorar las colaboraciones científicas y el desarrollo temático realizado en relación a la industria turística y aspectos de la pandemia. Los principales resultados revelan intereses importantes de investigación interdisciplinar sobre gestión de crisis, sostenibilidad del turismo, colaboraciones de actores relevantes, etc. Esta investigación también identifica temas poco explorados sobre las dimensiones social, ambiental, cultural y de gobernanza del turismo sostenible, además de enfatizar la función de la tecnología y la innovación para ayudar a la conservación ambiental, la gobernanza y los protocolos sostenibles.

El segundo artículo de la Parte II (Capítulo 3) se centra en el análisis temático de la sostenibilidad del turismo y temas relativos a la. pandemia. Los resultados destacan el potencial de uso de nuevas y avanzadas tecnologías, especialmente la utilización de herramientas virtuales, redes sociales, inteligencia artificial, etc. También se espera que se preste más atención a la planificación y gestión estratégicas para promover la eficiencia general y la estabilidad de toda la industria.

El tercer artículo de la Parte II (Capítulo 4) lleva a cabo un análisis temático de las estrategias de recuperación y resiliencia del turismo, tomando como ejemplo las principales megaciudades turísticas de China. Medidas relacionadas con el reempleo en el sector, la mejora de la imagen internacional, la digitalización, la naturaleza y los patrimonios culturales se convirtieron en factores importantes en el futuro desarrollo del turismo de China. El turismo “oscuro”, como potencial estrategia de recuperación turística, también obtuvo una gran relevancia, centrada en la potenciación de la memoria de las personas fallecidas en la pandemia, y en la herencia del patriotismo nacional.

La Parte III presenta dos estudios empíricos. El primero de estos estudios, que consiste en el cuarto artículo de esta tesis doctoral (Capítulo 5) lleva a cabo un análisis de regresión con datos de panel para

explorar la relación entre el desempeño sostenible determinado a través de las puntuaciones de sostenibilidad ESG y el desempeño financiero, diferenciando entre subsectores dentro del turismo, y analizando el efecto moderador de la crisis industrial global provocada por la pandemia. Este estudio contribuye a mejorar nuestra comprensión de los determinantes que influyen en la sostenibilidad en el sector turístico y hotelero, con una comprensión más profunda sobre cómo las crisis industriales globales moderan estas dinámicas.

El quinto artículo (Capítulo 6) de la Parte III también consistió en un estudio empírico sobre la sostenibilidad y la innovación del turismo, tratando de explorar las relaciones entre la innovación ambiental y los desempeños sostenibles del turismo a través de las puntuaciones ESG y los desempeños financieros, analizando de nuevo el efecto moderador de la pandemia, como crisis global de la industria turística. De este estudio se desprende la importancia vital que adquiere la innovación ambiental como una inversión potencial valiosa y una oportunidad de transición verde, para abordar el cambio climático global, mejorar las capacidades innovadoras en la gestión ambiental, y cumplir con el compromiso social de los principales actores involucrados.

La Parte IV consiste en las conclusiones (Capítulo 7), implicaciones (Capítulo 8), limitaciones e investigaciones futuras (Capítulo 9) de cada etapa de la investigación.

Resum

Aquesta tesi doctoral se centra en la recuperació del turisme, la sostenibilitat i els problemes de desenvolupament futur sota la influència de la crisi sanitària global, prenent com a exemple la COVID-19. Sota l'impacte devastador de la pandèmia generalitzada, el turisme i l'hostaleria, com a indústries més frustrades, s'han enfrontat a pèrdues de llocs de treball espectaculars, desigualtat social i inestabilitat professional. En aquesta dimensió, és de vital importància trobar possibles solucions per a la recuperació, la resiliència i el desenvolupament sostenible futur de tota la indústria. Aquesta tesi consta de quatre parts en introducció, marc conceptual, estudis empírics i l'apartat de conclusions.

Part I (Capítol 1): la introducció proporciona una visió general de la indústria turística sota la lent de la pandèmia. Es desenvolupa en cinc etapes de recerca: recerca teòrica sobre turisme i COVID-19, investigació teòrica sobre sostenibilitat turística i COVID-19, investigació teòrica sobre resiliència turística i COVID-19, investigació empírica sobre sostenibilitat turística i COVID-19, investigació empírica sobre sostenibilitat turística, innovació i COVID-19.

La segona part introdueix el marc conceptual d'aquesta tesi, abraçat amb tres articles teòrics publicats. El primer article del Capítol 2 il·lustra la investigació teòrica sobre turisme i COVID-19. El primer article se centra en la investigació d'estudis bibliomètrics de col·laboracions científiques i desenvolupament temàtic sobre la indústria turística i temes de la COVID-19. L'estat actual de les arts revela interessos de recerca interdisciplinaris sobre gestió de crisi, sostenibilitat turística, col·laboracions amb grups d'interès, etc. Aquest document també identifica temes poc explorats sobre les dimensions socials, ambientals, culturals i de governança del turisme sostenible, així com destaca la funció de la tecnologia i la innovació per ajudar a la conservació del medi ambient, la governança sostenible i els protocols.

El segon article de la Part II (Capítol 3) se centra en l'anàlisi temàtica de la sostenibilitat turística i els temes de la COVID-19. Nous potencials de creixement en la utilització de les altes tecnologies, especialment la utilització d'eines virtuals, xarxes socials, intel·ligència artificial; S'espera que la planificació estratègica i la gestió per promoure l'eficiència i l'estabilitat generals de tota la indústria obtinguin més atenció.

El tercer article de la part II (Capítol 4) també se centra en l'anàlisi temàtica de les estratègies de recuperació i resiliència del turisme, prenent com a exemple les principals ciutats de mega-turisme de la Xina. Les mesures relacionades amb la reocupació industrial turística, la millora de les imatges internacionals, la digitalització, la natura i els patrimonis culturals es van convertir en factors importants en el desenvolupament futur del turisme de la Xina. El turisme fosc, com a potencial estratègia de recuperació turística, també va obtenir una gran emergència, per a la memòria de les persones difuntes en la pandèmia i per a l'herència del patriotisme nacional.

La part III presenta dos estudis empírics, amb el quart document (Capítol 5): anàlisi de dades de panells sobre el rendiment sostenible de les empreses relacionades amb el turisme i l'hostaleria, per descobrir les seves relacions amb els resultats financers de les empreses i com es diferenciaria aquesta relació entre aquestes dues. sectors, en considerar la influència moderadora de les crisis industrials globals.

Aquest estudi contribueix a avançar en la nostra comprensió dels determinants que influeixen en la sostenibilitat en el sector de l'hostaleria, amb una comprensió matisada de com les crisis industrials globals moderen aquestes dinàmiques.

El cinquè document (Capítol 6) de la part III es va construir a partir d'un estudi empíric sobre la sostenibilitat i la innovació del turisme, per trobar les relacions entre innovació ambiental i rendiments sostenibles del turisme, rendiments financers i com es veurien influenciades les relacions sota el lent de crisi global. Aquesta part de l'estudi ha aportat una importància vital a l'hora de defensar la innovació ambiental com una oportunitat potencial d'inversió digna i una oportunitat de transició verda, que contribuiria a fer front al problema del canvi climàtic global, a la millora de les capacitats innovadores en la gestió ambiental i al compliment del compromís social de les parts interessades.

La part IV mostra les conclusions (Capítol 7), les implicacions (Capítol 8), les limitacions i la recerca futura (Capítol 9) de cada etapa de la recerca.

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List of Acronyms

COVID-19 Coronavirus disease of 2019

PRISMA: Preferred reporting items for systematic reviews and meta-analyses

CSR: Corporate social responsibility

ESG: Environmental, social and governance

CFP: Corporate financial performance

ENV: Environmental pillar

SOC: Social pillar

GOV: Governance pillar

Size: Firm size

ROA: Return on assets

TQ: Tobin's Q

Lev: Leverage ratio

Div: Dividend yield

Dummy: Dummy variable

EIS: Environmental innovation score

St.Dev: Standard deviation

Max: Maximum

Min: Minimum

VIF: variance inflation factor

* List of abbreviations are presented according to the sequence that appeared in the thesis.

PART I. INTRODUCTION

Chapter 1. Research presentation

1.1 Overview of the research background

The introduction section focused on the general description of the research field and background – the tourism industry and global crises, by taking COVID-19 as an example, research design in five stages of research, the methodology used, and the structure of the thesis. This doctoral thesis originated to one research proposal – how was tourism globally affected under the devastating global health crisis scenario, and which could be the recovery, resilience, and future sustainable development opportunities for the tourism sector under this lens.

To be more specific, this chapter embraced five research studies. The first study consisted of developing theoretical research on tourism and COVID-19, generated a systematic bibliometric review to bring about a holistic reflection over the prevailing knowledge, key areas, and to come up with new thinking and ideas in finding tourism research directions and growth potentials upon the development of tourism studies in the context of COVID-19.

The second study entailed theoretical research on tourism sustainability and COVID-19, originated from one of the most debated topics in the first bibliometric study, focusing on the notion of tourism sustainable development, as well as developing a bibliometric study of tourism sustainability topics under the pandemic lens, that originated from one of the most debatable research interests in the first theoretical research.

The third research focused on the theoretical investigation of tourism recovery and resilience studies in the specific case of China – a well-recognized country for its rapid COVID-19 mitigation responses. In this dimension, four main mega China's tourism cities were selected as the research targets in identifying main pandemic prevention measures, recovery strategies and new trends of local tourism developments of these cities.

The fourth research and the fifth research (two empirical ones) could also be originated to the first two theoretical research, from which tourism sustainability issues, tourism innovative behaviors were also laid special focus.

In this sense, the fourth research focused on the empirical study in finding possible sustainable protocols when faced with severe financial status under the influence of the global pandemic. It aimed to explore how firms' characteristics and corporate financial performances (CFP) influence sustainability initiatives encompassing environmental, social, and governance (ESG) aspects, while considering the moderating influence of global industrial crises, particularly in the comparison between hospitality and other tourism-related companies. This study contributed to advancing our comprehension of the determinants influencing sustainability in the hospitality sector, with a nuanced understanding of how global industrial crises moderate these dynamics.

The fifth research (empirical research) focused on exploring the innovative behaviors of tourism companies, especially in the relationships between environmental innovation and tourism sustainable performances, financial performances, and whether these relationships could be influenced by a global industrial crisis, such as the recent pandemic. This empirical approach enriched the current state of art of tourism sustainability and innovation and would be of vital importance for both future scholars and industrial practitioners in finding corporate sustainable development protocols and research potentials under the impact of similar severe health emergencies.

1.2 Theoretical research on tourism and COVID-19

In the long history of human development, we witnessed the continuous progress of human civilization through overcoming disasters one after another. The pervasive diffusion of the pandemic caused severe damage over global economy, huge job losses and even political conflicts out of unstable country image (Zenker & Kock, 2020). As a consequence, a huge increment of economic recovery research from all over the world emerged, from which, the tourism industry, as the most devastating sector, was paid especial attention by worldwide scholars (Abbas et al., 2021). As reported by the UNWTO (2022), in 2021 international arrivals were 72% below the pre-pandemic year of 2019. The main subsectors, hotels and airlines, saw a year-to-date reduction in bookings and reservations of 33% and 88% respectively due to mandatory social distancing, outgoing and travel restrictions by the year of 2021 (UNWTO, 2021). Thanks to widespread vaccination and digital communication, a recent spring-back of international travelers occurred in 2021. Notwithstanding this, it was predicted that global tourism could not recover to the pre-COVID level until 2024 (UNWTO, 2022).

This phenomenon attracted the interest of academics, emerging articles in the field of tourism-related diseases management (Chen et al., 2020), business survival strategies (Colmekcioglu et al., 2022; Lau, 2020), and urban recovery studies (Ntounis et al., 2022). The global pandemic stressed tourism resilience and the need to rethink a more sustainable approach for the whole industry (Brouder, 2020). Recent studies focused on the need of consistent development of tourism subsectors, especially the most affected by the pandemic crisis, like hospitality and transportation (Gössling, 2020). Academics were interested in offering alternatives for a successful transformation of the tourism industry from a classic volume-driven model to a more sustainable one, which embraced the fulfillment of tourist expectations, the development of the tourism industry and local communities, and the resolution of social concerns related to tourism (Cheer, 2020; Elkhwesky et al., 2022; Higgins, 2020; Sigala, 2020; Yang & Wong, 2021).

The polyhedric nature of this topic explained the continued growth of studies, especially during, and right after the recovery from the pandemic, that addressed one or multiple of its dimensions, and the urgent need to construct a comprehensive knowledge map regarding the tourism survival and expectations to re-boom the industry under the lens of crisis, as well as shed light on future research possibilities in this field. Bibliometric reviews were conducted to revise this emerging and growing literature, and summarized the main reflections and analyses on COVID-19 and tourism, but they were

quite limited, in both, number and scope. From previous literature, none of these studies developed a broad social network analysis, incorporating relevant metrics to determine the scientific collaboration structure and performance in the field. Secondly, the few previous bibliometric studies mainly focused on industry-based subfields, like digital tourism and tourism city development (Akhtar et al., 2021; Casado et al., 2021). All these limitations justified the need to develop more studies for elucidating the scientific collaboration structure and performance, as well as the knowledge and thematic structure of the field from a broad and holistic perspective rather than from specific tourism subfields.

The main objective of the first research stage of this doctoral thesis could be stated as twofold. First, it aimed to explore tourism development in the context of COVID-19 via social network analysis focusing on the scientific collaboration and relationship among countries, journals and authors. Second, it sought to develop a holistic thematic analysis, which would also embrace the construction of a knowledge map and thematic relationships.

1.3 Theoretical research on tourism sustainability and COVID-19

In the same vein, the global pandemic provoked an earth-shaking impact on the people's social life, recreation, and led to an unprecedent challenge to the whole tourism industry. Facing the increasing socio-cultural issues like huge unemployment, lockdown and industrial instability, many scholars proposed that it was time to rethink the tourism structure, from which the profit-driven model was questioned to be transformed into a more sustainable way of development (Gössling et al., 2020; Higgins, 2020).

In this dimension, faced with the gradual reduction of global carbon footprints due to large decrement of global mobility, advocative opinions consolidated in the continuance of this green model (Gössling and Higham, 2020), also; developed into a sustained mode, through increasing the utility of clean energy and pollution treatment (Gössling, 2020). Bakreen et al., (2022) found similar results in optimizing the operational resilience of aviation industries towards a more sustained development model, mainly through improving capacity and operational efficiencies, passenger communication, worker and stakeholder transversal abilities in the combat over the extreme uncertainties.

At the same time, higher sanitation and privacy protection (e.g., higher requirements in equipment disinfection, room services, social distancing, ventilation, etc.) were proposed during travels out of the avoidance to cross infection and exposure to the COVID-19 virus (Bae & Chang, 2020). From this dimension, some studies pointed out that the huge reduction of tourists due to the pandemic actually had a favorable effect on the sustainable tourism development; notwithstanding, future efforts should be paid into the construction of local sustained tourism infrastructures (e.g., environmental-friendly projects, innovative stimulus, clean energy, vaccine and mask usage, tourism coupons, positive media promotion, etc.) so as to reduce customer fears in traveling and encourage their revisit intentions (Hüsser and Ohnmacht, 2023).

Some concern emerged in the discussion of over tourism sustainable and collaborative governance issues, as suggested by Dangi and Petrick (2021). They also advocated the idea that a sustainable governance should be of critical relevance to the benefits of all the stakeholders – the residents, the community, the society, and the natural environment, under the enhancement of the vigorous development and more opportunities to all of the related entities. To be more specific, this would include promoting local re-employment by supporting tourism business of new-starts, small and medium-sized corporates, effective allocation of governmental financial stimulus; at the same time, equilibrating the welfare of tourists and local resident, in creating both meaningful tourism experience and local satisfaction (Sigala, 2020; Renaud, 2020). Likewise, it was advocated by Le and Phi (2021) that the short-term profit model could be transformed into a diverse one, which emphasized in advance crisis preparedness and recovery of financial resources and stability in front of any kind of provoking diseases and social uncertainties.

Previous studies paid great attention to literature reflections and professional commentaries to find out possible directions towards a more sustainable future (Sigala, 2020); soon after, empirical studies upon green practices and governances (Dangi & Petrick, 2021; Yousaf et al., 2021), destination resilience and sustainability (Kuščer et al., 2021; Yiu & Cheung, 2021), and stakeholder wellbeing (Agrusa et al., 2021) become popular in the relief of industrial losses, minimizing the environmental disturbance and maintaining the longevity of the whole society.

In this dimension, our research at this stage focused on the discussion over the thematic relationships of tourism sustainability issues under the influence of global crises, in identifying main knowledge domains and potential themes and areas in tourism sustainability under the pandemic background.

1.4 Theoretical research on tourism resilience and COVID-19

In a further step, global awareness on the need of tourism recovery and resilience protocols emerged also at a country- level. In the specific case of China, this country was recognized by its rapid COVID-19 mitigation responses and tourism recovery (McCartney, 2020). Since the outbreak of the global crisis, multiple strategies were adopted, giving response to the different stages of domestic pandemic, including strict transmission tracing and targeting regional policies in the face of small-scaled spreading (Cheng et al., 2021). Under the gradual control of COVID-19 in China, we witnessed a huge increment of new tourism products such as family, independent tours, wellness, and personalized traveling in nature areas (Huang et al., 2021), as well as the utilization of digital technologies in the enrichment of tourist experiences (Lu et al., 2021). As a consequence, tourism industry in China was expected in 2022 to recover to 70% of the pre-pandemic level (Yang, 2022), revealing the relevance of analyzing the specific case of China's prevention measures and recovery strategies.

Going down to a regional and local perspective, we found tourism studies that highlighted prevention policy implementations, e.g., in the case of Macao region (China), Hongkong city (China), and Can Tho city (Vietnam), emphasizing the governmental support in mobility supervision, disinfection, distancing,

etc. (Im et al., 2021; Huynh et al., 2022; Yu et al., 2021). However, these prevention measures referred to the first wave and recovery stage (Im et al., 2021; Yu et al., 2021), mainly during 2020 which might be considered insufficient, because the pandemic covered a longer period with different intensity in its multiple stages that might demand different responses. In addition, most of these policies proved ineffective due to the delayed local application (Huynh et al., 2022). Also, previous studies in tourism recovery research on tourism cities mainly shed light on the construction of sustainable city branding and responsibility, especially in European destinations and Australian cities (Bosone, et al., 2021; Jiricka et al., 2021; Kowalczyk et al., 2021; Pasquinelli et al., 2022), being scarcer the studies carried out on Chinese cities and destinations.

To overcome these voids, we chose the main China's tourism cities as research targets and identified the following objectives: 1) to investigate prevention measures of China's main tourism cities – Wuhan, Beijing, Shanghai, and Guangzhou; 2) to identify the recovery strategies and new trends of local tourism developments of these cities.

Compared with previous research on prevention policies, this study proposed to expand the timespan of China's pandemic diffusion to the second and third wave – from January 2020 to September 2021, which contributed to a more completed view of the whole phenomenon under investigation, and it was beneficial for identifying the changes of local tourism strategies. In addition, the focus of this study on China's tourism resilience and recovery protocols provided a more holistic review that complemented and enriched this line of research on global tourism recovery – comparing China with other western tourism cities and destinations.

1.5 Empirical research on tourism sustainability and COVID-19

From an empirical perspective, we firstly conducted research focused on tourism sustainability and COVID-19 topics originated from the first two theoretical research, in finding how the tourism industry (especially hospitality companies in our case) implemented possible sustainable protocols when faced with severe financial status under the influence of the global pandemic.

In previous studies, global corporations increasingly prioritized corporate social responsibility (CSR), responsible behaviors, and professional ethics in their developmental endeavors in addition to pursuing economic profitability (Nirino et al. 2022). As a result, there was a growing interest in research regarding their sustainable practices (Sánchez et al., 2022), evaluated through their environmental, social and governance (ESG) components (Gavrilakis & Floros, 2023). Similarly, the hospitality industry was recognized for its commitment to socially responsible behaviors and practices, particularly in its engagement with the surrounding community and society at large (Tahniyath & Saïd, 2023).

Prior theories shed light on the significance of ESG initiatives. For example, the resource-based theory emphasized leveraging internal resources for sustainable investments to attain competitive advantages and foster long-term corporate development (Habib & Mourad, 2023; Zhang et al., 2021a). Stakeholder theory advocated for sustainable reporting and social aspects of responsible investments, particularly

among large companies, to enhance stakeholder satisfactions and mitigate potential risks (Drempetic et al., 2020; Hamdi et al., 2022; Nguyen et al., 2022). Additionally, institutional theory underscored the significance of sustainable corporate management, decision-making, and diverse practices, considering firm-based characteristics, such as size, and financial performance as pivotal indicators influencing companies' sustainable behaviors and outcomes (Levy & Kolk, 2002; Lynch & Jin, 2016).

Despite theoretical support for the relevance and positive effects of sustainability, current research revealed conflicting arguments and inconclusive evidence regarding the actual relationships between the corporate financial performance (CFP) and ESG (Abdi et al., 2022b; DasGupta, 2022; Moneva et al., 2020; Kuo et al, 2021; Rodríguez et al., 2019), as well as between firm size and ESG indicators (Bissoondoyal et al., 2023; Dkhili, 2023; El Khoury et al, 2023). Furthermore, little discussion on the relationship of CFP, size, and ESG were conducted within the hospitality industry (Bodhanwala & Bodhanwala, 2023; Chen et al., 2022; Clark et al., 2021), particularly about potential differences in sustainability performance across hospitality companies and other tourism-related industries.

This line of research gained significant prominence amid global crises, like the recent one provoked by the COVID-19, due to the notable opportunity that emphasizing sustainability initiatives might represent during such times, particularly in the hospitality sector (Nirino et al. 2022). Previous studies pointed out the impacts of ESG indicators as defensive protocols on the CFP of hospitality corporations (Chen et al., 2022; Yeon et al., 2021), revealing varied results, such as a positive relationship between ESG and the return on assets (ROA), and between ESG and market value (Clark et al., 2021), alongside insignificant relationships between ESG and size, and ESG and dividend yield (Bodhanwala & Bodhanwala, 2023). These contentious findings underscored the necessity for additional research on the relationships between financial performance and other corporate features (such as size) and sustainability indicators, especially in the context of global industrial crises, which could moderate the relationship between CFP, firm size, and ESG performance.

Therefore, our research aimed to extend the research and provide more empirical evidence on firms' characteristics and CFP impacts on ESG performances, thereby establishing three distinct research objectives:

1) To investigate the influence of corporate financial performance (CFP) and firm size on the sustainable performance of tourism companies, specifically examining their overall sustainability scores (ESG), as well as their environmental (ENV), social (SOC), and governance pillars (GOV) separately.

2) To compare and analyze the different effects of hospitality and other tourism-related subsectors on sustainable performance.

3) To assess the moderating effect of global industrial crises, such as the recent pandemic outbreak, on the relationship between firms' characteristics, financial performance, and sustainability performance within the tourism and hospitality industry.

This specific research enriched the existing literature by employing an empirical approach to explore cross-sectoral differences in sustainability performance among hospitality companies and other tourism-

related subsectors, encompassing leisure, recreation, casinos, cruise lines, and more. Additionally, it contributed by examining the moderating effect of global industrial crises, providing insights into the factors influencing sustainability performance within the hospitality sector. Particularly, it scrutinized the moderating impact of recent global pandemic, serving as a potential proxy for future similar global emergencies or crises. Moreover, this research provided actionable insights for tourism practitioners, corporate leaders, and policymakers, underscoring the importance of investing in sustainable initiatives during challenging times, for facilitating effective resilience and paving the way for long-term corporate development and prosperity.

1.6 Empirical research on tourism sustainability, innovation and COVID-19

The last stage of the doctoral thesis included another empirical research on the innovative behaviors of tourism companies, originated from our theoretical findings emphasizing this topic as an emerging trend. This piece of research was also an extending research based on the last empirical research which laid special focus on the relationship between tourism sustainable and financial performances when influenced by the global pandemic. In this sense, our last research concentrated on the investigation of the innovative solutions of tourism companies when involved in severe global health crises, and in a further step, in finding the relationship of sustainability and financial performance with environmental innovation under the framework of a global industrial crisis.

Faced with global environmental devastation, energy reduction, and climate change issues, sustainable development aroused much attention from both scholars and industrial practitioners for decades. Environmental innovation, defined as the development and implementation of new products, organizational procedures, and markets that prioritize environmental protection, played a crucial role in achieving sustainable development goals and facilitating the green transition of industries (Liu et al., 2024; Ren et al., 2023). Investments in environmental innovation were also essential for corporate and business, enabling them to achieve competitive advantages and green innovative capabilities. These investments helped companies align with environmental regulations, respond to growing environmental awareness among customers and markets, and fulfill their social commitment to stakeholders (Fleith de Medeiros et al., 2022).

In this scenario, it was important to comprehend the determinants and mechanisms behind environmental innovation as a strategic corporate initiative, with ESG factors and financial performance being two of the most emphasized elements. On one hand, according to the “stakeholder theory”, companies should consider the benefits and needs of their relevant stakeholders, including customers, employees, financial communities and partners, etc., in their decision-making process (Freeman, 1999; Mahajan et al., 2023). Previous research highlighted the importance of ESG practices in enhancing company operating efficiency, fulfilling stakeholder responsibilities, and promoting long-term development (Drempetic et al., 2020; Habib and Mourad, 2023; Hamdi et al., 2022). However, ESG

investments were also scrutinized by traditional business models for potentially threatening institutional development (Long et al., 2023), especially during severe global crises such as the recent pandemic (Clark et al., 2021). From previous studies, in general, we found more support for ESG investment in improving corporate environmental performance, sustainable management, and stakeholder responsibilities, which were fostered by environmental innovation (Wang & Chu, 2024). As a result, companies were increasingly inclined to invest in environmental innovation for the long-term development of both their business and society as a whole (Wang et al., 2023; Xue et al., 2022).

From another standpoint, the resource-based theory emphasized that a company's competitiveness stems from its valuable tangible and intangible assets (Freeman, 1999; Mahajan et al., 2023). Environmental innovation could thus generate a competitive advantage by leveraging the capabilities and resources obtained by the company (Liu et al., 2024). Following this logic, many researchers also explored the link between corporate financial performance and environmental innovation. Specifically, most studies investigated how environmental innovation impacts financial performance, arguing that companies with strong green innovation capabilities tended to enhance firm value and profitability by implementing innovative processes that improve operational efficiency and resource management (Benkraiem et al., 2023; Iqbal et al., 2022). At the same time, environmental innovation encompasses the development of green products, which could enhance companies' financial performance through the cultivation of a green brand image and improved green competency (Farza, et al., 2021; Wang & Chu, 2024). There were also critics who argued a non-significant relationship between environmental innovation and financial performance, however, a win-win situation was expected to arise under the conjoint effort that integrated environmental, economic, and organizational innovation (Vasileiou et al., 2022).

The tourism industry paid special attention to improving environmental innovation to meet low carbon emission and high-quality goals, aligning with the sustainable development of the entire sector (Sun et al., 2022). Empirical studies established a foundation for similar research by examining the implementation of environmental innovation strategies in related sectors such as the air transportation industry in G7 countries (Jahanger et al., 2024), Chinese smart cities (Yang et al., 2024), the tourism industry in Thailand (Yue et al., 2021), and the hospitality industry in South Africa (Fatoki, 2021). These studies highlighted efforts to reduce local environmental damage and carbon emissions while promoting competitive advantage and green industrial transformation. Recent research also addressed the impact of the global COVID-19 pandemic on the environmental innovation performance of companies, noting the reduction in global carbon emission due to decreased footprints and economic activities; as well as examining how companies have survived and recovered from this severe health emergency (Al Amosh & Khatib, 2023).

As one of the industries most affected by the global pandemic, the tourism sector faced severe challenges such as global unemployment, low profitability, and environmental concerns (Clark et al., 2021). Consequently, it was crucial for the entire industry to explore potential solutions for recovery, resilience, and long-term sustainable development (Chen et al., 2022; Lee et al., 2024). COVID-19 was seen as an opportunity for sustainability transition, with green innovation forming a crucial foundation

for achieving this goal (Hermundsdottir et al., 2022), by enhancing resource utilization effectiveness and upgrading organizational mechanism (Tan & Zhu, 2022). Based on the findings from previous literature, we identified a general scarcity of investigation into environmental innovation topics within the tourism industry, particularly concerning its relationship with sustainable and financial performance. This relationship primarily focused on the impacts of ESG performance on environmental innovation (Drempetic et al., 2020; Habib and Mourad, 2023; Hamdi et al., 2022; Long et al., 2023), without a comprehensive discussion of how the three pillars – environmental, social, and governance- affect environmental innovation. Additionally, no studies were found that explore the impact of financial performance on environmental innovation within the context of tourism studies. Therefore, our research aimed to fulfill the following objectives:

1) To determine whether environmental innovation is influenced by the sustainable performance of tourism companies, as measured by environmental, social and governance (ESG) scores.

2) To assess whether environmental innovation is affected by the financial performance of tourism companies.

By the same token, previous studies also focused on the impacts of the global pandemic on corporate financial and ESG performance within the tourism sector (Al Amosh & Khatib, 2023; Bodhanwala & Bodhanwala, 2023; Clark et al., 2021; Habib & Mourad, 2023), as well as on the environmental innovation (Hermundsdottir et al., 2022), notwithstanding, no research has analyzed the moderating effect of the industrial crisis on the relationship between the above-mentioned indicators. therefore, the third objective of this study was:

3) To explore whether the global pandemic moderates the relationships between environmental innovation and financial and ESG performance within the tourism sector.

This research enriched the current state of art and contributed to the limited studies investigating the relationships between environmental innovation, ESG, and corporate financial performance in the tourism sector. Its findings were expected to be valuable for both scholars and industrial practitioners in identifying sustainable development protocols and research opportunities under the impact of severe global crises. In addition, this research highlighted the importance of green innovation investments for forward-thinking investors and decision-makers, encouraging them to integrate effective environmental management, stakeholder social commitment, and sustainable strategic protocols into their preliminary considerations for the long-term resilience of the entire industry.

1.7 Methodology

In this section, we would also introduce the methodology applied in each part of research in order to fulfill the above-mentioned objectives. The first theoretical research (**Chapter 2**) in terms of the tourism and COVID-19 studies was constructed based on a bibliometric review, which has been widely utilized into constructing scientific collaboration networks (Espasandin et al., 2020; Koseoglu et al., 2018), finding main thematic domains and knowledge interests (Akhtar et al., 2021; Casado et al., 2021;

Ferjanić, 2020; Utkarsh & Sigala, 2021) through a systematic reflection of previous literature. We used the VOSviewer software in the visualization of country and author dimension co-authorship, source co-citation, keywords co-occurrence, as well as knowledge mapping of tourism and COVID-19 studies to bring about a holistic thematic overview over this topic.

The second theoretical research (**Chapter 3**) was constructed based on one of the most popular topics as tourism sustainability drawn from the first theoretical research, from which this topic was farther extended into a bibliometric thematic study in terms of tourism sustainability and COVID-19 issues. This research focused on the keywords co-occurrence visualization from VOSviewer software under the discussion of main research topics themes that were related to tourism sustainable development perspectives influenced by the pandemic background.

The third theoretical research (**Chapter 4**) constructed according to one of the most debated topics as the tourism resilience, embraced with a social media analysis of tourism recovery strategies, so as to catch up with the latest news and information within this topic. We chose China and its four mega tourism cities - Wuhan, Beijing, Shanghai, and Guangzhou as the main research targets due to their rapid pandemic response and prevention strategies, from which gained huge international praise and emulation. We generated a data scraping from the Sina Weibo platform of local tourism administration and touristic attractions, adopted an inductive approach in coding the most frequent occurring features, and categorized main thematic discussions as pandemic prevention, tourism ticket policy and financial supports, international image, tourism growths, and the development of dark tourism.

The fourth research (**Chapter 5**) became one of our empirical studies corresponding to the first and second theoretical research in terms of tourism, sustainability and COVID-19 topics. We generated a panel data analysis in discovering the sustainable performances of large tourism and hospitality companies, how would their sustainable performances being affected by the firm-level financial characteristics (firm size and financial performances), if their sustainable performances would be differentiated both in terms of the different subsectors within the tourism and hospitality sectors, and the under the influence of global pandemic. Based on this objective, we applied several regression models in finding both the main effects as the influence of firm size and financial performances on firms ' sustainable performances, differentiated by subsectors, and the moderating effect of the COVID-19 on their relationships.

The last empirical research (**Chapter 6**) rehearsed with another interesting topic drawn from tourism and COVID-19 theoretical research and tourism recovery theoretical research – tourism innovation, and investigated tourism sustainability, innovation and firm financial performances of tourism corporates. This piece of research was also an extending research based on the last empirical research which laid special focus on the relationship between tourism sustainable and financial performances when influenced by the global pandemic. In a further step, it encompassed tourism innovative behaviors, and aimed to determine if environmental innovation was influenced by the sustainable performance, as well as financial performance of tourism companies; and to explore if the global pandemic moderated the relationships between environmental innovation and financial and ESG performance within the tourism sector. In detail, a panel data analysis in the utilization of regression models was also applied to this

research from the Thomson Reuters Eikon database, embraced with a total of 289 valuable samples, covering the period from 2017 to 2023, classified into two categories: 2017 to 2019 as the 'pre-pandemic' period, and 2020 to 2023 as the 'during-pandemic and recovery' period.

To conclude, this doctoral thesis applied both qualitative and quantitative research methods, so as to bring about a holistic point of view over the development of the debating tourism industry, under the influence of all the stages of the global pandemic, from the pandemic response, recovery, resilience and future redevelopment periods.

1.8 Structure of the thesis

This thesis was constructed as a presentation of several publications and scientific results. We included a total number of five articles, with three of them as theoretical papers and two as empirical papers. One theoretical paper was published in International Journal of Contemporary Hospitality Management. One theoretical paper was published in International Journal of Tourism Cities, and the other theoretical paper was published in the ATLAS Review. Two empirical papers are under review after being submitted to high ranked indexed journals – one of them is under review in the International Journal of Hospitality Management, and the other has been submitted to the International Journal of Contemporary Hospitality Management.

This thesis was structured as follows: Part I consists of the introduction (**Chapter 1**). It included a general overview of the research background (Subsection 1.1) of five stages of research in terms of all the changes of the tourism industry going through the start of the global pandemic, the recovery period, and future research period after the pandemic. Subsection 1.2 to 1.6 described the introduction of the research overview and main research objectives of the five research, titled as: 1.2 theoretical research on tourism and COVID-19; 1.3 theoretical research on tourism sustainability and COVID-19; 1.4 theoretical research on China's tourism recovery and COVID-19; 1.5 empirical studies on tourism sustainability; 1.6 empirical studies based on tourism sustainability and innovation. Subsection 1.7 introduced a brief introduction to the qualitative and quantitative methods applied in this thesis. Subsection 1.8 consisted of the structure of the thesis.

Part II consisted of the conceptual framework, incorporating three theoretical papers published in International Journal of Contemporary Hospitality Management (**Chapter 2**), ATLAS Review (**Chapter 3**), and International Journal of Tourism Cities (**Chapter 4**). **Chapter 2** described the bibliometric studies of the tourism industry and COVID-19 related topics, one the one hand, in finding the scientific collaboration and relationship among countries, journals and authors; on the other hand, in constructing thematic relationships and knowledge mapping between topics. **Chapter 3** embraced thematic analysis on one of the most debated topics – tourism sustainability and COVID-19. **Chapter 4** consisted of social media analysis of tourism resilience and COVID-19, in investigating prevention measures, recovery strategies and new trends of China's main tourism cities.

Part III embraced analytical process of two empirical papers (**Chapter 5** and **Chapter 6**). **Chapter 5** investigated how firms' characteristics and corporate financial performances (CFP) influence their sustainability initiatives, when considering the moderating effect of global industrial crises, particularly in the comparison between hospitality and other tourism-related companies. **Chapter 6** focused on the influence of firms' sustainable performances and financial performances on their environmental innovation initiatives of tourism-related subsectors, and how this relationship would be influenced under the global crisis lens.

Part IV consisted of conclusions (**Chapter 7**), implications (**Chapter 8**), limitations and future research (**Chapter 9**) of each stage of research.

PART II. CONCEPTUAL FRAMEWORK

Chapter 2. Scientific collaboration and thematic analysis of the tourism industry in the context of COVID-19: a bibliometric approach

2.1 A general overview

This part illustrated a general conceptual framework based on the findings of three published theoretical research. First and foremost, we would like to understand the impact or consequence of the global pandemic on the global tourism industry. In this sense, a holistic bibliometric review (**Chapter 2**) upon the tourism industry and COVID-19 fields has been conducted, to further investigate current interests and trends emerging from this area. In detail, we focused on scientific collaboration visualization and thematic analysis, and to identify research gaps that indicate future research directions. This subsection included bibliometric research on the development of the tourism industry under the influence of the global pandemic. We conducted several analyses, which included the co-authorship and social network analysis, co-citation, and keyword co-occurrence knowledge structures. We generated a knowledge map of the leading articles and linked them with previous literature to elucidate the debates and consensus in research on COVID-19 and tourism. It contributed to guiding tourism researchers in identifying and finding publication references and future collaborations. Moreover, the investigation of knowledge structures could be beneficial for scholars hoping to broaden the current understanding of this field and discover potential for future tourism research, especially in the global pandemic and other severe health crises. In the same vein, this section also focused particularly on the discussion of tourism sustainability– one of the most important issues under the pandemic background, from which a thematic analysis in terms of the construction of keyword co-occurrence knowledge map, and a content literature review was conducted in **Chapter 3.**

2.2 Theoretical background of tourism and COVID-19

The pervasive sweep of the global pandemic provoked the rethinking and change of the tourism industry, including different spheres related mostly to tourists, destinations, and tourism-related subsectors (Jamal & Budke, 2020). This section presented the main themes addressed by previous tourism research in the COVID-19 crisis, considering these different fields. Regarding tourists and destinations, one of the key themes referred to new preferences of tourists when choosing tourism destinations. Previous researchers found out that there existed the tendency of traveling preferences to less crowded areas, domestic and coastal regions, with higher sanitation and privacy standards arising from virus avoidance considerations (Jeon & Yang, 2021). However, some scholars pointed out (Wen et al., 2021), as the global pandemic came into a stabilization thanks to the widespread of the vaccine, people would shift their concerns back to the fulfillment of tourism experiences, coming back to more traditional

determinants of destination choice. Positive destination image, mainly based on a sense of security and privacy, was considered essential to relieve the tourists' negative sentiments and win back their tourism confidence during and after the pandemic (Song et al., 2022; Yang & Wong, 2020). Some practical actions were also proposed in establishing active emotional communications between destinations and customers to enhance their revisit intentions and foster local tourism recovery (Balakrishnan & Sambasivan, 2022).

In terms of tourism subsectors, those with the largest damage such as hospitality and transportation (UNWTO, 2021), also gained attention from worldwide researchers (Colmekcioglu et al., 2022; Ntounis et al., 2022). From the perspective of the hospitality issues, the pandemic damages were related to the worsening of working atmosphere, employee job insecurity and turnover (Colmekcioglu et al., 2022). In this context, many researchers advocated that corporate social responsibility and governmental support could provide a positive and equal organizational climate (Han et al., 2020; Zhang et al., 2021a). Additionally, legalized employment contracts and more opportunities should be accommodated, out of the labor rights protections and stimulation of employee safety behaviors (Baum et al., 2020). Another popular issue was related to the utilization of new technologies, especially in hotel sectors, as improving tourism service qualities and reducing social anxiety and the risk of human exposure to COVID-19 (Ghosh & Bhattacharya, 2022; Lau, 2020). These technologies could also be potential in creating responsible behaviors from both tourism and hospitality entities in resource management, environmental protection, and customer satisfaction (Elkhwesky et al., 2022).

From the viewpoint of transportation, the huge reduction in international tourist numbers and reduced carbon footprint, especially in the air transportation, might provide an opportunity for ongoing sustainable development (Lu et al., 2022). Wieckowski (2021) proposed that a sustainable post-pandemic future should be considered, under a green transport model with low energy density and consequent pollution. Gössling (2020) advocated effective control over booking and seat vacancies to reduce reluctant waste in energy consumption and risk of cross-infection. The debate between mass tourism and environmental vulnerability, and a rethinking about tourism sustainable transformation, aroused in the research agenda (Gössling & Higham, 2021; Song et al., 2022). Some researchers (Higgins, 2020; Sigala, 2020) related both spheres of sustainability, the social and the environmental, and proposed that a sustainable future should take "sociocultural issues" such as discriminative tourist experiences, social equality, and deteriorating working conditions of a vulnerable workforce into consideration, so as to achieve benefits and welfare for all the tourism stakeholders (Cheer, 2020; Santos et al., 2020).

Overall speaking, multiple fields addressed by previous tourism research in the context of COVID-19 mostly focused on tourists, destinations, and tourism subsectors. The main discussed themes have been related to new tourists' preferences, destination image, social issues and sustainable tourism (He et al., 2022). However, interactions between the different spheres and themes were not sufficiently explored. Social network, thematic analysis and knowledge mapping would serve to identify common concerns, scientific cooperation, and the knowledge structure among the tourism related fields and topics of interest.

2.3 Bibliometric studies on tourism and COVID-19

A review of previous studies revealed only a few bibliometric studies on tourism and pandemic-relevant topics. All of them developed thematic analysis with different purposes, scopes and techniques. Those with the broadest scope considered the whole industry, analyzing previous tourism research in the context of COVID-19. Ferjanić (2020) focused on investigating the productivity of tourism and pandemic publications to determine future paths in a sustainable perspective. Utkarsh & Sigala (2021) applied content analysis regarding the tourism and hospitality areas and proposed a complete scenario of the tourism development in the post-pandemic era towards a sustainable and collaborative future. However, despite the broad scope of these studies, they mostly performed limited bibliometric analysis, being the case that none of these studies analyzed scientific collaborations and social network analysis to determine collaborative structures. In addition, none of the previous thematic analyses provided the construction of a knowledge map, which would contribute to the better comprehension of the main themes and spheres in this research topic, and the potential interrelations between them.

There were only a few reviews combining thematic analysis, and the study of scientific collaborations, and they were focused on specific tourism-based subfields, hence neglecting the use of a broader scope on the whole tourism industry. A bibliometric study of digital tourism was conducted by Akhtar et al. (2021), who proposed that under the global stress caused by the pandemic, technological innovation, especially digitalization in tourism development, acted as a possible solution for rescuing the tourism economy and releasing mass tourism. Likewise, Casado et al. (2021) also generated bibliometric analyses in a different tourism subfield, in finding thematic connections and emerging trends for urban destination development and discovering considerable current and post-pandemic potential for investigating smart tourism, sustainable and social industrial growth. Therefore, scientific collaborations were explored only on specific and few tourism subfields, which suggested the need to broaden this approach developing a holistic and broad analysis on the tourism industry as a whole in the context of the pandemic.

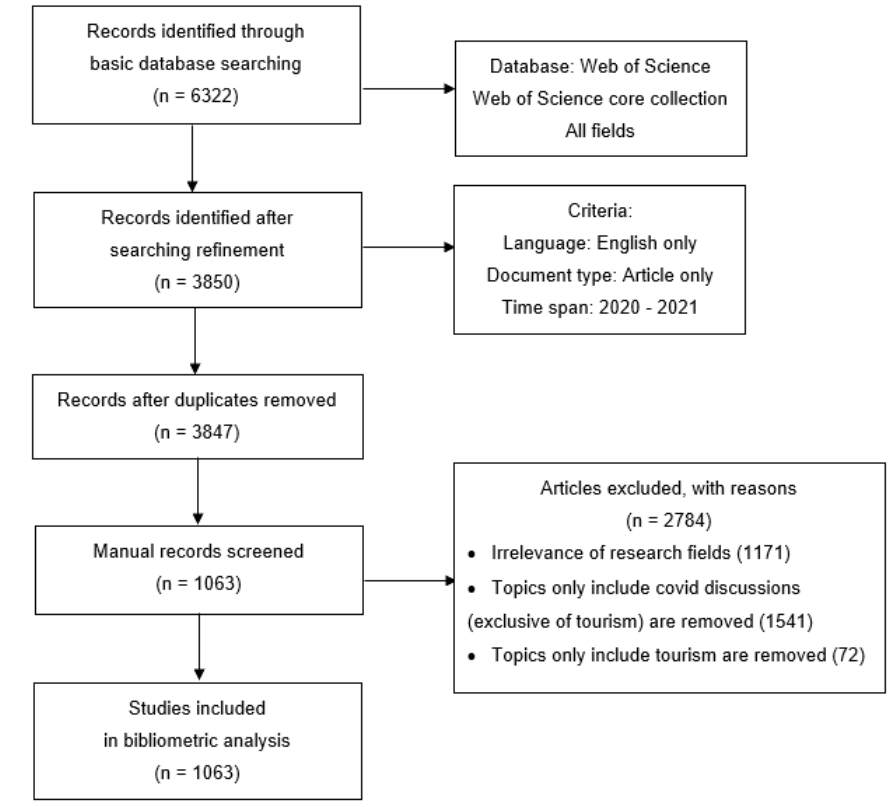
Moreover, scientific collaboration studies could be extended, through social network analysis metrics, which have been widely used in bibliometric analyses (Koseoglu et al., 2018), and from which a better understanding of the academic and knowledge structure could be achieved (Espasandin et al., 2020). These analyses were beneficial in identifying knowledge domains, areas, and discovering new research niches through the combination of valuable information and viewpoints from the academic networks. They thus might trigger information sharing among scholars navigating novel theories, concepts, and multidisciplinary fields (Song et al., 2022). From the revision, it was concluded the need of a broader and more holistic bibliometric research in this field, including both, thematic and scientific collaboration analysis, to better understand the academic structure of the research on COVID-19 and tourism, as well as to gain greater comprehension of its knowledge dissemination. In this dimension, our bibliometric studies aimed to explore tourism development in the context of COVID-19 via social network analysis focusing on the scientific collaboration and relationship among countries, journals and authors.

Moreover, it also sought to develop a holistic thematic analysis, which would also embrace the construction of the knowledge map and thematic relationships.

2.4 Bibliometric analysis on tourism and COVID-19

We exhibited a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram (Moher et al., 2009), over a total collection and refinement period of November 23, 2020, to September 6, 2021 (**Chart 1**). The first step was to select a suitable database for scientific data collection. We chose the Web of Science Core Collection due to its extensiveness and academic recognition, as well as being compatible with mapping visualizations in the bibliometric analytical process (Garrigos et al., 2019). In the next stage, we defined relevant keywords as: “COVID-19” (with its synonyms - “pandemic”, “coronavirus”) + “tourism” (with the synonym - “travel”) to be applied into the Web of Science database, both in the title and abstract parts. Moreover, we adopted a “*” wildcard in search strings to include related words like “tourist,” “traveling” or different COVID-19 related expressions (Utkarsh and Sigala, 2021). This resulted in an optimized search string: (covid* OR pandemic* OR "coronavirus") AND (touris* or travel*), filtered to include English - only articles, in the period 2020 - 2021.

Chart 1. PRISMA flow diagram: literature filtering process of the research



Source: Elaborated by the authors

We used Mendeley to remove duplicates, and manually excluded irrelevant articles based on the following criteria. Articles of irrelevant research fields such as air quality, energy consumption, disease treatment and care in Ebola, SARS, etc. were excluded. Topics related to the COVID-19 virus (COVID-19 transmission, detection, clinical symptoms, treatment and prevention measures like social distancing, non-pharmaceutical preventions, etc.) were removed. We excluded tourism related articles without any discussion of the pandemic. Using these selection criteria, a total number of 1,063 articles were finally targeted for our bibliometric research, with the inclusion of relevant industries like tourism and leisure, hospitality, accommodation, transportation, and different fields like tourists, tourism destinations, companies, and local communities among others.

The VOSviewer program is frequently utilized to construct social networks and graphical mappings, and to present scientific correlations of specific fields, involving subject domains, global academic contributions, etc. (Mulet et al., 2019). We first explored the scientific collaboration in the field, that addressed the main scientific performances and collaborations worldwide among countries, journals and authors. In this regard, we carried out country-dimension co-authorship network analysis to identify scientific collaborations between countries and regions, journal-based co-citation analysis to analyze the disciplinary characteristics of frequently cited journals, and author dimension co-authorship analysis to determine the specific collaboration among scholars (Van & Waltman, 2020). Second, we conducted a thematic analysis through keyword co-occurrence analysis, and created visualizations for the co-occurring term frequencies in different articles (Van & Waltman, 2020). We included some relevant social network analysis metrics (centrality and density) and calculated them by using Ucinet 6 both in co-authorship and keyword co-occurrence networks to gain a better and more solid understanding of the scientific collaboration as well as the thematic structure of the field. Finally, we constructed a knowledge map by analyzing the most cited articles and linking their main ideas with the existing literature to elucidate consensuses and debates over COVID-19 and tourism discussions.

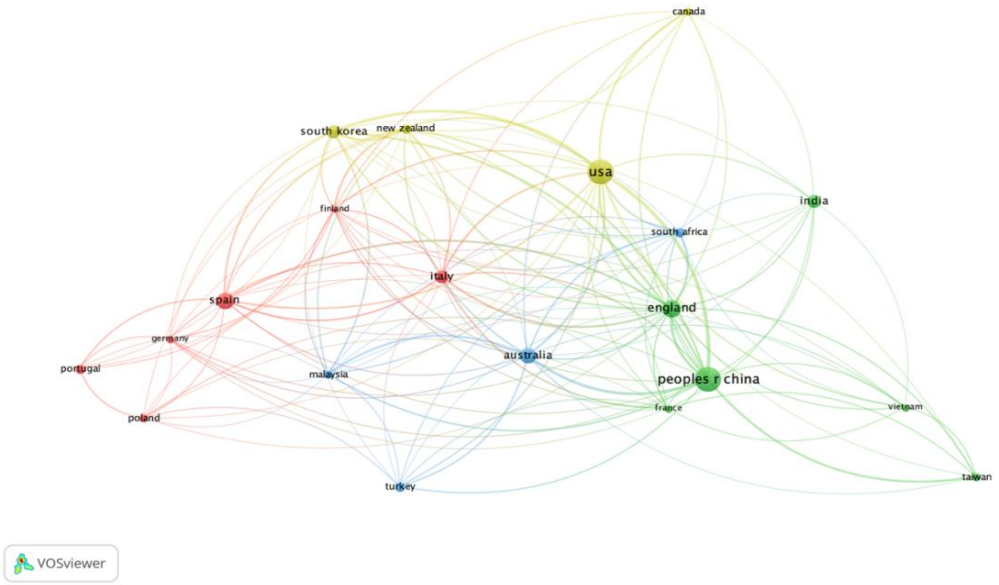
2.5 Scientific collaboration on tourism and COVID-19

2.5.1 Country dimension co-authorship analysis

A country dimension co-authorship map was presented in **Figure 1**. The minimum number of publications for each country was refined to be twenty, with twenty items meeting the thresholds within one hundred countries and regions. Among the four clusters, USA (yellow) and China (green) were the two largest items with largest total strength links (133 and 131 correspondingly), which implied their leading positions in collaborating with other countries and regions. Other sizeable nodes like England (green), Spain (red), Australia (blue) and South Korea (yellow), were highly ranked among the most productive countries in **Table 1** (3rd to 6th). Australia (blue) and New Zealand (yellow) have the second and third highest numbers of total citations (1089, 1047), behind England (1382). Overall, international interests and connections in tourism and COVID-19 research increased, especially in the USA, China, Europe, and the Oceania areas.

Geographically based international participation among European countries could be demonstrated in the red cluster in the map. “Germany,” “Poland,” “Spain,” and “Portugal” exhibit shorter distances, thus indicating closer scientific connections between them probably based on geographical similarities. There were also thicker lines of main nodes in all clusters - “South Korea” and “New Zealand,” “China” with “USA,” “Australia” and “England,” which may indicate close cross-continental partnerships between these most prolific countries. In general, all 20 nodes in the map were relatively scattered, showing the absence of strong knowledge sharing and collaboration in general terms among countries (Jamal & Budke, 2020). In the face of severe global health crises, it appeared that little academic effort was made in the case of developing countries and regions (Novelli et al., 2018). It thus drove the rethinking to the establishment of more solid and broad networking and communications among not only the identified leading countries but also collaborations that involved some vulnerable regions.

Figure 1. Country dimension co-authorship map of tourism and COVID-19



Source: Elaborated by the authors

Table 1. Top 20 most productive countries (according to total publications)

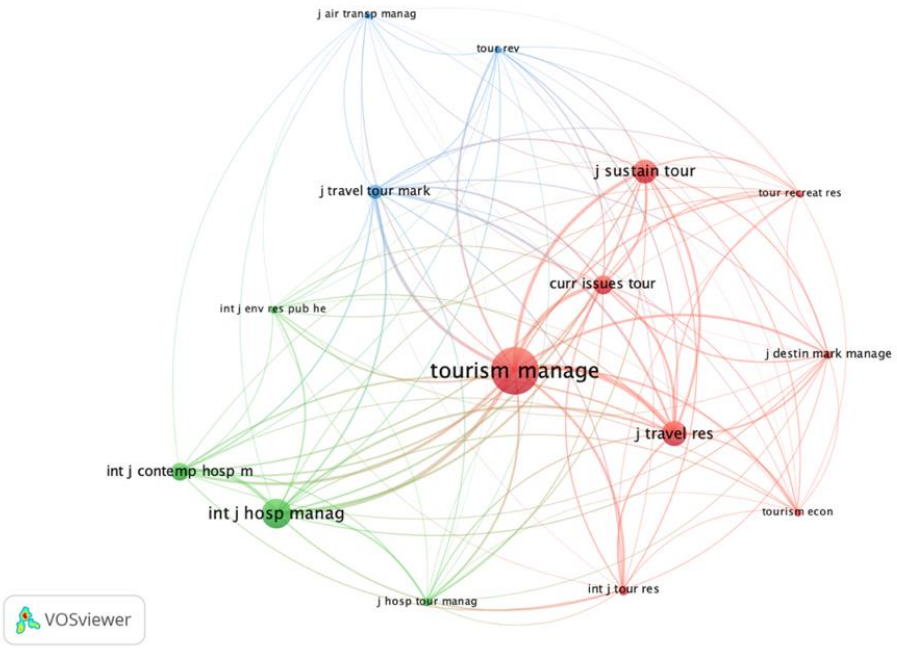
Country	Publications	Total citations	Total link strength
USA	181	1020	133
China	181	990	131
England	103	1382	95
Spain	92	408	53
Australia	86	1089	80
South Korea	67	375	73
India	63	174	18
Italy	60	369	58
New Zealand	42	1047	70
Portugal	40	82	15

Source: Elaborated by the authors

2.5.2 Source co-citation analysis

The cited source co-citation network was presented in **Figure 2**, with the minimum number of each co-cited sources refined to 250, thus, fifteen items met the requirements. In **Figure 2** and **Table 2**, the biggest node - *Tourism Management* (red), enjoys the highest co-citations (2475), indicating that the main academic concerns in the field were concentrated on tourism management, policy, and planning topics as impacted by COVID-19. The top journals - *Tourism Management*, *Journal of Travel Research*, *Journal of Sustainable Tourism* and *Current Issues in Tourism* in the red cluster and *International Journal of Hospitality Management* (the biggest node in the green cluster) apparently had closer relations due to the thicker link strength lines between them. This indicated that their main concerns and collaborations lie in the tourism and hospitality fields, among which tourism management, marketing, tourist behavior and sustainable development fields drew the major interest.

Figure 2. Cited source co-citation map of tourism and COVID-19



Source: Elaborated by the authors

Similarly, there were three clusters separately distributed in the map. Eight journals (red) focused on the tourism and travel fields - tourism management, planning, policies, sustainable issues, etc. Four nodes (green) ranged from the studies of hospitality management to marketing, environmental sciences, and public health. There were three items in the blue cluster, concentrating in tourism marketing, technology, and air transportation issues. We could conclude that the journal co-citation analysis revealed that researchers held conjoint interests in dispersed disciplinaries and themes (Niñerola et al., 2019), as far as relevant connections were detected among journals that belonged to different disciplines.

Table 2. Top 15 highly co-cited source (according to total co-citations)

	Most co-cited journals	Disciplines	Co-citations	Total link strength
1	Tourism Management	Tourism management, planning and policy	2475	36925
2	International Journal of Hospitality Management	Hospitality HR, marketing, business, economics, management, information technology, legislation	1376	8858
3	Journal of Travel Research	Travel and tourism behavior, management and development	1120	20719
4	Journal of Sustainable Tourism	Tourism and sustainable development	1058	13491

5	Current Issues in Tourism	Tourism inquiry, method and practice	853	14629
6	International Journal of Contemporary Hospitality Management	Hospitality strategic management, marketing, finance and HR management	796	12277
7	Journal of Travel and Tourism Marketing	Tourism management, business, government policies, new technologies	585	11333
8	International Journal of Tourism Research	Tourism, leisure and hospitality business, management and accounting, environmental science, social sciences	362	7122
9	Journal of Destination Marketing and Management	Tourism destination marketing, management, policy, planning, economic, geographical and historical contexts	318	6802
10	Journal of Hospitality and Tourism Management	Tourism and travel management, leisure and recreation studies, event management	291	5339
11	Journal of Air Transport Management	Air transport policy, regulation and law, strategy, operations, marketing, economics and finance, sustainability	277	1702
12	Tourism Review	Tourism and subsectors business, management, strategies, marketing, policy, planning and development, information, technology, sustainability, culture, HR, crisis management	271	4774
13	Tourism Economics	Business, tourism, social interests, sustainability, recreation resources	269	4396
14	International Journal of Environmental Research and Public Health	Environmental sciences and engineering, public health, environmental health, occupational hygiene, health economic, global health	268	3907
15	Tourism Recreation Research	Tourism, leisure and hospitality cultural Studies, geography, planning and development, management, monitoring, policy and law	266	3886

Source: Elaborated by the authors

2.5.3 Author dimension co-authorship analysis

We conducted social network analysis through the calculation of centrality and density indicators. **Table 3** showed the degree of centrality of the top eight most-cited authors from the co-authorship network displayed in **Figure 3**. These metrics identified the critical positions, strength of collaborations and corresponding influences of some of the most influential authors in the social network (Koseoglu et al., 2018). We observed that Hall C. Michael, Gössling Stefan, and Scott Daniel, the most cited authors with 800, 782 and 765 citations respectively, also possessed the leading positions according to the scores

of degree centrality and eigenvector centrality. These results indicated their prominent position in terms of scientific collaboration, but also their influential role, prestige and status within the scientific network (Isfandyari et al., 2021). Betweenness centrality ranked Baum Tom in the first position – demonstrating that he represented a channel between several authors, increasing his power and decreasing his dependence on others (Koseoglu et al., 2018). The degree of density was also calculated for the clusters in the co-authorship map, indicating that the cluster including authors such as Gössling Stefan, Hall C. Michael and Scott Daniel, held the largest score (density = 4.8), which would prove the tighter collaborations among these authors, especially the leading ones (Koseoglu et al., 2018).

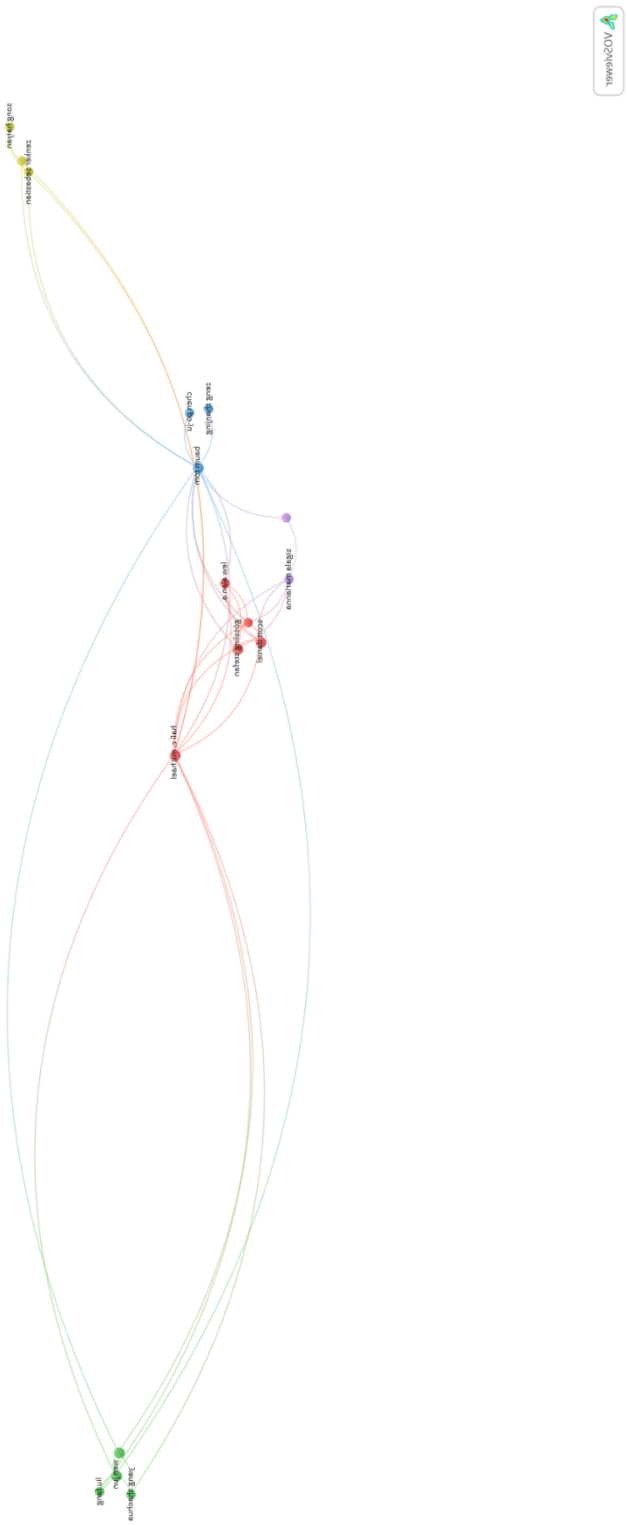


Figure 3. Author dimension co-authorship map of tourism and COVID-19

Table 3. Degree centrality of authors with most citations

		Degree centrality		**Betweenness centrality**		**Eigenvector centrality**
1	Hall C. Michael	41	Baum Tom	157.667	Hall C. Michael	0.817
2	Gössling Stefan	23	Hall C. Michael	124.533	Gössling Stefan	0.377
3	Scott Daniel	22	Song Haiyan	102	Scott Daniel	0.341
4	Baum Tom	21	Zenker Sebastian	67.833	Baum Tom	0.169
5	Wen Jun	21	Wen Jun	10.167	Sigala Marianna	0.114
6	Sigala Marianna	11	Sigala Marianna	5.5	Wen Jun	0.094
7	Zenker Sebastian	10	Scott Daniel	2.033	Zenker Sebastian	0.051
8	Song Haiyan	2	Gössling Stefan	2.033	Song Haiyan	0.002

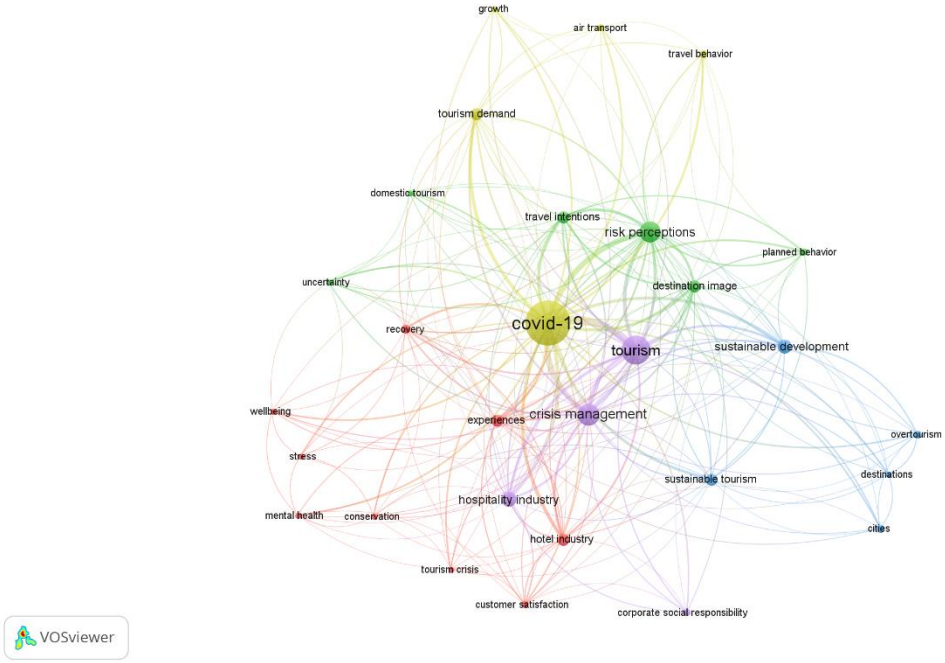
Source: Elaborated by the authors

2.6 Thematic analyses on tourism and COVID-19

2.6.1 Keyword co-occurrence analysis

We also constructed the keyword co-occurrence map (**Figure 4**) and analyzed the centrality degree (**Table 4**) of the top 29 keywords with the most co-occurrences to further identify the prominent positions of main keywords and their influences upon each other (Muritala et al., 2020). Twenty-nine items met the threshold after defining the minimum occurrences of each keyword to be ten. “COVID-19” became the biggest node in the network both in occurrences and total link strength. Terms like “tourism,” “crisis management,” “risk perceptions” and “hospitality industry,” also showed higher total occurrences. The biggest term “COVID-19,” was closely connected with terms like “tourism,” “crisis management,” “risk perceptions,” “hospitality industry” and “hotel industry,” as could be seen from the thick line connections between them. This might also indicate current interests of hot topics in tourism-related subsectors and areas.

Figure 4. Keywords co-occurrence map of tourism and COVID-19



Source: Elaborated by the authors

According to the total number of occurrences and all the three-centrality metrics, tourism, hospitality industry, hotel industry and tourists (with keywords like risk perceptions, tourism demand, travel intentions, travel behavior, customer satisfaction, etc.) became dominant tourism related entities within the area of tourism and COVID-19. Crisis management and risk perceptions also proved to be central and influential according to their high ranks in all three centrality measures (Muritala et al., 2020). We found less influenced topics and fields like destination (destination image), sustainable tourism (sustainable development), overtourism, air transport, corporate social responsibility, etc., with relative low influences and ties of connections with main nodes from the map, due to their smaller values of betweenness and eigenvector centrality (Isfandyari et al., 2021). These topics might be highlighted as underexplored areas and future research that would be necessary to investigate in breadth and depth. Finally, we calculated the degree of density of different clusters from the keyword co-occurrence map. It appeared that nodes in the cluster that includes – tourism, hospitality industry, crisis management and corporate social responsibility – holding closer connections with each other (density = 20.1677), compared with nodes in other clusters (Isfandyari et al., 2021).

Table 4. Degree centrality of keywords with most occurrences

		Occurrences		**Degree centrality**		**Betweenness centrality**		**Eigenvector centrality**
1	covid-19	742	covid-19	910	covid-19	31.924	covid-19	0.882
2	tourism	283	tourism	514	tourism	28.341	tourism	0.385
3	crisis management	153	crisis management	378	risk perceptions	27.177	risk perceptions	0.172
4	risk perceptions	146	risk perceptions	323	crisis management	20.984	crisis management	0.154
5	hospitality industry	67	hospitality industry	146	experiences	14.731	hospitality industry	0.065
6	sustainable development	61	experiences	140	hotel industry	8.189	hotel industry	0.047
7	tourism demand	48	travel intentions	123	hospitality industry	7.672	tourism demand	0.047
8	destination image	47	destination image	121	sustainable development	7.607	experiences	0.046
9	hotel industry	47	hotel industry	111	destination image	6.323	destination image	0.045
10	experiences	46	tourism demand	101	recovery	6.054	travel intentions	0.045
11	sustainable tourism	43	sustainable development	101	sustainable tourism	5.451	sustainable development	0.043
12	travel intentions	41	sustainable tourism	67	travel intentions	4.618	sustainable tourism	0.029
13	recovery	25	recovery	66	tourism demand	4.497	recovery	0.024
14	travel behavior	21	planned behavior	45	customer satisfaction	2.556	travel behavior	0.017
15	cities	17	customer satisfaction	38	uncertainty	2.035	planned behavior	0.016
16	overtourism	17	overtourism	37	conservation	1.818	air transport	0.012
17	customer satisfaction	16	uncertainty	36	mental health	1.193	overtourism	0.012
18	planned behavior	16	travel behavior	33	planned behavior	1.129	wellbeing	0.012
19	air transport	14	cities	28	wellbeing	1.003	growth	0.011
20	corporate social responsibility	13	wellbeing	28	travel behavior	0.896	cities	0.011
21	growth	12	corporate social responsibility	28	stress	0.761	uncertainty	0.011
22	mental health	12	growth	27	air transport	0.739	mental health	0.011
23	uncertainty	12	destinations	27	tourism crisis	0.638	corporate social responsibility	0.01
24	conservation	11	mental health	26	corporate social responsibility	0.444	domestic tourism	0.01
25	domestic tourism	11	air transport	25	destinations	0.361	customer satisfaction	0.01

26	wellbeing	11	domestic tourism	23	domestic tourism	0.26	tourism crisis	0.009
27	destinations	10	tourism crisis	22	growth	0.25	conservation	0.007
28	stress	10	conservation	21	cities	0.236	destinations	0.007
29	tourism crisis	10	stress	19	overtourism	0.111	stress	0.007

Source: Elaborated by the authors

2.6.2 Most cited articles and previous literature linking

The most cited articles with high number of citations were listed in **Table 5**. Here, “Pandemics, tourism and global change: a rapid assessment of COVID-19” (Gössling et al., 2020) had the highest scientific impact. It compared the impact of previous global diseases crises and COVID-19, and questioned the volume-oriented tourism model. The second most-cited reference – “Tourism and COVID-19: impacts and implications for advancing and resetting industry and research” (Sigala, 2020) also focused on the discussion of the transformational opportunity provided by COVID-19, towards a more sustainable and collaborative tourism future. Seen from both keyword domains in **Figure 4** and the top five most cited articles, we concluded that current trending topics concentrated on the “crisis management,” “sustainable tourism,” “resilience” and “social justice” aspects.

Based on the findings of the most cited articles, we constructed a knowledge map (**Figure 5**) of the most discussed themes and linked them with the existing literature to further identify current concerns and research potentials in the discussions of tourism and COVID-19. We accumulated basic ideas from the findings of the keyword co-occurrence map and defined main tourism related entities to be included in the construction of the knowledge map. These entities were also paid special attention by previous scholars, involving tourists (Jeon & Yang, 2021), destinations (Yang & Wong, 2020), hospitality (Han et al., 2020) and transportation (Gössling, 2020). These general entities were combined with more specific topics as customer satisfaction, experience, mental health, wellbeing, overtourism issues, etc., which appeared in the keyword co-occurrence map, and were also emphasized in previous research (Cheer, 2020; Gössling & Higham, 2021; Santos et al., 2020).

Sustainable tourism development was not only emphasized as important research potentials by previous scholars (Gössling & Higham, 2021; Utkarsh & Sigala, 2021), but it also appeared in all the most influential articles, referring as sustainable tourism and transformations (Brouder, 2020; Gössling et al., 2020; Hall et al., 2020; Higgins, 2020; Sigala, 2020), or as sustainability and sustainable development in tourism (Baum & Hai, 2020; Qiu et al., 2020; Wen et al., 2021; Zeng et al., 2020; Zenker & Kock, 2020). This topic was consequently considered as one of the key elements faced by different tourism-related entities in the future tourism growths and decision-makings. Thus, it occupied the center of the knowledge map. We also identified the main sub-themes addressed by the top ten most cited articles and categorized them according to their nature into four dimensions. For the categorization process, we considered the categories already used by previous scholars (Utkarsh & Sigala, 2021), who already identified the social, cultural and environmental categories. We also added the governance

dimension, studied by the authors from the most cited articles (Qiu et al., 2020; Zenker & Kock, 2020). The numbers illustrated in the knowledge map represent the article in which the sub-themes appeared according to the rank of **Table 5** on the most cited papers.

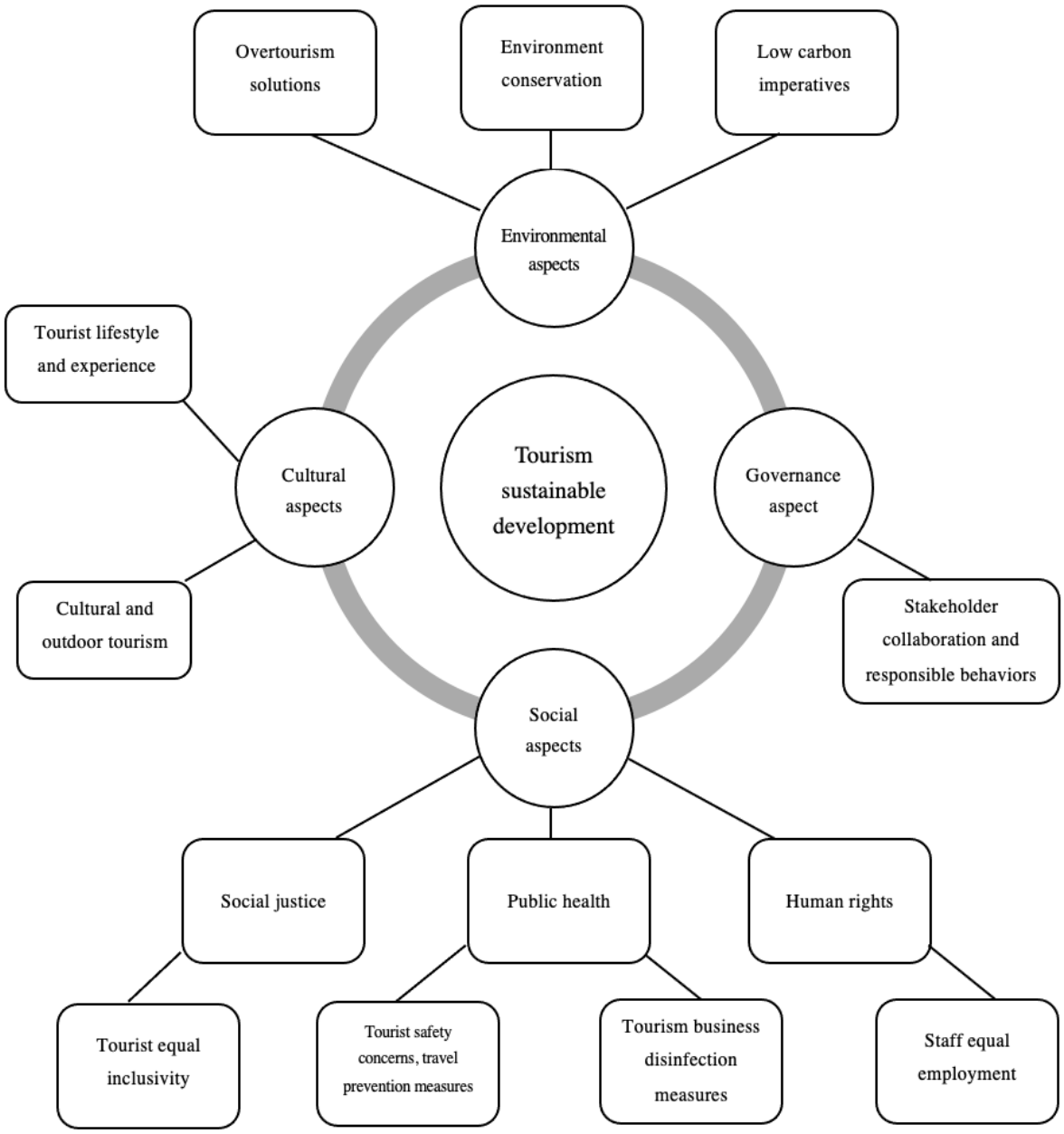
Table 5. Top 10 most cited articles and keywords of tourism and COVID-19

Rank	Titles	Keywords	Citations
1	Pandemics, tourism and global change: a rapid assessment of COVID-19 (Gössling et al., 2020)	Global change, COVID-19, pandemic, crisis, travel restrictions, tourism demand, resilience	607
2	Tourism and COVID-19: impacts and implications for advancing and resetting industry and research (Sigala, 2020)	Tourism, COVID-19, impacts, recovery, resilience, crisis	187
3	Pandemics, transformations and tourism: be careful what you wish for (Hall et al., 2020)	COVID-19, crisis management, disaster management, disaster recovery, pandemic impact, pandemic response, resilience, sustainable tourism, third-order change, tourism policy	158
4	Socialising tourism for social and ecological justice after COVID-19 (Higgins, 2020)	COVID-19, responsible tourism, critical tourism, social tourism, social justice, public good tourism, cruiseship industry	140
5	The coronavirus pandemic – a critical discussion of a tourism research agenda (Zenker & Kock, 2020)	Crises, disasters, coronavirus, COVID-19, pandemic research agenda	112
6	COVID-19: potential effects on Chinese citizens' lifestyle and travel (Wen et al., 2021)	COVID-19, lifestyle, travel behavior, post-disaster, collectivist orientation, China	109
7	From high-touch to high-tech: COVID-19 drives robotics adoption (Zeng et al., 2020)	COVID-19, lifestyle, travel behavior, post-disaster, collectivist orientation, China	91
8	Hospitality, tourism, human rights and the impact of COVID-19 (Baum & Hai, 2020)	Tourism, human rights, hospitality, COVID-19, pandemic	84
9	Social costs of tourism during the COVID-19 pandemic (Qiu et al., 2020)	Tourism impact; pandemic crisis; social cost; willingness to pay; contingent valuation method	83

10	Reset redux: possible evolutionary pathways towards the transformation of tourism in a COVID-19 world (Brouder, 2020)	COVID-19, evolutionary economic geography, path dependence, pathways, reset, tourism, transformation	74

Source: Elaborated by the authors

Figure 5. Knowledge mapping of the top10 most cited articles of tourism and COVID-19



Source: Elaborated by the authors

2.6.2.1 Social dimension

Social concerns over public health management were firstly paid great attention (Hall et al., 2020; Zeng et al., 2020). Top-cited articles provided a general protocol to the fact that crisis management practices were carried out and exampled country by country, including social distancing, traveling restrictions, preventative behaviors like tourism avoidance, disinfection and sanitation approaches (Zeng et al., 2020). In the implementation stage, previous research pointed out that crisis management was found to be more effectively coordinated by some specific tourism entities like hospitality practitioners (Lau, 2020). However, it was also highlighted the absence of proactive and coordinated strategies and planning at the regional or country level.

In addition, job insecurity (Sigala, 2020), unequal exploitation, discrimination of vulnerable groups exposed during the pandemic (Higgins, 2020), appeared in the most cited papers, leading to a rethinking of human rights. Possible solutions which could be found from previous studies should be implemented to better prepare for future emergencies, like the improvement of hospitality employee protection, the corporate support for guaranteeing staff rights, legalized contract, and soft training (Baum et al., 2020; Zhang et al., 2021a). The last social issue was related to the fulfillment of equal tourist access to local tourism sites, activities, and enjoyments, regardless of restrictions and discriminations out of racial or gender bias (Baum & Hai, 2020, Utkarsh & Sigala, 2021). Previous researchers (Yang & Wong, 2020) investigated tourist uncomfortable experiences and pointed out the negative significances it brought to them (deterioration of tourist wellbeing and increased anxious sentiments). New thoughts upon how to improve tourist experiences and sense of participation, as compared to merely regaining tourist access might be an additional problem to be considered (Yang et al., 2021a).

2.6.2.2 Environmental dimension

Previous researchers gave full attention to a series of environmental issues that experienced some changes as a consequence of the pandemic (Gössling & Higham, 2021), as overtourism (Wen et al., 2021; Zeng et al., 2020), environment deterioration (Higgins, 2020) and climate change (Gössling et al., 2020). The pandemic gave the opportunity to rethink these issues and propose some adaptations. As a result of the decreasing tourism traffic imposed by the pandemic, on the one hand, environmental protection was given full attention, as far as the conservation of natural environments emerged as a trending topic, in line with the pursuit of a long-term tourism sustainable development and ecological justice (Higgins, 2020). On the other hand, to solve the overtourism problem, especially in famous tourism destinations and cities, it was advisable to adopt modern high technologies to facilitate the tourism volume management (Wen et al., 2021), and supervision over current tourism assets of cultural heritages and natural sites (Zeng et al., 2020). Another important issue lay in the promotion of low carbon imperatives, incentivized by the mitigation of global climate change in the face of consistent reduction of global travel demands brought by the pandemic (Gössling, 2020). In this regard, research was

focused on a reconsideration towards a sustainable air transportation management with an effective control over both energy consumption and optimized sales for the seats.

2.6.2.3 Cultural dimension

Some top cited articles stressed cultural dimensions, like the changes of tourist lifestyles and preferences - towards less-crowded, nature-based areas to reconnect themselves with the nature and avoidance of the COVID-19 (Wen et al., 2021). This could be explained by the fear to unseen risks like the pandemic and priority to the general wellbeing, especially emphasized by the collectivism culture of Asian countries. Therefore, on the one hand, it could be advised that cultural-sensitive tourists – especially health-sensitive in this sense, might benefit from some niche tourism and outdoor recreation, which would be helpful in the restoration of tourists' mental health, tiredness from daily work and pursuit of novel experiences. On the other hand, future investigations might also shed light on other geographic locations and regions (Jeon & Yang, 2021), to identify if cultural sensitivity could also be differentiated and if this factor would influence tourist intentions in the face of a global health emergency.

2.6.2.4 Governance dimension

In general, a reconsideration of the volume-driven tourism model towards a more sustainable development approach was proposed (Brouder, 2020; Gössling et al., 2020; Hall et al., 2020; Higgins, 2020; Zenker & Kock, 2020). This idea was connected with the governance transformation of the business structures, by taking both the innovative supply and demand management from all the stakeholders into consideration (Qiu et al., 2020; Zenker & Kock, 2020). The rapid development of global modern technologies might even accelerate the solutions for issues, like resource management (Zeng et al., 2020), disinfection and service improvement (Elkhwesky et al., 2022), and fulfillment of tourism experiences (Yang et al., 2021b). Nevertheless, a real tourism sustainable transformation would need the responsible behaviors and willingness to the changes from all the entities, especially local communities and tourism businesses, endowed already with the high benefits from previous large tourism volumes (Hall et al., 2020).

Chapter 3. A thematic analysis upon sustainable issues in the field of tourism and COVID-19

3.1 Theoretical background of tourism sustainability and COVID-19

Under the pervasive sweep of global pandemic, and correspondent governmental responses such as social distancing and strict travel restrictions, various changes occurred among tourism-related sectors, stakeholders, and tourism destinations. The widespread of the global pandemic brought about the opportunity to the rethinking of whole industry (Lenzen et al., 2020). Based on the findings drawn from the first research in **Chapter 2**, it was illustrated that tourism sustainability has always become one of the most interesting topics in the demonstration of keyword analysis and knowledge mapping. In this sense, **Chapter 3** illustrated a bibliometric analysis upon the sustainable issues in the tourism field especially under the influence of the global health crises, by taking the pandemic as an example, for the better comprehension of thematic structures and relationships among different topics discussed before, as well as identifying main knowledge domains and potential themes and areas in this field.

Previous literature in terms of tourism sustainability under the pandemic lied in several perspectives. First and foremost, from the environmental perspective, it was proposed by many researchers that previous volume-driven tourism model should be questioned, whereas a more sustainable transformation under the consideration of environmental vulnerability, climate change and local destination resilience would be of vital importance in the post-pandemic tourism recovery (Cristiano & Gonella, 2020; Gossling & Higham, 2020). In a further step, the consideration over effective allocation of nature resources, preservation of historical sites, local wildlife was paid great attention by many European tourism destinations, whereas the optimization of new energies such as sewage conversion, air purification in the decontaminating of local environment was expected to be developed (Charalambous & Violaris, 2021). Similarly, facing the relief of worldwide carbon footprint due to decreasing international transport and mobility, the advocates towards the continuous of this sustainable model even after the pandemic were proposed by many scholars. For instance, domestic, short distance- trips during air and cruise travels should be promoted due to its small environmental impacts; notwithstanding, whether the volume-based model will be repeated under the gradual recovery of global tourism would arise new challenges to the development of sustainable transportation (Gössling, 2020).

At the same time, a sustainable future also aroused new issues in solving growing socio-cultural problems such as discrimination, inequality, increasing gaps between the rich and the poor. It was thus triggered the enhancement of equal inclusivity of both touristic activities, industrial participation, and employment guarantee (Baum & Hai, 2020). On the one hand, open communication, flexible information exchange and social caring would be beneficial at handling tourists' discriminative experiences, fears, and conflicts due to race, gender and regional bias (Jamal & Budke, 2020), especially when encountered with misleading media news (Yang & Wong, 2020). On the other hand, the security of working conditions and staff rights, especially for unpaid groups, the vulnerable and undeclared work, also became a vital

part in stabilizing the organization structure, long-term sustainability, and survivability of the tourism industry (Higgins, 2020).

From the perspective of the pursuit of the industrial re-boom, a collaborative tourism governance, under the involvement of all the tourism stakeholders, would be of crucial in creating a proactive and responsible atmosphere, and embrace more opportunities and for the realization of local community wellbeing, business vitality and everlasting development (Dangi & Petrick, 2021). To be more specific, the function of governmental incentives, financial supports, and community empowerment was emphasized in promoting local employment and entrepreneurship especially for small and medium businesses (Utkarsh & Sigala, 2021). By the same token, in face of gradual recovery of global tourism, a changeable management of the relocation of tourism resources, contributing to the creation of meaningful tourists' experiences as well as balancing local resident benefits put forward new requirements to both the governments and tourism practitioners in the post-covid sustainable destination reconstructions (Sigala, 2020; Renaud, 2020). In this sense, it was of vital importance to bring about a systematic and holistic reflection over the development of tourism sustainability issues when faced with the global pandemic, to better understand the evolution of themes and topics and discover future research lines within this area.

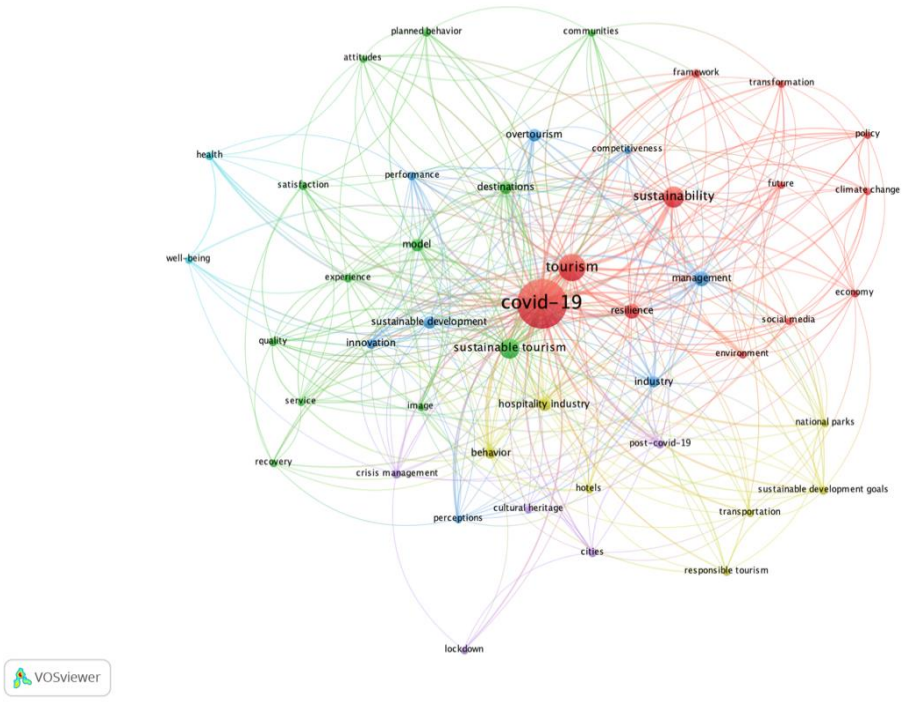
3.2 Bibliometric analysis on tourism sustainability and COVID-19

We utilized the Web of Science database to collect the data from 23rd November 2020 to 06th September 2021, from which the refinement function of research fields (social science), time span (2020-2021) and document type (English only) was adopted. Moreover, we manually examined the data according to their research fields, topics, keywords, abstracts, etc., with a final number of 310 valuable publications for the analytical process. In a further step, the VOSviewer Program was functionated, focusing on the keyword co-occurrence analysis, through which keyword frequencies and the interrelations between them were visualized (Van & Waltman, 2010), to further identify the topic domains, key and underexplored areas in the research process (Utkarsh & Sigala, 2021). Moreover, in order to minimize the replicate information of key topics from synonyms and singular/plural, a thesaurus function of the VOSviewer was utilized into the analytical process as well.

3.2.1 Keyword co-occurrence analysis

Seen from **Figure 6**, within all the 310 selected articles, we defined the minimum number of occurrences to be 6, resulting in a total of 46 items and 6 clusters in the mapping, with a number of total link strength of 986. In detail, according to **Figure 6** and **Table 6**, "sustainability" (red), "sustainable tourism" (green), "management" (blue), "resilience" (red) and "hospitality industry" (yellow) became keywords with most frequencies, following "covid-19" and "tourism", under the discussion over tourism sustainable issues in the pandemic background.

Figure 6. Keywords co-occurrence map of tourism sustainability and COVID-19



Source: Elaborated by the authors

Table 6. Top ten keywords with highest total occurrences of tourism sustainability and COVID-19

Keyword	Occurrences	Total link strength
Covid-19	216	379
Tourism	71	177
Sustainability	43	109
Sustainable tourism	39	91
Management	23	83
Resilience	23	65
Hospitality industry	18	61
Destinations	16	60
Model	16	54
Overtourism	16	34

Source: Elaborated by the authors

Under the navigation of selected articles and previous research, it was found out that studies upon “sustainable tourism”, “sustainability” and “sustainable development” concerns focused on the discussion over collaborative governance in reliving local overtourism, conservation of biodiversity, natural environments, as well as enhancing local wellbeing (Gossling & Higham, 2020; Kuklina et al., 2021; Robina et al., 2021). A possible resolution of these symptoms would be the cultivation in territory and urban planning, exploration in less-discovered areas with rich natural, cultural resources and tourism potentials (Yiu & Cheung, 2021), while at the same time, the utilization of virtual technologies, which contributed to the improvement of tourists’ psychological buffering, alleviation of overcrowding and promotion of destination and community identity would become robust sustenance in the local tourism redevelopment during and in the post-pandemic era (Lemmi & Deri, 2020; Streimikiene & Korneeva, 2020).

By the same token, in terms of “management” and “resilience” perspectives, the significance from both governmental and business efforts in enhancing crisis preparedness, mutual communication and belongness, as well as flexible strategies and responses was laid specially emphasis (Altshuler & Schmidt, 2021; Sharma et al., 2021). Likewise, attentions were also paid to the creation of innovative products especially with technological sustenance, which were predicted to be widely utilized into the tourism industry in the future for providing immersive customer experiences, and sustainable business operation (Srivastava et al., 2021; Streimikiene & Korneeva, 2020). Nevertheless, it was argued that the rapid development of digital products would deteriorate the conditions and wellbeing of lower-paid tourism staff due to job precarisation (Rydzik & Kissoon, 2021). Technological issues were seen as an important factor that would influence the development of tourism competitiveness and longevity, whereas only the item – “innovation” (blue) could be related to the field in the map. This might indicate the research potentiality in respect to the connection between new tech and sustainable tourism models in the future.

One of the most reviewed entities lay in the “hospitality industry” topics, on one side, the negative impact of the pandemic causing unemployment and staff psychological problems was widely discussed (Chen & Chen, 2021), whereas the benefits of the most vulnerable groups due to gender, age and education bias were expected to raise further considerations (Higgins, 2020; Lopes et al., 2021). On the other side, the green practices from both hotel and restaurant industries, incorporating the promotion of local products, tidy environment and energy-saving facilities, not only contributed to the enhancement of destination branding, customer satisfaction but should also be bolstered for the sake of the whole industry (Cai et al., 2021; Yousaf et al., 2021).

Seen from the mapping, compared with “covid-19” and “tourism” terms, items in the keyword-co-occurrence map demonstrated a scattered allocation, with a small number of occurrences. Keywords from each cluster also presented a diverse entity characteristic, involving items like “hospitality industry” (yellow), “national parks” (yellow), “transportation” (yellow), “destinations” (green), “communities” (green), “cities” (purple) and “hotels” (purple), which indicated that the tourism sustainable development under the focus of the health crisis would be a conjoint effort from a variety of stakeholders. It conformed to the idea of Dangi and Petrick (2021), who further stressed the thought into the construction of equal

participation of decision-making process, especially embracing the ignored entities such as the small and medium enterprises, and the developing destinations, which haven't gained much attention, might be deeply developed in a further step.

We also found several less-discovered areas in the visualization. First and foremost, the importance of tourists' responsible behaviors when making travel choices gained little attention (Eichelberger et al., 2021). Nodes "responsible tourism" (yellow), "behavior" (yellow) and "planned behavior" (green) could reflect this discussion, however with little relatedness among them, which would indicate the future research orientation in terms of "responsible practices" of different entities during tourism activities, under the consideration of minimizing the site and environmental impacts. In addition, it appeared that "transportation" (yellow) holds a close relationship with "sustainable development goals" (yellow), which could be manifested in the arguments upon the increasing necessity over safer, cleaner and more comfortable mobility patterns like private cars, bicycles, the public transportation or even walking (Thombre & Agarwal, 2021). This corresponded with the idea of Gössling (2020), Ioannides and Gyimóthy (2020), who furtherly advocated the consistency of this sustainable model even when the health crisis terminates, for the establishment of a more balanced touristic world.

Furthermore, "social media" (red), was regarded as an effective approach for the relief of psychological stress brought about by outgoing confinement or negative tourism experiences (Mansourian, 2021; Yang & Wong, 2020). It turned out that the remote distance between "social media" (red) and "well-being" (light blue) might indicate the research potential between these two concepts and further extended into the social media impacts on the fulfillment of tourists' life quality and satisfaction. It was also pointed out by Crossley (2020) that social media played a vital role in presenting a sustainable destination image when correctly utilized, whereas the strategic planning related to the transmission of local positive image and enhancement of sustainable awareness could be furtherly navigated.

Chapter 4. Tourism and COVID-19 in China: recovery and resilience strategies of main Chinese tourism cities

4.1 A general overview

Another important topic that was highly correlated to the tourism development would be the recovery and resilience perspectives. Tourism resilience was also paid special attention in the second theoretical research in enhancing the crisis preparedness, mutual communication and belongness, as well as flexible strategies and responses from a macro level (Altshuler & Schmidt, 2021; Sharma et al., 2021). Drawn from the first bibliometric study, in which scientific collaboration networks (**Table 1** and **Figure 1**) highlighted China as one of the main collaborative countries in terms of tourism and COVID-19 studies. In a broader sense, the global pandemic also brought about China as the topic center due to its rapid health emergency response and recovery from the pandemic. In this dimension, we included a theoretical study to investigate the recovery and resilience tourism strategies and possible future development of four main Chinese tourism cities (**Chapter 4**). We collected data from the official accounts of tourism administrations of these cities, tourist attractions and opinions from media and newspapers in Sina Weibo platform. We adopted an inductive approach in observing relevant social media posts, and applied content analysis to identify main China's tourism prevention and recovery strategies. Our research enriched the current literature in urban tourism recovery studies analyzing the specific case of Chinese tourism cities and fulfilled some voids of previous research mostly focused on the first wave of the pandemic and the recovery strategies mainly of western cities. It also provided valuable suggestions to tourism practitioners, destinations and urban cities in dealing with regional tourism recession and finding possible solutions for the scenario associated to the COVID-19 and other similar health crisis.

4.2 Prevention measures under the pandemic backdrops

Ever since the outbreak of COVID-19, scholars worldwide have emphasized the importance of pandemic prevention measures. Previous studies illustrated the need of conjoint efforts from governments, health professionals and local communities in the construction of open communications, public health infrastructures and capabilities to provide in-time response and measures in dealing with global health emergencies. These measures included testing, sanitation, social distancing and mobility tracing (Qiao et al., 2021; Vărzaru et al., 2021; Villacé et al., 2021).

Prevention measures applied at a local level by tourism cities or regions were also analyzed. In the specific case of China, Im et al. (2021) emphasized the prevention measures applied in Macao region, which included strict mobility restrictions, guarantee of mask supply, quarantine measures, disinfection of hotels and public places, and cancellation of big events. Similarly, Yu et al. (2021) advocated the utilization of digital passenger contact tracing and strong nonpharmaceutical preventions, especially in

controlling the pandemic diffusion brought by international travels in the case of Hongkong city. Out of China, Huynh et al. (2022) analyzed Can Tho city (Vietnam) and concluded the relevance of proper crisis preparedness, proactive and adaptive management over the global pandemic, after observing the negative effects of the overload of healthcare system and ineffective governmental response in some waves during the pandemic.

We conclude that the studies on the prevention measures applied in tourism cities were quite scant, and that they mostly concentrated in a limited time span, basically during the first wave and the corresponding recovery stage. As a consequence, part of our research also aimed to fill this gap. In detail, we would like to investigate the main prevention measures, recovery strategies and new trends of China's main tourism cities in all the three stages of the global pandemic, from January 2020 to September 2021. Our research not only expanded the research timespan – including both the first and second wave of China's pandemic expansion with their corresponding recovery stages, and the third wave of expansion - but also extending the scope of the research targets to four main China's mega tourism cities - Wuhan, Beijing, Shanghai and Guangzhou, so as to bring about a more complete view of the pandemic prevention response at a local level and its changes during different phases of the health crisis.

4.3 Tourism recovery protocols in a pandemic scenario

Worldwide researchers and tourism practitioners also paid attention to the recovery and achievement of robust tourism growth in the pandemic scenario. With this objective, some measures were applied by governments as financial supports and tax reduction, the release of short-term financial burdens, and fostering the improvement of crisis management abilities, flexible employment, and development of recovery protocols and plans in the long-term (Knight et al., 2020; Vărzaru et al., 2021). From the corporate perspective, main concerns were raised in the promotion of local destination image and recovery of customer confidences, which required a more effective customer relationship management, e.g., effective communication and refund policies (Liu et al., 2021b), and sustainable destination management in correspondence with changeable tourist cultural identity and travel preferences, e.g., high-quality personalized products in wellness, outdoor tourism (Neuman et al., 2021; Huang et al., 2021) and promotion of virtual experiences (Lu et al., 2021).

The resilience of the tourism industry, and especially in the case of tourism cities, emphasized the focus on a sustainable development perspective. On the one hand, some solutions were around the counterbalance of historical cultural resource preservation and the establishment of city branding under the sustenance of modern technologies. For instance, Naples (Italy) and Kraków (Poland) both launched digital tours of local cultural attractions with the aims to provide immersive customer experiences, cultural identity, and reservation of local heritages in the avoidance of over-tourism and COVID-19 transmissions (Bosone, et al., 2021; Kowalczyk et al., 2021). In addition, Macao region (China) devoted its efforts to tourism management, by embracing both governmental financial stimulus for the survival

of local tourism enterprises, consumptions, and regional technological collaborations in the enhancement of local cultural authenticity and branding (Liu et al., 2021a).

On the other hand, many European and Oceanian countries focused on the establishment of transformative and sustainable cities, promoting for example local green spaces and suburban areas, under the premise of orienting the traveling preferences towards domestic, outdoor, fresh environments (Liang et al., 2021). The development of sustainable cities also involved the enhancement of city responsibility in combining green initiatives, technological innovation, resource management, and mitigation of local conflicts together for the better preparedness of future tourism crises (Jiricka et al., 2021; Pasquinelli et al., 2022).

The last trend identified in previous studies on recovery strategies of the tourism industry from a local perspective considered the use of the pandemic as an opportunity to foster the sector (Zhang, 2021). There was a research line on dark tourism that used historical disasters as a resource to boost tourism. It was the case of worldwide popular dark tourism sites that offered full cultural attractiveness to tourists (Lewis et al., 2021) and educational significances in the enhancement of human identities (Qian et al, 2017; Wang et al., 2021), taking profit of a strong marketing orientation in the establishment of authentic customer experiences and sense of belonging (Boateng et al., 2018; Powell et al., 2018). In the specific case of the COVID-19 pandemic, Wuhan city became a recognized destination of dark tourism because of its successful survival in the anti-pandemic campaigns in recent years (Stone, 2020).

This revision emphasized the significance in the understanding of tourism cities' recovery strategies worldwide in the pandemic scenario, and the opportunity that it offered as a means to explore possible solutions to foster tourism recovery and development opportunities. In this dimension, we found an absence of discussion over China's tourism recovery and resilience, which could be supplemented by this study, in the special case of China's tourism cities – Wuhan, Beijing, Shanghai and Guangzhou, with the aims to enrich current state of the art, discover new tourism growth potentials and better preparedness for tourism urban city survivals in the face of global health diseases.

4.4 Social media analysis of mega tourism cities of China

We chose main mega tourism cities of China – Shanghai, Beijing and Guangzhou, as research targets to fulfill our objectives because of the following reasons. Shanghai, as the center of technology, innovation, trade and finance of China (Deng et al., 2019), has become a well-known international metropolis and famous tourist destination (Mou et al., 2020). Beijing, the capital and political heart of China, endowed with a long history of over 3000 years and rich cultural heritages (Zhang et al., 2019). Guangzhou – as the largest trade center of South China (Huang, 2021), has attracted thousands of worldwide and domestic tourists as a "shopping paradise" and city with worldwide tourist attractions (Yang & Zhang, 2020). We also embraced the study of Wuhan – as the origin of the first confirmed COVID-19 case. It obtained high worldwide reputation due to quick response, control over the pandemic, and rapid recovery of local tourism and consumption from the health emergency (Wang et al., 2022b).

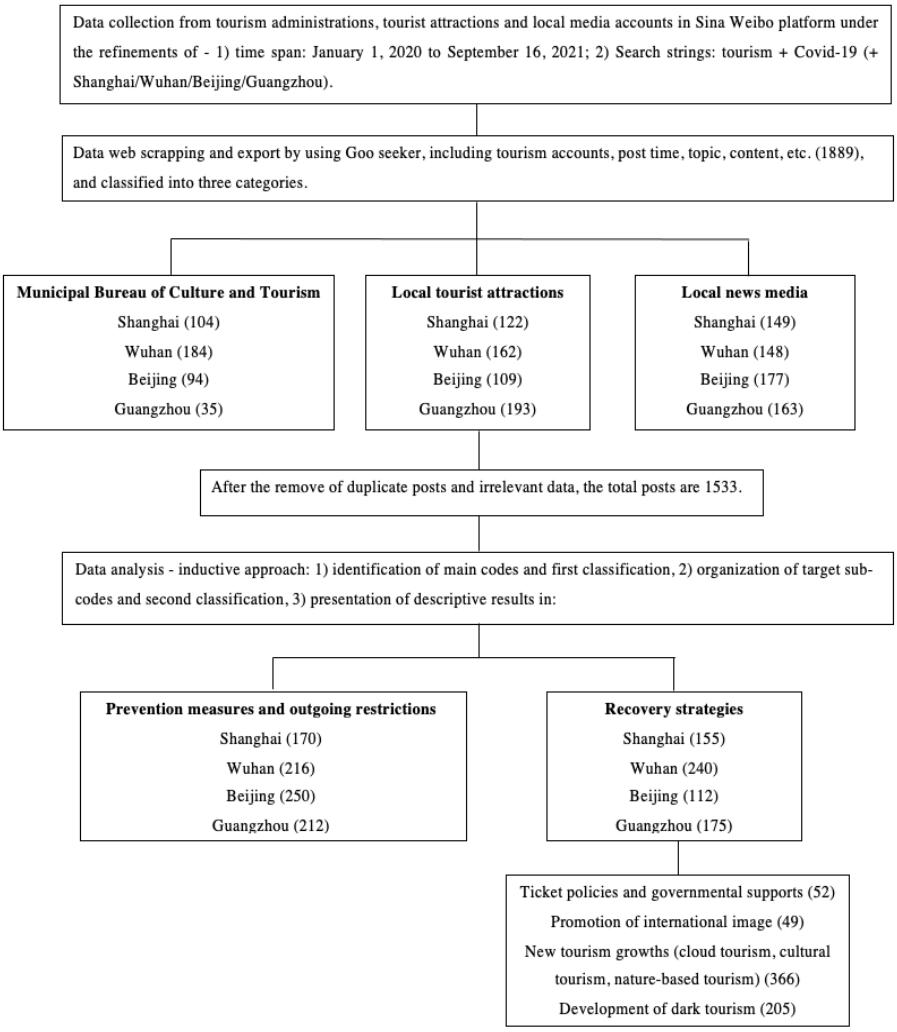
Data were collected using Sina Weibo, as one of the biggest micro-blogging platforms in China, which has been widely used by Chinese people to share their thoughts and interact with others due to its convenience in posting and retweeting online texts, pictures and videos. Sina Weibo platform was previously applied to conduct research on destination marketing strategies (Yang et al., 2021b) and the solution of online complaints (Liu et al., 2021b).

Sina Weibo accounts considered in our research belonged to the local tourism administrations, tourist attractions and newspapers. We combined the tourist attraction ranking in Trip.com (Trip.com, 2022) – one of the biggest travel agencies in China, by selecting top attractions with over 4.5/5 scores, including local museums [Wuhan Revolution Museum, Shanghai Museum, The Palace Museum (Beijing) and Guangdong Museum (Guangzhou)], scenic spots [Yellow Crane Tower (Wuhan), The Summer Palace (Beijing), The Canton Tower], resorts (Guangzhou Chimelong Tourist Resort, Shanghai Disney Resort), etc. Some local newspapers with over one million followers were also chosen as targets, including Eastday.com (Shanghai), WuhanChina.com, BeijingDaily.com, and GuangzhouDaily.com.

In the next stage, we applied the advanced searching function of Sina Weibo, by refining the keywords of “tourism + COVID-19”, timespan as January 1, 2020 – September 16, 2021; and utilized the searching in all the three types of accounts we chose (**Chart 2**). We supplemented the keywords to “tourism + COVID-19 + Shanghai/Wuhan/Beijing/Guangzhou” when we retrieved the information from local newspaper to make sure the relevant data were refined within the scopes of these four chosen cities. We chose Goo seeker – an online data scraping platform to export all the relevant data – tourism accounts, post time, topic, content, etc., and downloaded a total of 1889 posts. We looked through all the data; removed the duplicates and the irrelevant data without pandemic discussions. In total, we obtained 1533 valuable posts.

We adopted an inductive approach, rooted in the observation of the phenomenon (Brotherton, 2015). During the analysis, the main researcher reviewed the sample to become familiar with the data. Frequently occurring features - COVID-19 prevention and China’s tourism recovery strategies were identified as main codes. The other co-authors reviewed the initial codification and provided a holistic input on the codebook. In an iterative and reflexive process, the main researcher applied the coding strategy to all posts according to the coding framework established in the code identification process and categorized four subcategories as ticket policy and financial supports, international image, tourism growths, and the development of dark tourism. The codification was discussed among all the coders until broad consensus was reached. Finally, we discussed the contents in each category and subcategory, refined them, and elaborated the results.

Chart 2. Data collection and analytical process of social media analysis



Source: Elaborated by the authors

4.5 Prevention measures and outgoing restrictions of mega tourism cities of China

Regarding China's prevention and outgoing restrictions, five stages of the pandemic expansion in mainland China were formalized (Wikipedia, 2021): the first wave (2019.12-2020.3) and recovery stage (2020.3-2020.11), the second wave (2020.12-2021.2) and recovery stage (2021.3-2021.6), and the third wave (2021.7-2021.8). Each stage embraced the discussion over both domestic and cross-border prevention information and outgoing restraints (**Table 7**). It was found that general instructions over COVID-19 prevention and control policies were imposed by the central government of China. During the different stages, flexible regional policies were further organized by the Ministry of Culture and Tourism and implemented by the tourism cities, according to the situation of local COVID-19 expansion and travel mobilities.

Table 7. Prevention measures and outgoing restrictions of China's main tourism cities

Classification	No.	Examples of posts	Key content	User
Prevention measures	1	"…tourist attractions should establish reservation system…enter the park at intervals…do a good job in the registration of tourist information…" "… the opening of scenic spots should not engage in "one size fits all"… "…on April 13…only outdoor areas are open to tourist attractions … tourists received shall not exceed 30% of the maximum carrying capacity…"	Tourist entrance examination	Ministry of Culture and Tourism
	2	"…fully open shopping malls, supermarkets, hotels, restaurants…take current restrictions to open parks, scenic spots…entertainment places limit the flow of consumers…not exceed 50%…"	Gradual recovery of tourism activities	
	3	"…tourists received by the scenic spot…spectators in theaters…should not exceed 75% of the maximum carrying capacity…"	Release of entrance carrying capacity	
	4	"…during the Spring Festival, we call for the reduction of mobility, travel, gatherings, and advocate people to spend the festival at where they work…"	Spring Festival "stay-put"	
	5	"…no longer a unified limit on the proportion of the number of people in entertainment venues in low-risk areas…" "…Beijing will resume cultural and sports tourism activities…open parks, scenic spots, scenic spots and historical sites according to 75% of the current limit…" "…Shanghai's theaters, Internet service and entertainment venues should be open…visitors to museums and art galleries are no longer subject to a unified limit but shall not exceed the approved maximum capacity…"	Flexible control policy	Ministry of Culture and Tourism and media (Beijing, Shanghai)
	6	"…tourism venues in the medium and high-risk areas of Guangzhou are all closed… entertainment venues, museums, art galleries…should close in other areas…outdoor parts of tourist attractions are limited to 50%..."	Pandemic management in Guangzhou	Municipal Bureau of Culture and Tourism (Guangzhou)

	7	"…we will strengthen the defense line of "internal non-proliferation and external anti-import", strictly prevent the spread of the pandemic through cultural and tourism channels…"	Overall strict pandemic control	Ministry of Culture and Tourism
Outgoing restrictions	8	"…China has decided to temporarily suspend the entry of foreigners with valid Chinese visas on March 28, 2020…"	Suspension of international travel	Media (Beijing)
	9	"…inter-provincial passenger transport and tourist-chartered vehicles entering and leaving Beijing will be suspended…" "…Wuhan City has strengthened the control of people entering and leaving Wuhan…. random inspections of private vehicles…check whether live birds, wild animals, etc. are carried…"	Suspension of inter-provincial travel	Media (Beijing, Wuhan)
	10	"On July 14…travel agencies and online travel companies can resume operating inter-provincial team travel and "air ticket + hotel" business, except medium and high-risk areas…"	Resumption of inter-provincial travel	Media (Shanghai)
	11	"…the general public go on staggered peak travel…" "…. the Dragon Boat Festival holiday is the first holiday after Beijing's emergency response level raised…adhere to 'limited, appointment, staggered peak'…travel prudently…" "…at the peak of summer travel…Shanghai citizens should choose their travel destinations carefully…take personal protection, maintain proper social distance, travel safely…"	Festival outgoing tips	Municipal Bureaus of Culture and Tourism (Wuhan, Beijing, Shanghai)
	12	"…is the peak tourist season in the summer vacation…people in high-risk areas should cancel their travel…people from other areas should carefully check the pandemic risk situation of the travel destination before traveling…"	Festival outgoing tips	Ministry of Culture and Tourism

Source: Elaborated by the authors

4.5.1 The first wave and recovery stage

Ever since the outbreak, the Ministry of Culture and Tourism of China already recommended a series of prevention measures including the close of travel agencies and careful control over tourism flow. By

March 2020, domestic tourist attractions in low-infected regions were allowed to reopen under the consideration of actual situation of local pandemic. However, Wuhan, Beijing, Shanghai and Guangzhou all conducted strict pandemic control, through closing main tourist attractions, activities and inputting tourist entrance temperature testing, reservation, regular cleaning and disinfection (Table 7, No. 1). By the middle of April 2020, a gradual recovery of China's outdoor scenic spots, tourist attractions and entertainment places appeared, refined with 30% of daily customer entrance limits (Table 7, No. 1). In May 2020, domestic restrictions were further released, through the overall reopen of hotels, restaurants, shopping malls and adjusting capacity of scenic spots and entertainment places from 30% to 50% (Table 7, No. 2). By September 2020, the domestic daily number of passenger entrance into scenic spots were expanded to 75%, with the overall reopening of both indoor and outdoor activities (Table 7, No 3).

In terms of traveling, foreigner entry into China was suspended in this stage (Table 7, No. 8). In January 2020, Beijing and Wuhan also strengthened local outgoing control, with either suspending all the interprovincial passenger transports or improving local mobility supervision (Table 7, No. 9). The recovery of interprovincial travels and "hotel + ticket" services in the low-infected areas appeared in July 2020 (Table 7, No. 10). Beijing, Wuhan and Shanghai strongly recommended the citizens to choose staggered peak travels and strict obey to the prevention measures during Dragon Boat Festival in June and the summer holidays (Table 7, No. 11).

4.5.2 The second wave and recovery stage and the third wave

In the second wave, the Ministry of Culture and Tourism of China advocated "stay-put" policy (Xinhua, 2021) to encourage people to celebrate the Spring Festival at where they worked or lived to reduce domestic personnel mobility (Table 7, No. 4), opening at the same time many tourist attractions to satisfy the citizens' expectations during the festival. The Ministry of Cultural and Tourism of China adapted the control policy, under the consideration of local tourism flow and pandemic situation in March 2021. For instance, tourism in Beijing and Shanghai obtained rapid recovery – the former stressing the carrying limits of outdoor recreations to 75%, and the latter advocating a non-unified regulation of local scenic spot and entertainment place visits, within the maximum carrying capacity (Table 7, No. 5). In May 2021, regional mass infections reoccurred in Guangzhou, provoking the forbidden of indoor dining and close of entertainment places in highly infected districts (Guo, 2021). Partial Guangzhou's tourist attractions in low-infected areas could be open under a 50% limitation of the total holding capacity (Table 7, No. 6).

The third wave started with the regional pandemic diffusion in Yunnan Province in July 2021, when the central government imposed strict prevention and outgoing control over all the country, as a national priority – involving reclose of partial scenic spots, strict control tourist entrance, and public place disinfection (Table 7, No. 7). Moreover, the Ministry of Culture and Tourism of China advocated several outgoing suggestions – especially high attention to self-protection during travels (Table 7, No. 12). By the end of August 2021, scenic spots were steadily reopened, which might indicate the next stage of the pandemic.

4.6 Recovery strategies of mega tourism cities of China

Among the recovery strategies of China's tourism cities, four aspects were categorized, including ticket policies and governmental financial supports, promotion of international image, new types of local tourism – cloud, culture and rural tourism, and the development of China's dark tourism. **Table 8** and **Table 9** summarized the results.

Table 8. Recovery strategies of China's main tourism cities

Classification	No.	Examples of posts	Key content	User
Ticket policy	1	"… Wuhan Tourism Benefit Vouchers distributed to Wuhan citizens and tourists…." "…from January 23rd, Wuhan Happy Valley will be temporarily closed...Visitors who have booked tickets online can apply for a full refund…" "…fans can apply for a refund for tickets that have not been written off …you can use the same discount to buy the [new Zhu Yilong fan exclusive ticket] …" "…tickets that have already been purchased for Canton Tower can be fully refunded..."	Ticket refund, discount and vouchers	Municipal Bureau of Culture and Tourism (Wuhan) Tourist attraction (Wuhan, Shanghai, Guangzhou)
	2	"… '12345 legal consultation service line' is opened for citizens involved in travel agency withdrawal and refund disputes during the pandemic..."	Complaint consultant	Municipal Bureau of Culture and Tourism (Beijing)
Financial supports	3	"…from July 23, Wuhan has vigorously promoted 'Hundred Days Action to Stabilize Posts with Training'… subsidized funds can be used to issue wage subsidies and living allowances for employees…" "…subsidies for work-based training in Guangzhou will continue…"	Employment stabilization	Media (Wuhan, Guangzhou)
	4	"…the Municipal Finance Bureau of Beijing has worked with cultural and tourism departments to pass the budget…to ensure tourism exhibitions, overseas tourism promotion, tourism market management…" "…funds will focus on supporting Shanghai cultural enterprises… more attentions to the fields of audio-visual, cultural consumption, e-sports…"	Competitiveness enhancement	Media (Beijing, Shanghai)

Promotion of international image	5	"…the 7th Beijing Wangfujing International Brand Festival officially opened… to display the phased achievements of Wangfujing's transformation and consumption upgrading…" "[When foreigners in China travel to Wuhan…] …this is my fourth visit to Wuhan, and my first visit to Wuhan after the pandemic…I admire the city of Wuhan, which is very safe and prosperous…"	Transmission of rapid recovery message to the whole world	Tourist attraction (Beijing) Media (Wuhan)
Tourism and new technologies	6	"…the exhibition hall is temporarily closed… we can walk into it through the VR panorama of the Palace Museum Exhibition App…"	Virtual reality	Tourist attraction (Beijing)
	7	"…we will suspend the manual explanation service…you can use the intelligent audio guide device of the museum…"	Digital audio guide	Tourist attraction (Wuhan, Beijing, Shanghai, Guangzhou)
	8	"…the Municipal Park Management Center is actively building a smart ticketing platform…"	Smart ticketing platform	Municipal Bureau of Culture and Tourism (Beijing)
	9	"…Guangdong can take the opportunity of 'cloud trading' to integrate into the global trend of mobile Internet, new media, and integrate artificial intelligence, big data, 5G…to promote cloud economy, cloud expo, cloud cultural tourism…"	New technologies	Media (Guangzhou)
Cultural tourism	10	"… 'Relics Don't Talk - Listening After Recovery' was co-hosted by Hubei Provincial Museum…The event interprets the story behind 6 cultural relics in short videos, and conveys the traditional Chinese humanistic spirit…" "…We held Weibo online activities, such as the 'How Much You Know About Guangdong Museum' knowledge contest… 'Guangdong Museum's Intangible Cultural Heritage' live broadcast… "… 'Beijing intangible cultural heritage open course' series were launched… "Meihuazhuangquan" - one of China's traditional martial arts, was taught to help people to enhance the body's immunity against the COVID-19…" "…Shanghai Museum will launch the 'Tang Dynasty Heishi Shipwreck Relic Collection	Cultural forum, course and exhibition	Tourist attraction (Wuhan) Tourist attraction (Guangzhou) Media (Beijing) Tourist attraction (Shanghai)

		exhibition' - the first inbound exhibition of cultural relics after the pandemic…"		
	11	"…during the Chinese New Year…organize online cultural performances, Spring Festival temple fairs…carry out cloud tours, cloud classrooms…" "…a dragon boat is displayed in Guangdong Museum…How did the children inherit the dragon boat culture? On June 12, let us follow the camera… [broadcasting platform]"	Celebration of traditional Chinese festivals	Media (Beijing) Tourist attraction (Guangzhou)
Rural tourism	12	"…tourism products such as ecology, red, gourmet, picking…will be launched…a series of products called 'Visiting Shanghai' will be launched, hoping to guide citizens and tourists to experience Shanghai…" "…will launch a series of Beijing outings in the directions of Gubei Water Town, Yunmeng Mountain, Yunfeng Mountain, and Yanqi Lake…"	Traveling to superb	Municipal Bureau of Culture and Tourism (Beijing), media (Shanghai)
	13	"…despite the impact of the pandemic, people's willingness to travel is still relatively strong, and a large number of passengers flows to villages, mountains and lakes…various localities have launched folk tours, hot spring tours, ski tours, flower viewing…"	Enjoying the nature	Media (Wuhan)
	14	"…Guangzhou launched the 'Beautiful countryside' project…Hot Spring Fortune Town, Ecological Design Town, National Medical Town… have received unanimously praised…"	Countryside tourism	Media (Guangzhou)

Source: Elaborated by the authors

4.6.1 Ticket policies and financial supports

In the face of the halt of domestic tourism, ticket policies were launched by local tourism administrations and tourist attractions. Full-refund and discount policies were provided by local tourist attractions to maintain the trustfulness from the customers (Table 8, No. 1). Beijing Municipal Bureau of Culture and Tourism opened the "legal consultation line" for citizens and travelers involved in withdrawal and refund disputes with travel agencies (Table 8, No. 2). The National Ministry of Finance of China introduced financial supports by March 2020, which were managed in different ways in each city. Wuhan and Guangzhou chose to stabilize local employment by launching subsidized staff training plans (Table 8, No. 3). Shanghai and Beijing preferred to enhance local tourism competitiveness with the former

integrating tourism and technological resources in e-sport and e-tourism consumptions; and the latter supporting the launching of tourism events like oversees tourism promotion and market management (Table 8, No. 4).

4.6.2 International image

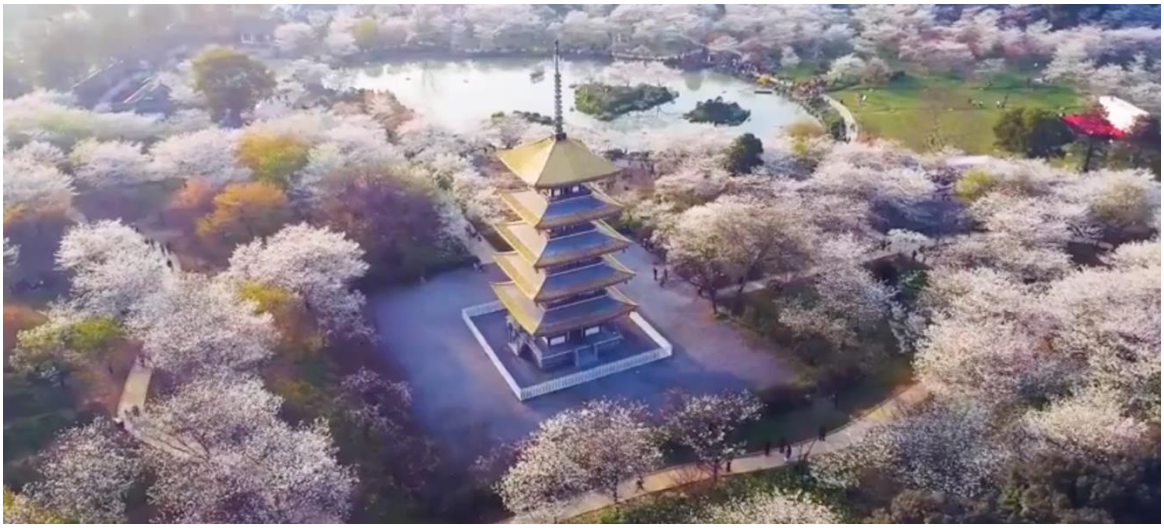
During the recovery stage of domestic pandemic, international events were convened to transmit the rapid resilience message of China's tourism to the whole world. From June to December 2020, Beijing held several international festivals such as trade and service fairs, and brand festivals (Table 8, No. 5). In October 2020, Wuhan Municipal Bureau of Culture and Tourism celebrated the "Foreigners in China Traveling to Wuhan" event, where a sense of safety and satisfaction was expressed by the visitors (Table 8, No. 5). At the same time, the foreign media CNN (Gan, 2020) released a report saying that "China has brought the new coronavirus pandemic under control. Now, hundreds of millions of people there are beginning to take vacations." CNN also specifically mentioned in the report that, "Wuhan becomes one of the most popular destination cities for the Chinese tourists and will regain its vitality and overcome the upcoming difficulties in dealing with the global pandemic".

4.6.3 New trends of tourism growth

4.6.3.1 China's "cloud tourism" and new technologies

Under severe outgoing restrictions, the main Chinese tourism cities launched "cloud tourism" to promote their tourism products and services through online platforms. One key method was to present vivid videos of local gastronomy, daily life and sightseeing to arouse people's memory over the past happiness to revisit the city after the pandemic. For instance, Wuhan local media appealed the tourists to see the "cherry blossoms" through visualizing its blooming on Weibo videos (**Figure 7**). Shanghai and Guangzhou Zoological Parks focused on the presentation of local images through illustrating adorable animal pictures (**Figure 8**).

Figure 7. Online enjoyment of cherry blossom



Source: Sina Weibo

Figure 8. Adorable animals in Shanghai and Guangzhou Zoological Parks

Source: Sina Weibo

The technology utilization into tourism recovery was also stressed by local tourism administrations and tourist attractions. The Palace Museum (Beijing) introduced one exhibition App, where a virtual reality panorama of the treasure collections in the museum was opened to the customers (Table 8, No. 6). Olympic Museum (Beijing), Hubei Museum (Wuhan), Shanghai Museum and Guangdong Museum (Guangzhou) utilized the intelligent audio explanation and guide services to replace manual guides and prevent physical contact (Table 8, No. 7). Moreover, Beijing Municipal Bureau of Culture and Tourism

established the smart ticketing platform for the municipal park management, with online reservation services and big data analyses of customer profiles, to improve the smartness and safety of local park visits (Table 8, No. 8). Guangzhou Municipal Bureau of Culture and Tourism paid special attention to the integration of high-tech including new media and artificial intelligence into the development of local cloud economy, tourism, and enhancement of tourism competitiveness (Table 8, No. 9).

4.6.3.2 China's cultural tourism

Another key issue focused on the transmission of traditional Chinese culture through launching either online or offline activities. Hubei Museum (Wuhan) and Guangdong Museum (Guangzhou) held online forums to further arise people's awareness of learning the culture. Beijing Municipal Bureau of Culture and Tourism carried out online courses to help the citizens strengthen their body and enrich their home time during the lockdown. Shanghai Museum launched offline exhibitions, where cultural relics were presented to reveal the past mysteries from the Tang Dynasty (Table 8, No. 10). The celebration of traditional China's festival became another important part of Chinese cultural transmission fostered online, for example to celebrate the Spring Festival, or the Dragon Boat Festival (Table 8, No. 11).

4.6.3.3 Slow tourism under enjoying the superb and nature sites

Under the huge impacts of the pandemic, nature tourism also gained rapid growths. Traveling to superb areas became popular and were promoted by many cities involving Beijing and Shanghai (Table 8, No. 12). Local Municipal Bureaus of Culture and Tourism launched several visiting of the superb Beijing/Shanghai semi routes, to encourage the citizens and tourists to enjoy the cities through viewing local architecture and tasting the gastronomy. Wuhan Municipal Bureau of Culture and Tourism focused on the promotion of local tourism specialties including ski, flower viewing, and mountaineering tours (Table 8, No. 13). Guangzhou Municipal Bureau of Culture and Tourism launched the "Beautiful countryside" project, including the promotion of local rural tourism products like forest recreation, agriculture sightseeing, self-driving camping, etc. to help local tourists to escape from daily anxieties and avoid the exposition to the COVID-19 (Table 8, No. 14).

4.6.4 China's dark tourism

As part of the potential tourism recovery strategies, dark tourism related contents were analyzed in this section (**Table 9**). In 2020, several courses and exhibitions were held in Wuhan, Beijing and Guangzhou in the commemorate of the people who fought against the pandemic (Table 9, No.1 and **Figure 9**). Through the narrative scenes of the hospitals, and the stories of those who survived from the pandemic, the national bravery and persistence were showed and acted as an attractor for tourists. Moreover, entrance subsidies and discounts were offered in order to express appreciation to the medical staff who worked on the frontlines against the pandemic (Table 9, No. 2 and 3). The last attractor for tourists was

based on the lament of people deceased during fights against the pandemic and inheritance of national patriotism. On the Qingming Festival in 2020, a national mourning was held, with a three-minute horn of cars, trains and ships spreading every corner of China and cancellation of all the domestic entertainment activities (Table 9, No. 4). It expressed good wishes to the deceased people to rest in peace and those who survived could be fearless when confronting future difficulties.

Figure 9. Online exhibitions of dark tourism

Source: Sina Weibo

Table 9. Dark tourism of China's main tourism cities

Classification	No.	Examples of posts from Sina Weibo	Key content	User type
Remembering the history and treasure the current	1	"…the volunteers on the battlefield of Shouyi had no hesitation to overthrow dictatorship and establish a republic…we will work hard on the front line of the battle against the pandemic..."	Online course	Tourist attraction (Wuhan)
		"…Beijing and Shanghai launched 'fight the pandemic, united as one, cheer for China' comics and short video collection activities… guide positive energy, popularize the knowledge of pandemic prevention…"	Video collection activity	Municipal Bureau of Culture and Tourism (Beijing)
		"...literary and art workers demonstrated their determination to fight the pandemic through calligraphy, painting, sculpture, music and other art forms, sung the anti-pandemic spirit…"	Artwork	Tourist attraction (Guangzhou)
Entrance subsidies to medical staffs who fight against the COVID-19	2	"…medical aid team members in Hubei can visit A-level tourist attractions in the province for free within 5 years…"	Free ticket	Local media (Wuhan, Beijing)
		"…until December 31, 2020, Beijing Tourism Distribution Center's 'one-day tour' tourism product will provide free rides for medical workers…"		
	3	"…a total of 228 A-level tourist attractions in the province…will provide medical workers with preferential services such as free tickets and consumption discounts…"	Ticket discount	Local media (Guangzhou)
		"…Shanghai/Beijing/Chongqing Madame Tussauds will open a half-price discount for the medical staffs from the opening date to June 30, 2020…"		Tourist attraction (Shanghai, Beijing)
For the lament of deceased people	4	"…the State Council issued an announcement deciding to hold a national mourning event on April 4, 2020…national and foreign embassies and consulates flew flags at half-mast, and public entertainment activities were suspended nationwide…"	A national mourning	Tourist attraction (Guangzhou, Wuhan), media (Shanghai, Beijing)

Source: Elaborated by the authors

4.7 Discussion

This study focused on prevention measures and tourism recovery of four main China's tourism cities, under the pandemic backgrounds. From the perspective of prevention measures, a series of top-down and flexible regional policies were implemented according to the local situations of pandemic expansion and mobility flows. Our findings confirmed the relevance of prevention measures based on mobility restriction, public places disinfection, sanitation and distancing, similarly to worldwide researchers (Im et al., 2021; Vărzaru et al., 2021; Villacé et al., 2021). Moreover, our findings emphasized the significance in the planning of urban tourism prevention protocols for cities, by taking close supervision over interprovincial, vacation travels, and participation in tourist activities. We also witnessed the wide use of applications (Apps) for pandemic prevention and control in all the tourism cities in China, that allowed tourist trace within 14 days and recorded basic health conditions (Cheng et al., 2021). These applications served as an example for other countries and regions, for the improvement of pandemic management in tourist attractions and tourism cities or destinations.

In terms of tourism recovery, our results highlighted that Chinese tourism cities applied multiple strategies that allowed their rapid recovery. From our findings, we classified these strategies into four main typologies, including those related to financial supports, promotion of international image, new trends of local tourism – emphasizing the role of technology, culture and nature, and the development of dark tourism. Some of these strategies were also explored by previous studies. For example, new technologies played a key role in the form of digital tours launched in many European cities, like Naples and Kraków, for the enhancement of local cultural authenticity and reservation of heritage resources (Bosone, et al., 2021; Kowalczyk et al., 2021). These studies also stated that modern technologies would be able to accelerate the development of contemporary tourism management and city branding in the pandemic scenario (Lu et al., 2021; Lu & Atadil, 2021; Trinh et al., 2022).

Among the new trends in tourism motivated by the pandemic also emerged the significant role of culture and nature in our results. It was pointed out similarly by previous studies that considered the pandemic as an opportunity for the exploration of areas with rich nature resources, changing tourist preferences towards tourism in nature and superb areas (Neuman et al., 2021; Huang et al., 2021). This idea was already developed into a sustainable tourism transition sense and advocated in many European cities, in the construction of green, inclusive and collaborative destinations (Jiricka et al., 2021; Pasquinelli et al., 2022). In the future, China's tourism is also expected to be developed towards a more sustainable transformation, by embracing local characteristic, green initiatives, ecological and picking-up tours, local folks, homestays, etc. as part of the tourism reconstruction process.

One relevant recovery strategy that appeared in our results was the development of China's dark tourism under the pandemic background. From previous studies, this kind of tourism was regarded as part of post-disaster recovery and resilience strategies (Zhang, 2021). Travelers to western and non-western dark tourism sites could express differentiated feelings – more entertaining, historic-oriented for western tourist sites (Lewis et al., 2021), and more reflections on human life and national identity in non-western (Qian et al, 2017; Wang et al., 2021). Our results confirmed these remarks, by presenting main large

exhibitions and nationwide lamentation in Wuhan, Shanghai, Beijing and Guangzhou. They were celebrated to memorize the people who sacrificed during the pandemic, contributing to the inheritance of traditional Chinese patriotism and self-sacrifice spirits.

PART III. EMPIRICAL STUDIES

Chapter 5. Longitudinal exploration of financial performance and firm characteristics on sustainability: insights from the hospitality industry amid global crises

5.1 A general overview

This chapter of study was based on the first two theoretical studies, who focused on the bibliometric studies of tourism and COVID-19; and tourism sustainability and COVID-19, which became the central topic of the first two papers. At the same time, it was also of great importance to find possible solutions for the resilience of strict financial conditions of the whole industry. In this dimension, this chapter focused on the discussion of the empirical parts of tourism and hospitality companies in finding possible sustainable protocols when faced with severe financial status under the influence of the global pandemic. To be more specific, it aimed to explore how firms' characteristics and financial performances influence sustainability initiatives, while considering the moderating influence of global industrial crises, particularly in the comparison between hospitality and other tourism-related companies. In specific, this chapter aims to discover the research questions as: if tourism and hospitality companies would pay special attention to the development of sustainable performances particularly when faced with severe global crises, such as the pandemic. If so, whether their sustainable performances (encompassing environmental, social, and governance (ESG) aspects) would be influenced by firm size, ROA and Tobin's Q, if the influences could be differentiated between the hospitality companies and other tourism related companies, and if COVID-19 would moderate the effects.

Panel data regression models were applied to analyze a global sample of 289 tourism and hospitality corporations, sourced from the Refinitiv Eikon database, spanning the period from 2017 to 2023. Our findings highlighted the positive and significant impact of firm size and leverage on ESG and the social sustainability pillar within tourism companies, alongside positive relationships between dividend and the environmental pillar. Notably, the interacting effects revealed a stronger positive association between the size and leverage of hospitality firms and ESG, environmental, social, and governance sustainability during the crisis and recovery period compared to the pre-crisis era. Additionally, our analysis unveiled the divergent effects of corporate financial impacts and firms' characteristics on sustainable practices when comparing hospitality with other tourism-related industries, both before and during the industrial crisis period under examination. It contributed to advancing our comprehension of the determinants influencing sustainability in the hospitality sector, with a nuanced understanding of how global industrial crises moderated these dynamics.

5.2 Theories and hypothesis development

Hospitality industry, acknowledged for its vulnerability to external shocks and volatility, garnered significant attention from researchers and tourism practitioners worldwide, particularly concerning its

resilience and recovery strategies amid the recent global health crisis and economic downturns (Lee et al., 2024). In this scenario, socially responsible investment was recognized as a leading practice seamlessly woven into conventional economic models driven by a commitment to sustainability. Explored through diverse theoretical frameworks, it sought to foster not only sustained growth for companies over the long term but also to generate tangible social benefits (Su & Chen, 2020; Yeon et al., 2021).

One such theoretical paradigm was the resource-based theory, which prioritized harnessing internal firm resources - such as assets, capabilities, organizational processes, attributes, information, and knowledge to secure sustainable competitive advantages for the company (Zhang et al., 2021b). This theoretical perspective emphasized the critical importance of internal resources in driving sustainability performance, particularly during periods of external upheaval, such as the recent pandemic crisis, where companies must mitigate adverse financial pressures (Al Amosh & Khatib, 2023; Hwang et al., 2021; Nirino et al. 2022; Zhang et al., 2023). Another example was the stakeholder theory, evolved from the conventional shareholder-based model (Freeman, 1999). This theory emphasized the identification of key stakeholders and their priorities, thereby ensuring that the company's practices, including sustainable initiatives, were not only economically feasible for the company but also beneficial to these stakeholders (Ullah & Masim, 2021).

Both theoretical approaches endorsed the significance of firm size as a pivotal determinant of sustainability performance. Empirical studies aligning with the resource-based theory revealed a positive relationship between firm size and ESG performance (Dkhili, 2023; El Khoury et al., 2023). This connection underscored how economies of scales served as a driving force, motivating larger companies to meet stakeholder expectations, lower operational expenses, and optimize resource utilization in their pursuit of sustainable practices (Bissoondoyal et al., 2023; Gholami et al., 2022). Considering the stakeholder theory, firm size emerged also as a relevant factor, due to the heightened pressure on larger corporations to disclose information to their stakeholders, surpassing that of smaller firms. Additionally, larger companies possessed greater resources to facilitate sustainability reporting and ESG data provision (Drempetic et al., 2020).

Moreover, the influence of firm size on sustainability extended beyond direct effects; past research unveiled its moderating role in various contexts. For instance, during periods such as the global financial crisis, firm size moderated the impact on both financial and ESG performance, with larger companies experiencing comparatively lesser declines (Ahmad et al., 2023). Other scholars questioned this positive relationship and pointed out that firm size could negatively moderate the relationship between financial and sustainability performance. They contended that in the context of smaller corporations, those at the forefront of sustainability practices tended to yield superior financial returns compared to their counterparts less focused on sustainability—an observation that contrasts with trends observed among larger companies (Ferrat et al., 2023; Gavrilakis & Floros, 2023).

In addition to firm size, the bidirectional connections between financial and sustainability performance in companies operating within the tourism sector and related industries also garnered academic interest, drawing on various theoretical frameworks. Through the lens of the resource-based theory, it was

proposed that enhanced financial performance furnished companies with the resources necessary to invest in sustainability initiatives and strategic long-term planning, mitigating uncertainties (Moneva et al., 2020). The stakeholder approach also underscored the managerial challenge of achieving sustained value creation and aligning sustainability practices and performance with the interests of stakeholders (Moneva et al., 2020).

Despite the theoretical arguments suggesting positive links between financial and sustainability performance, previous studies yielded inconsistent findings. Regarding the influence of ESG on firms' CFP, research presented a mixed picture. Some studies suggested that ESG performance, encompassing environmental, social, and governance dimensions, could impact the profitability and market value of various tourism-related companies (Moneva et al., 2020). However, results varied, with effects ranging from negative to positive or inconclusive depending on the specific subsector analyzed or the metrics used to assess financial or sustainability performance. For instance, negative associations between ESG and financial performance were observed in the hotel and transportation industries, while the leisure industry showed no significant effects (Bodhanwala & Bodhanwala, 2023). Conversely, positive impacts of governance on the return on assets (ROA) of tourism companies were identified (Rodríguez et al., 2019), alongside positive effects of environmental performance on financial performance in the hospitality sector (Singal, 2013) and the airline industry (Abdi et al., 2022b; Kuo et al., 2021).

Fewer studies concentrated on the impact of CFP on environmental, social, and governance (ESG) factors in the tourism industry, yielding also inconsistent results. Some suggested a positive relationship, indicating that as companies improved their CFP, they also advanced their ESG practices (Hamdi et al., 2022). However, contrasting findings pointed to negative influences, such as those observed in the airline industry, where during adverse economic conditions, more profitable companies exhibited lower ESG performance (Abdi et al., 2022b; DasGupta, 2022).

These conflicting outcomes underscored the need for further empirical research into the relationship between firm size, financial performance, and ESG factors. Consequently, we proposed the following hypothesis:

Hypothesis 1*. Firm size and CFP of tourism companies affect their ESG score, and its environmental, social and governmental pillars.*

The varied outcomes of prior research could be attributed in part to the diverse array of companies and subsectors within the tourism industry. To delve deeper into this diversity's potential effects, the institutional theory at the firm level provided a framework for comprehending how institutional processed—stemming from collective experiences, education, social norms, and societal rules—shape certain homogenizations driven by normative, regulative, and cultural-cognitive institutions (Levy & Kolk, 2002; Lynch & Jin, 2016). This theory was widely employed to elucidate companies' socially responsible behaviors within specific environments, suggesting that a company's commitment to sustainability might inspire similar practices among its peers (Ullah & Masim, 2021).

Moreover, institutional theory at the macro level was firmly established for conducting comparative analyses among different organizations under the influence of country-level characteristics such as culture, legitimacy, and governmental policies (Baldini et al., 2018; Daniel et al., 2012; Reverte, 2022).

At the micro or firm-level perspective, the impact of individual firm characteristics and variables, such as firm size and financial performance, on sustainability performance might vary among companies within the tourism industry, contingent upon the strength of institutional influences. This underscored the importance of conducting cross-sectoral comparisons, a dimension that was underexplored in this research domain. Consequently, we proposed the following hypothesis for comparing hospitality with other tourism-related activities:

Hypothesis 2*. Firm size and CFP affect ESG score, and its environmental, social and governmental pillars, and these effects could be different when comparing the hospitality industry with other tourism-related sectors.*

During global crises, such as severe economic downturns, ESG investments emerged as a "safety net" bolstering companies' financial resilience, particularly amid challenging financial predicaments induced by such crises (Al Amosh & Khatib, 2023; Dogru et al., 2022; Hwang et al., 2021; Umar et al., 2020). This assertion found support in previous studies within the tourism and hospitality sector.

For instance, Chen et al. (2022) argued that hotels with high ESG ratings would inherently possess pandemic-resilient value, serving as defensive investments amidst market turbulence. However, findings were not always consistent; Clark et al. (2021), in a comparative analysis of financial characteristics among hospitality firms, reported an insignificant relationship between corporate financial performance (CFP) and ESG disclosures. Their study suggested a propensity toward traditional economic investment strategies rather than socially responsible behaviors concerning environmental, social, and governance issues during severe global crises. Bodhanwala and Bodhanwala (2023) similarly noted a negative correlation between CFP and ESG in the hotel industry, although this relationship became insignificant within the leisure sector.

The divergent perspectives regarding the relationship between ccorporate financial performance (CFP) and environmental, social, and governance (ESG) factors among hospitality and other tourism-related companies underscored the necessity for further empirical investigation into this association (Bodhanwala & Bodhanwala, 2023; Chen et al., 2022; Clark et al., 2021). Moreover, while some studies explored the mitigating influence of ESG on CFP during the global pandemic context (Al Amosh & Khatib, 2023; Habib & Mourad, 2023; Hwang et al., 2021), none compared these effects while considering the potential moderating impact of global industrial crises. Consequently, we proposed the following hypothesis:

Hypothesis 3*. A period of industry crisis moderates the effect of firm size and CFP on ESG performance.*

5.3 Methodology

5.3.1 Data and sample selection

Data were collected from Refinitiv Eikon database – a broadly utilized platform in finding financial and accounting data of worldwide public-listed companies (Bodhanwala & Bodhanwala, 2023). Our sample primarily focused on hospitality companies operating within main subsectors such as hotels, motels, cruise lines, restaurants, and bars. Additionally, data were gathered from other tourism-related sectors including leisure, recreation, casinos, and gaming companies. The selected timeframe spanned from 2017 to 2023, segmented into two distinct subperiods to capture the impact of the recent global pandemic: 2017 to 2019 representing the pre-crisis era, and 2020 to 2023 signifying the crisis and recovery period. Companies deemed irrelevant were excluded due to insufficient financial and ESG data availability within the specified timeframes, resulting in a final sample size of 289 companies.

5.3.2 Measurement of variables

Table 10 presented the definitions and descriptions of all variables sourced from the Eikon database. As dependent variables, our study initially considered the ESG score, which reflected a company's overall performance across environmental, social, and governance pillars, graded on a scale from zero to one hundred (Dkhili, 2023; El Khoury et al., 2023), with higher scores indicating superior performance. Additionally, each individual ESG pillar was included: the environmental pillar score (assessed based on resource use, emissions, and innovation weights), social pillar score (derived from workforce, human rights, community, and product responsibility weights), and governance pillar score (evaluated using management, shareholder, and CSR strategy weights).

Turning to independent variables, we incorporated two financial indicators: Return on Assets (ROA) and Tobin’s Q. ROA measured a company’s profitability (Bodhanwala & Bodhanwala, 2023) and was calculated as post-tax income divided by average total assets. Tobin’s Q, indicative of a company's financial performance and market value (Abdi et al., 2022c), was computed as the logarithm of the Market value divided by Total assets. Additionally, one firm characteristic independent variable was included: firm size, measured as the natural logarithm of total assets (Bissoondoyal et al., 2023).

As control variables, leverage and dividend were included. Leverage, defined as total liabilities over total assets, was pertinent for assessing a company's financial structure, with a higher leverage ratio indicating a greater focus on meeting the requirements of larger capital providers (Abdi et al., 2022c). Dividend represented wealth distribution to shareholders and served as an indicator of a company's financial health (Wang et al., 2022a).

Furthermore, we created one categorical time-variant variable, that served as the moderator in our models, reflecting the "pre-crisis period" (2017 to 2019) and the "crisis and recovery period" (2020-2023), alongside a dummy variable taking the value of 1 if observations belonged to the "hospitality" category or 0 if categorized as "other tourism-related industries".

Table 10. Descriptions of ESG and CFP variables

Variable	Definition	Description
		Independent variables
ESG	ESG score	An overall company score based on the self-reported information in the environmental, social and corporate governance pillars.
ENV	Environmental pillar score	The environmental pillar measures a company's impact on living and non-living natural systems, including the air, land and water, as well as complete ecosystems. It reflects how well a company uses best management practices to avoid environmental risks and capitalize on environmental opportunities in order to generate long term shareholder value.
SOC	Social pillar score	The social pillar measures a company's capacity to generate trust and loyalty with its workforce, customers and society, through its use of best management practices. It is a reflection of the company's reputation and the health of its license to operate, which are key factors in determining its ability to generate long term shareholder value.
GOV	Governance pillar score	The corporate governance pillar measures a company's systems and processes, which ensure that its board members and executives act in the best interests of its long-term shareholders. It reflects a company's capacity, through its use of best management practices, to direct and control its rights and responsibilities through the creation of incentives, as well as checks and balances in order to generate long term shareholder value.
		Dependent variables
Size	Firm size	Represents the natural logarithm of total assets of a company.
ROA	Return on assets	This value is calculated as the income after taxes for the fiscal period divided by the average total assets and is expressed as percentage. Average total assets is the average of total assets at the beginning and the end of the year.
TQ	Tobin's Q	Market value / total assets. The Company' market capitalization represents the sum of market value for all relevant issue level share types. The issue level market value is calculated by multiplying the requested shares type by latest close price.
		Control variables
LEV	Leverage ratio	Total liabilities / total assets. Total liabilities represent the sum of total current liabilities, total long-term debt, deferred income tax, minority interest and other liabilities, total.

DIV	Dividend yield	The ratio of the annualised dividends to the price of a stock. Dividends are adjusted to account for any stock splits during the 12-month period. The dividend yield only measures recent historical dividends, but does not address any expected dividend changes
	One dummy variable	
Dummy	Dummy variable	The authors also included one dummy variable for the categorization of hospitality and other tourism-related industries. When the dummy equals to one, it referred to the hospitality industry. When the dummy equals to zero, it referred to other tourism-related industries.
	One categorical variable	
Period	The period before and during the COVID-19	One categorical time variable was also included: the researched period from 2017 to 2019 referred as the “pre-crisis” period; the researched period from 2020 to 2023 referred as the “crisis and recovery” period.

Source: Elaborated by the authors

5.3.3 Model specification

The Hausman's test (Hausman, 1978) was conducted to determine the best estimation method for the regression with panel data, which pointed to random-effects estimation procedure given the non-significance of the Hausman's statistics, supporting it as the best estimation when the individual component of the error was not correlated with the regressors (Croissant & Millo, 2008).

Four independent models were proposed, each one related to a different dependent variable, specifically, ESG and their three pillars – environmental, social and governance scores. For each model, two regressions were generated in a stepwise manner, a first one where only the main effects of independent and control variables were considered, and a second one which introduced the interaction terms of the moderating effect of the industrial crisis, the global pandemic in this case.

Model 1 (dependent variable ESG score)

$$ESG_{it} = \alpha + \beta_1 ROA_{it} + \beta_2 TQ_{it} + \beta_3 Size_{it} + \beta_4 Sector_{it} + \beta_5 Period_{it} + \beta_6 LEV_{it} + \beta_7 DIV_{it} + \beta_8 ROA_{it} * Period_{it} + \beta_9 TQ_{it} * Period_{it} + \beta_{10} Size_{it} * Period_{it} + \beta_{11} Sector_{it} * Period_{it} + \beta_{12} LEV_{it} * Period_{it} + \beta_{13} DIV_{it} * Period_{it} + \varepsilon_{it}$$

Model 2 (dependent variable ENV pillar)

$$ENV_{it} = \alpha + \beta_1 ROA_{it} + \beta_2 TQ_{it} + \beta_3 Size_{it} + \beta_4 Sector_{it} + \beta_5 Period_{it} + \beta_6 LEV_{it} + \beta_7 DIV_{it} + \beta_8 ROA_{it} * Period_{it} + \beta_9 TQ_{it} * Period_{it} + \beta_{10} Size_{it} * Period_{it} + \beta_{11} Sector_{it} * Period_{it} + \beta_{12} LEV_{it} * Period_{it} + \beta_{13} DIV_{it} * Period_{it} + \varepsilon_{it}$$

Model 3 (dependent variable SOC pillar)

$$SOC_{it} = \alpha + \beta_1 ROA_{it} + \beta_2 TQ_{it} + \beta_3 Size_{it} + \beta_4 Sector_{it} + \beta_5 Period_{it} + \beta_6 LEV_{it} + \beta_7 DIV_{it} + \beta_8 ROA_{it} * Period_{it} + \beta_9 TQ_{it} * Period_{it} + \beta_{10} Size_{it} * Period_{it} + \beta_{11} Sector_{it} * Period_{it} + \beta_{12} LEV_{it} * Period_{it} + \beta_{13} DIV_{it} * Period_{it} + \varepsilon_{it}$$

Model 4 (dependent variable GOV pillar)

$$GOV_{it} = \alpha + \beta_1 ROA_{it} + \beta_2 TQ_{it} + \beta_3 Size_{it} + \beta_4 Sector_{it} + \beta_5 Period_{it} + \beta_6 LEV_{it} + \beta_7 DIV_{it} + \beta_8 ROA_{it} * Period_{it} + \beta_9 TQ_{it} * Period_{it} + \beta_{10} Size_{it} * Period_{it} + \beta_{11} Sector_{it} * Period_{it} + \beta_{12} LEV_{it} * Period_{it} + \beta_{13} DIV_{it} * Period_{it} + \varepsilon_{it}$$

5.4 Empirical results of ESGs and CFPs

5.4.1 Descriptive results

Table 11 presented descriptive statistics for the numeric variables. Analysis of the main variables pertaining to sustainability initiatives revealed that the governance pillar score exhibited the highest mean value (46.28), followed by the social score (45.65), and the overall ESG score (43.74). However, the mean value of the environmental score (37.71) was relatively lower, indicating comparatively weaker environmental performance compared to other sustainability indicators. The high standard deviation of these variables (21.26 for ESG, 29.23 for environmental, 23.64 for social, and 21.96 for governance) underscored the considerable disparity in sustainability performance among tourism companies in our sample.

Table 11. Descriptive statistics of ESG and CFP variables

Var.	ESG	ENV	SOC	GOV	Size	ROA	TQ	LEV	DIV
Obs.	1432	1431	1432	1431	1961	1920	1686	1961	1218
Mean	43.74	37.71	45.65	46.28	20.90	0.01	-0.02	0.69	0.02
Max	91.03	98.15	97.02	93.82	24.71	0.64	3.79	4.35	0.24
Min	1.79	0.00	0.48	2.39	11.62	-2.01	-3.69	0.03	-0.09
St. Dev.	21.26	29.23	23.64	21.96	1.64	0.15	0.96	0.40	0.03

Source: Elaborated by the authors

In terms of firm size, there was minimal discrepancy indicated by the small standard deviation (1.64), suggesting that the selected companies exhibited similar levels of total assets. The mean values of the return on assets (ROA) and dividend payout indicators (0.01 and 0.02, respectively) suggested a low average operating profitability derived from invested capital and low shareholder wealth in our sample. Furthermore, the mean leverage ratio of 0.69 indicated a significant reliance on debt in the capital structure of hospitality companies over the past seven years.

Turning to categorical variables, 49.13% of companies were classified as hospitality-related, with the remaining 50.87% categorized as "other tourism-related industries". Additionally, 42.86% of observations were from the pre-crisis period (2017-2019), while 57.14% were recorded during the crisis and recovery period (2020-2023).

5.4.2 Correlation analysis

Table 12 displayed the correlation matrix. The findings indicated that firm size, return on assets (ROA), and leverage exhibited strong and statistically significant relationships with key sustainability indicators across ESG, environmental, social, and governance pillar scores. However, the dividend variable demonstrated a relatively weaker and less significant association with the environmental pillar score.

Furthermore, the bivariate correlation coefficients for all independent variables were below 0.5, suggesting the absence of significant relationships among these variables and mitigating concerns regarding multicollinearity issues. Additional analyses were conducted by calculating the Variance Inflation Factor (VIF) values for each of the four models. The VIF values, all below the threshold of 4 (O'Brien, 2007), indicated no evidence of multicollinearity, with the highest value recorded at 1.41.

Table 12. Correlation matrix ESG and CFP variables

	ESG	ENV	SOC	GOV	Size	ROA	TQ	LEV	DIV
ESG	1								
ENV	0.904***	1							
SOC	0.929	0.809	1						
GOV	0.707***	0.472***	0.475***	1					
Size	0.262***	0.195***	0.295***	0.154***	1				
ROA	0.083***	0.037	0.085**	0.094***	0.088***	1			
TQ	-0.016	0.0004	-0.028	-0.008*	-0.156***	0.026	1		
LEV	0.099***	0.111***	0.102***	0.028***	0.095***	0.003	0.041	1	
DIV	-0.048	-0.063*	-0.012	-0.066	0.017	0.194***	-0.050	-0.084**	1

Source: Elaborated by the authors

5.4.3 Empirical results and discussion

Table 13, Table 14, Table 15 and **Table 16** presented the empirical findings from the regression analyses, detailing both the main effects and the interactions concerning the research period. In line with the first hypothesis and the outcomes of the main effects across all models, where ESG and its three pillars served as dependent variables, this study revealed a notable and statistically significant impact of firm size on all these measures. Specifically, a significance level of $p < 0.01$ was observed between firm size and overall ESG score, while $p < 0.05$ significance levels were evident between firm size and environmental (ENV) and social (SOC) scores, and a significance level of $p < 0.1$ was found between firm size and governance (GOV) score. However, the investigation failed to identify any significant impact of Tobin's Q or return on assets (ROA) on ESG, ENV, SOC, or GOV. This absence of significant relationships with Tobin's Q or ROA implied a lack of evidence regarding how tourism companies translated their current profitability or market capitalization into sustainable activities.

Additionally, the main effect results highlighted that tourism companies with higher leverage ratios – indicative of higher levels of debts – appeared to prioritize the concerns of powerful capital holders in ESG and social investments. This finding contrasted with previous literature findings (Abdi et al., 2022c). In Model 2 and Model 4, with ENV and GOV as the dependent variables respectively, the analysis demonstrated a significant positive relationship between dividend payout (DIV) and environmental

(ENV) and governance (GOV) performance. This suggested that companies transferring wealth to their shareholders also contributed to improvements in environmental and governance performance (Wang, G. et al., 2022).

Table 13. Empirical results for the regression analysis (1)

Model 1. ESG as dependent variable

Main effect				**Interacting effect**			
Variables	**Coeff.**	**z-Value**	**p-Value**	**Variables**	**Coeff.**	**z-Value**	**p-Value**
Intercept	-0.092	-0.863	0.388	Intercept	-0.120	-1.134	0.257
Size	0.206	3.078	0.002**	Size (pre)	0.214	2.974	0.003**
ROA	-0.001	-0.037	0.971	Size (during)	0.240	3.474	0.0005***
TQ	-0.026	-0.828	0.408	ROA (pre)	-0.130	-2.661	0.008**
LEV	0.164	4.616	3.924e-06***	ROA (during)	0.008	0.255	0.799
DIV	0.010	0.420	0.675	LEV (pre)	0.136	2.989	0.003**
Period Pre	-0.263	-7.415	1.220e-13 ***	LEV (during)	0.208	5.809	6.29e-09***
Hospitality	0.312	2.076	0.104*	TQ (pre)	-0.015	-0.332	0.740
				TQ (during)	-0.035	-1.077	0.281
				DIV (pre)	-0.103	-2.806	0.005**
				DIV (during)	0.005	0.202	0.840
				Hospitality (pre)	0.149	0.962	0.336
				Hospitality (during)	0.316	2.096	0.036*

Signif. Codes: '***' if p-value < 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '+' If p-value < 0.1

For the moderating variable Period, the label "Pre" denotes pre-crisis, while "During" signifies during the crisis and recovery period

Table 14. Empirical results for the regression analysis (2)

Model 2. ENV as dependent variable

Main effect				Interacting effect			
Variables	**Coeff.**	**z-Value**	**p-Value**	**Variables**	**Coeff.**	**z-Value**	**p-Value**
Intercept	-0.022	-0.207	0.836	Intercept	-0.072	-0.677	0.498
Size	0.167	2.497	0.013**	Size (pre)	0.195	2.681	0.007**
ROA	0.017	0.548	0.584	Size (during)	0.210	3.007	0.003**
TQ	-0.026	0.032	0.486	ROA (pre)	-0.146	-2.938	0.003**
LEV	0.025	0.626	0.411	ROA (during)	0.0189	0.578	0.563
DIV	0.059	2.603	0.009**	LEV (pre)	0.144	3.105	0.002**
Period Pre	-0.352	-9.905	2.2e-16 ***	LEV (during)	0.192	5.267	1.387e-07***
Hospitality	0.284	1.881	0.060+	TQ (pre)	0.0004	0.009	0.993
				TQ (during)	-0.047	-1.426	0.154
				DIV (pre)	-0.027	-0.734	0.463
				DIV (during)	0.036	1.486	0.137
				Hospitality (pre)	0.0509	0.325	0.745
				Hospitality (during)	0.300	1.974	0.048 *

Signif. Codes: '***' if p-value < 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '+' If p-value < 0.1

For the moderating variable Period, the label "Pre" denotes pre-crisis, while "During" signifies during the crisis and recovery period

Table 15. Empirical results for the regression analysis (3)

Model 3. SOC as dependent variable

Main effect				Interacting effect			
Variables	**Coeff.**	**z-Value**	**p-Value**	**Variables**	**Coeff.**	**z-Value**	**p-Value**
Intercept	-0.125	-1.141	0.254	Intercept	-0.142	-1.297	0.195
Size	0.174	2.528	0.0115**	Size (pre)	0.180	2.425	0.015*
ROA	-0.016	-0.513	0.608	Size (during)	0.229	3.199	0.001**
TQ	-0.021	-0.644	0.519	ROA (pre)	-0.136	-2.700	0.007**
LEV	0.193	5.253	1.494e-07***	ROA (during)	-0.012	-0.374	0.709
DIV	0.024	1.036	0.300	LEV (pre)	0.161	3.402	0.0007***
Period Pre	-0.232	-6.298	3.026e-10***	LEV (during)	0.238	6.428	1.291e-10***
Hospitality	0.340	2.207	0.027*	TQ (pre)	0.009	0.200	0.842
				TQ (during)	-0.033	-0.993	0.321
				DIV (pre)	-0.101	-2.647	0.008**
				DIV (during)	0.025	0.994	0.320
				Hospitality (pre)	0.223	1.395	0.163
				Hospitality (during)	0.3143337	2.020	0.043 *

Signif. Codes: '***' if p-value < 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '+' If p-value < 0.1

For the moderating variable Period, the label "Pre" denotes pre-crisis, while "During" signifies during the crisis and recovery period

Table 16. Empirical results for the regression analysis (4)

Model 4. GOV as dependent variable

Main effect				Interacting effect			
Variables	**Coeff.**	**z-Value**	**p-Value**	**Variables**	**Coeff.**	**z-Value**	**p-Value**
Intercept	-0.083	-0.807	0.420	Intercept	-0.087	-0.8611	0.389
Size	0.140	1.938	0.053+	Size (pre)	0.124	1.496	0.135
ROA	0.008	0.188	0.851	Size (during)	0.124	1.670	0.091+
TQ	-0.010	-0.234	0.815	ROA (pre)	-0.026	-0.370	0.711
LEV	0.072	1.560	0.119	ROA (during)	0.028	0.621	0.534
DIV	-0.075	-2.372	0.018*	LEV (pre)	0.032	0.511	0.609
Period Pre	-0.070	-1.399	0.162	LEV (during)	0.083	1.770	0.080+
Hospitality	0.192	1.304	0.192	TQ (pre)	-0.055	-0.922	0.357
				TQ (during)	0.007	0.173	0.863
				DIV (pre)	-0.134	-2.542	0.011*
				DIV (during)	-0.067	-1.982	0.048*
				Hospitality (pre)	0.120	0.763	0.446
				Hospitality (during)	0.219	1.501	0.133

Signif. Codes: '***' if p-value < 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '+' If p-value < 0.1

For the moderating variable Period, the label "Pre" denotes pre-crisis, while "During" signifies during the crisis and recovery period

In general, **Hypothesis 1** can be partially accepted, suggesting an association between ESG and their pillars and firms' size and financial performance, except for the relationships between ESG and ROA, and ESG and Tobin's Q. These results contradicted previous literature such as Hamdi et al. (2022), who confirmed a positive and significant relationship between ESG and ROA, focusing on the perspective of US companies. Similarly, the findings aligned with Abdi et al. (2022a), who did not find a correlation between ESG and ROA especially in the case of air transport industry. However, they were contradictory to the finding in the same study of a negative and significant relationship between ESG and Tobin's Q. The positive associations between ESG and their pillars, with firm size, demonstrated that tourism corporations with more assets tended to contribute more to sustainable initiatives, including resource use, green innovations, workforce protections, and management practices. Our findings aligned with the resource-based theory, which emphasized the utilization of internal firm resources such as assets, knowledge, information, and instruments to achieve sustainable competitiveness (Su & Chen, 2020; Yeon et al., 2021; Zhang et al., 2021b); and with the stakeholder theory, underscoring the higher pressure of larger corporations to disclose information to their stakeholder, to facilitate sustainability reporting and data provision (Drempetic et al., 2020).

In the main effect models, the time variable "Period Pre" exhibited a negative association with ESG, ENV, and SOC (p-values < 0.001), indicating that tourism firms tended to achieve higher ESG, environmental, and social scores during the crisis and recovery period compared to the pre-crisis era. The intercept, found to be insignificant in all our models, accounted for the effect of the baseline subsector in our sample, namely "other tourism-related industries." Conversely, when not accounting for the moderating effect of the crisis, "hospitality" demonstrated a significantly positive impact on sustainable development compared to "other tourism-related industries," largely supporting **Hypothesis 2**. This finding can be interpreted through the lens of the institutional theory (Levy & Kolk, 2002; Lynch & Jin, 2016), confirming that micro or firm-level characteristics exerted varying effects on sustainability performance among companies within the tourism industry, outweighing institutional influences and countering mimetic corporate behaviors across subsectors. While our research also made a significant contribution, further empirical insights and additional investigation into industrial comparisons of firm-level characteristics, financial performances, and their corresponding effects on ESG initiatives were necessary.

The results from the interacting effects models underscored the moderating impact of global industrial crises. They revealed that the positive and significant association between firms' size and leverage and ESG, ENV, and SOC (p-value < 0.01) was amplified during the pandemic and recovery period compared to pre-pandemic times. These findings aligned with the resource-based theory and the stakeholder theory, affirming the positive effects of firm size on sustainability. Large hospitality companies, according to our results, prioritized investments in the social aspects of relevant stakeholders and sustainable reporting, particularly during global industrial crises, as they addressed hidden financial constraints and fulfilled stakeholder demands (Ahmad et al., 2023; Drempetic et al., 2020; Hamdi et al., 2022; Nguyen et al., 2022).

However, our analysis indicated that the relationship between corporate financial performance (CFP) and sustainability was largely non-significant in our sample. The only significant observation was a negative impact of ROA on ESG, ENV, and SOC during the pre-crisis period, suggesting an inverse relationship between economic profitability and environmental and social sustainability in the absence of crisis-induced pressures. These negative associations between ROA and ESG, ENV, SOC scores (p-values < 0.01), as well as negative relationships between DIV-ESG, DIV-SOC, DIV-GOV before the pandemic periods (p-values < 0.01, p-values < 0.05 for GOV) in the interacting effects models indicated that **Hypothesis 3** can be partially accepted, except for the non-significant impact of Tobin's Q.

Regarding the effect of industrial crises on the relationship between the hospitality industry and sustainability scores, our result confirmed the positive impact of the crisis period, as stated in **Hypothesis 3**. This suggested that hospitality companies tended to invest more in sustainable compliances, especially during the crisis and recovery period. This finding was also supported by previous literature suggesting that ESG compliances acted as reliable "insurance-like" defenses for companies' financial performances during severe global crises such as the global pandemic health emergency (Al Amosh & Khatib, 2023; Hwang et al., 2021), thereby enhancing the overall financial resilience of hospitality companies (Chen et al., 2022). Furthermore, there was a negative, non-significant relationship between "other tourism-related industries" (captured in the intercept) and sustainable indicator. In summary, our findings underscored the moderating role of the global industrial crisis in the relationship between size and corporate financial performance with sustainable performance in the hospitality industry. This highlighted the importance of financial investments in ESG disclosures, particularly during severe industrial crises such as global health emergencies (Bodhanwala & Bodhanwala, 2023; Chen et al., 2022; Clark et al., 2021).

Chapter 6. Navigating global crisis: how ESG and financial performance drive environmental innovation in the tourism industry

6.1 A general overview

In previous theoretical studies, we witnessed a great growth of thematic discussions over tourism sustainability issues as well as increasing interests towards innovative concerns in both of the first two theoretical research (**Chapter 2** and **Chapter 3**). This piece of research was also an extended research based on the last empirical research (**Chapter 5**) who laid special focus on the relationship between tourism sustainable and financial performances when influenced by the global pandemic. In the last empirical research, it was also testified that in previous studies that sustainable behaviors would contribute to tourism resilience especially when faced with severe health crises (Al Amosh & Khatib, 2023; Chen et al., 2022; Clark et al., 2021; Hwang et al., 2021; Umar et al., 2020).

The recent global pandemic crisis raised many debates towards industrial resilience and development, particularly in severely impacted sectors like tourism, from which environmental innovation emerged as a crucial factor for the long-term sustainability of companies. In this sense, our last research concentrated on the investigation of the innovative performances (using environmental innovation as the main metric) of tourism companies to find out how could they survive when involved in severe global health crises, and in a further step, in finding the relationship of sustainability and financial performance with environmental innovation under the framework of a global industrial crisis. In detail, this chapter examined the impacts of financial performance and ESG factors on the environmental innovation of tourism-related companies, and explored how a global industry crisis can moderate these relationships.

Panel data analyses were conducted based on a sample of 165 hotel and entertainment companies, collected from Refinitiv Eikon platform and refined from the timespan of 2017 to 2023. Our findings revealed that companies committed to enhancing their ESG performance were also inclined to invest in green innovation initiatives, particularly driven by top shareholders and board members. Additionally, companies facing low profitability, especially exacerbated by global industry crises, tended to deprioritize environmental innovation, despite it was recognized as a valuable future investment and an essential step towards the green transition of the entire industry. This research enriched the current state of art and draws special attention from tourism scholars and decision-makers to the field of environmental innovation, which would be of vital significance for addressing global climate change, enhancing innovative capabilities in environmental management, and fulfilling stakeholder social commitment.

6.2 Theories and hypothesis development

In modern society, the pressures of global climate change have garnered increasing attention from both academic and social perspectives over the past few decades. As a result, environmental management

has become recognized as an essential element in the pursuit of socially sustainable development and prosperity (Fleith de Medeiros et al., 2022). Sustainable development, which involves optimizing the use of scare resources to achieve economic growth and benefits for future generations (Ozturk et al., 2024), underscores the essential role of modern technologies in creating effective environmental management. This notion defines the term “environmental innovation”.

Environmental innovation, also known as “green innovation”, is defined as “the development of innovative green products and processes aimed at environmental protection, energy conservation, and reduction of pollution and waste” (Ren et al., 2023). This differs from conventional innovation, which typically focuses solely on economic-driven development without considering negative environmental and social impacts (Khalil et al., 2022). Similarly, environmental innovation is considered an essential indicator influencing technological and industrial transformation at any given time (Zheng & Zhang, 2023). For example, in response to extreme industrial crises, such as COVID-19, severe global challenges like climate change, inequality, and unemployment have raised the necessity for innovations that promote the responsible and high-quality development of companies (Trittin & Böckel, 2022).

According to the “stakeholder theory”, companies should consider the benefits and needs of their relevant stakeholders, including customers, employees, financial communities and partners, etc., in their decision-making process. This approach is not solely driven by profit but also by the strategic pursuit of long-term company sustainability (Freeman, 1999; Mahajan et al., 2023).

Recent scholars have paid special attention to ESG indicators, emphasizing their role as the "counterbalance of environmental, social, and governance dimensions of modern corporate responsibility, aimed at satisfying all stakeholder interests" (Bodhanwala & Bodhanwala, 2023). ESG indicators are also viewed as key factors in achieving economic competitiveness and sustainability. The stakeholder theory is frequently related to discussions of corporate social responsibility (CSR), environmental responsibilities, and public commitments to protecting the environment (Drempetic et al., 2020; Ullah & Nasim, 2021). In this context, environmental innovation plays a crucial role in achieving sustainable company goals and effective sustainability management (Long et al., 2023). Therefore, research on the relationships between environmental innovation and ESG performance can add value to this theory, exploring whether stakeholder welfare can be fulfilled through dedicated sustainable investments.

Previous research highlights that environmental innovation, or green innovation, is usually constrained by high investment costs, significant zero-gain pressures, and low short-term profitability, stemming from both internal and external uncertainties. As a consequence, companies’ executives may be reluctant to commit to environmental innovation initiatives in order to maintain current high economic efficiency and smooth organizational management (Wang & Chu, 2024). However, when shareholders are well aware of the social commitment and sustainable goals to be achieved, such as reducing carbon emission or improving environmental management, green innovation performance can be effectively monitored and enhanced (Wang et al., 2022a).

In other words, ESG practices can improve environmental innovation through the release of evaluable ESG rating, scores, and reporting, thereby reducing information asymmetry and sending positive signals to stakeholders to pursue a green innovation strategy (Tan & Zhu, 2022). More specifically, the three pillars of ESG – environmental, social and governance dimensions- each have different impacts on environmental innovation. For example, some researchers propose that applicable environmental regulations can motivate companies to balance energy and resource control by implementing technological innovations (Wang et al., 2023; Zhang et al., 2024). Additionally, other studies correlate the positive effects of social performance, such as human capital management and labor talent, with environmental innovation, through a bidirectional relationship (Long et al., 2023). Based on these previous findings, this paper proposes the first hypothesis:

Hypothesis 1*. Environmental innovation is positively related to corporate ESG performance within the tourism sector.*

Innovation has been considered as a main driver of long-term economic prosperity and sustainable development for companies, as it fosters the continuous pursuit of competitive advantages, new market opportunities, and environmental benefits (Li et al., 2023b). Corporate financial performance significantly influences investment choices – whether they are economically driven or aimed at a more sustainable model (Clark et al., 2021; Hamdi et al., 2022). Consequently, the financial status of a company affects stakeholders' decisions on investing in innovative projects, considering long-term profitability, eco-friendly benefits, and sustainable development.

The “resource-based theory” highlights the strategic utilization of a company’s internal and external resources, capabilities, and firm attributes to achieve competitive advantages, better market value, and economic proficiency (Barney, 1991; Seddon, 2014). Environmental innovation, considered a high-risky investment, typically requires greater caution and significant allocation of corporate resources, particularly those related to core competitiveness, like technologies (Li et al., 2023c).

Previous empirical studies have analyzed the relationships between environmental innovation and corporate financial performance (Li et al., 2023c; Vasileiou et al., 2022), concluding that in general, environmental innovation positively impacts financial performance, competitiveness, market expansion, productivity, and corporate reputation (Farza, et al., 2021; Liu et al., 2024; Mansour et al., 2024). More specifically, financial indicators such as Return on Assets (ROA), Tobin’s Q, and market-to-book ratio are commonly included in previous studies.

For instance, some studies focused on different countries and industries such as oil and gas companies (Aastvedt et al., 2021), found a positive and significant relationship between environmental innovation and ROA among US-listed companies, while this relationship tends to be insignificant in European companies, This finding aligns with Lin et al. (2019), who also reported a positive and significant relationship between ROA and environmental innovation in the international automotive industry. Iqbal et al. (2022) further found a positive and significant correlation between environmental innovation and Tobin’s Q, as well as the market-to-book ratio, among US companies. In this context, the tourism industry

remains underexplored. Therefore, this paper aims to fill this gap by investigating the relationships between environmental innovation and corporate financial performance within the tourism sector. Based on these findings, we propose the second hypothesis:

Hypothesis 2*. Environmental innovation is positively related to corporate financial performance within the tourism sector.*

Another stream of research focuses on the impact of global industry crises on environmental innovation. The general consensus highlights the importance of environmental innovation investment for companies to better survive severe industrial crises, such as the last global pandemic (Hermundsdottir et al., 2022). This finding stems from the viewpoint that environmental innovation is path-dependent (Christmann, 2000), suggesting that the environmental innovation initiatives can be implemented based on the accumulation of companies' resources, capital, and capabilities (Liu et al., 2024; Seddon, 2014), even during period of global industry crises. Therefore, it would be possible to examine the relationship between environmental innovation and company capabilities and resources, such as its financial performance, to identify their correlations, particularly in the light of the last global pandemic.

By the same token, as stated by previous studies, companies would prefer stable development and firm resilience when facing severe external shocks (Chen et al., 2022; Lee et al., 2024). Thus, sustainability strategies continue to be emphasized in their daily business routines. Companies more involved in environmental innovation practices prove to be more flexible in utilizing dynamic resources, thereby maintaining stability and resilience during global crises (Hermundsdottir et al., 2022). At the same time, sustainable engagement provides external defense against extreme shocks due to enhanced innovation, risk avoidance capabilities, and fulfillment of stakeholder commitments (Al Amosh & Khatib, 2023; Hwang et al., 2021; Umar et al., 2020). These ideas support the possible association between green innovation and ESG factors in the face of a global crisis. Based on these findings, we propose the third hypothesis:

Hypothesis 3*. The global pandemic moderates the relationship between environmental innovation and corporate ESG performance, as well as the relationship between environmental innovation and corporate financial performance within the tourism sector.*

6.3 Methodology

6.3.1 Data and sample selection

This paper retrieved main financial data, ESG data, and environmental innovation data from the Thomson Reuters Eikon database – the current Refinitiv Eikon database – that provides a holistic historical financial and ESG data of over 5000 public-listed worldwide companies (Shi et al., 2023). The authors created a panel data set focusing on key tourism-related companies within the hotel and entertainment services category. This includes main subsectors such as recreations, casinos,

restaurants, bars, hotels, and cruise lines. The data set comprises a total of 1578 samples, covering the period from 2017 to 2023.

The data were initially exported into a CSV file and manually reviewed by the authors, to exclude irrelevant samples that lack ESG data throughout the entire refined timespan, resulting in 289 samples. Subsequently, the timespan was classified into two categories: 2017 to 2019 as the 'pre-pandemic' period, and 2020 to 2023 as the 'during-pandemic and recovery' period. Samples with missing data for comparing these periods were then excluded, leaving an unbalanced dataset of 165 observations. The dataset was finally formatted appropriately for panel data analysis.

6.3.2 Measurement of variables

Environmental innovation is chosen as the main dependent variable, from which the environmental innovation score (abbreviation in the model as: EIS) was retrieved from the Eikon database, and defined as the environmental innovation category score reflecting a company's capacity to reduce the environmental costs and burdens, as well as creating new market opportunities through implementing new environmental technologies, products and processes. The environmental innovation score ranges from zero to one hundred, with a higher score indicating better environmental innovation performance.

Two types of independent variables were included: sustainable indicators and firm-level financial indicators. On one hand, ESG and the three pillars – environmental, social and governance pillars- were chosen as independent variables. The ESG score aggregates company performance across these three pillars —environmental, social, and governance—ranging from zero to one hundred.

The environmental pillar score assesses a company’s impact on the ecosystem, focusing on efforts to mitigate environmental harm and leverage environmental resources for long-term shareholder value. The social pillar score evaluates a company’s ability to foster trust with its workforce, customers, community, and society, considering factors such as human relations and rights, community involvement, and product responsibility. The corporate governance pillar score measures a company’s adherence to responsible systems, behaviors, and CSR protocols. It ensures alignment with the best interests of shareholders through governance practices, including management quality, shareholders rights, and CSR strategy implementation.

On the other hand, ROA and Tobin’s Q were targeted as main firm-level independent financial variables (defined as corporate financial performances abbreviated as CFPs). ROA - return on assets, is calculated as the income after taxes divided by the average total assets and measures a company’s capability in generating profitability. The higher the return on assets ratio, more efficient a company is in managing its balance sheet and profit. In empirical studies, ROA has been broadly utilized in the analysis of short-term company financial performance, and its relationship with green innovation (Aastvedt et al., 2021; Johl & Toha, 2021; Mansour et al., 2024). Tobin’s Q is calculated as the market value divided by total assets of a company. When Tobin’s Q is less than one, it suggests that the market value of the

company is lower than the value of its total assets, indicating the company may be undervalued (Tobin & Brainard, 1976).

The authors included dividend and leverage as two main control variables. The leverage ratio is calculated as total liabilities divided by total assets, reflecting the proportion of a company's capital that derives from debt. A leverage ratio below one indicates a balanced debt structure with moderate risk (Acosta et al., 2020; Wang et al., 2024). Dividend yield measures the ratio of annualized dividends to stock price, indicating the extent to which wealth is distributed to shareholders (Abdi et al., 2022a; Wang et al., 2022a). Natural logarithms were applied when calculating the firm's Tobin's Q and leverage ratio. Additionally, a time moderating factor was introduced, creating a dummy variable that distinguished between the 'pre-pandemic' period (2017-2019) and the 'during-pandemic and recovery' period (2020-2023).

6.3.3 Model specification

We conducted panel data analysis to determine the relationships between main dependent (EIS) and independent variables (ESG and CFPs). Moreover, considering the significant impact of the global industry crisis, we introduced the moderating effect of time period—before and during the pandemic—to assess potential changes in these relationships. The analysis included both fixed effects and random effects models, and the Hausman test (Hausman, 1978) was conducted to determine the most suitable model. The p-values across all models were approximately one ($p > 0.05$), indicating that we failed to reject the null hypothesis. Consequently, the random effects model was deemed more appropriate for this study (Abdi et al., 2020).

Environmental innovation score (EIS) was chosen as the main dependent variable and was applied into two models: the main effect model (Model 1) that does not include the global crisis, and the moderating effect model under the consideration of the impact of the industry crisis (Model 2). In our models, EIS represents the environmental innovation score; ESG refers to the aggregated ESG score; ENV refers to the environmental pillar score; SOC represents the social pillar score; and GOV represents the governance pillar score. ROA is the return on assets ratio; and TQ refers to Tobin's Q. LEV represents the leverage ratio; and DIV the dividend yield.

Model 1 (dependent variable EIS score)

$$EIS_{it} = \alpha + \beta_1 ESG_{it} + \beta_2 ROA_{it} + \beta_3 TQ_{it} + \beta_4 LEV_{it} + \beta_5 DIV_{it} + \beta_6 Period_{it} + \beta_7 ESG_{it} * Period_{it} + \beta_8 ROA_{it} * Period_{it} + \beta_9 TQ_{it} * Period_{it} + \varepsilon_{it}$$

Model 2 (dependent variable EIS score)

$$EIS_{it} = \alpha + \beta_1 ENV_{it} + \beta_2 SOC_{it} + \beta_3 GOV_{it} + \beta_4 ROA_{it} + \beta_5 TQ_{it} + \beta_6 LEV_{it} + \beta_7 DIV_{it} + \beta_8 ENV_{it} * Period_{it} + \beta_9 SOC_{it} * Period_{it} + \beta_{10} GOV_{it} * Period_{it} + \beta_{11} ROA_{it} * Period_{it} + \beta_{12} TQ_{it} * Period_{it} + \varepsilon_{it}$$

6.4 Empirical results of ESGs, CFPs, and environmental innovation

6.4.1 Descriptive results

Table 17 summarizes the descriptive statistics of the dependent variable, main independent variables, and control variables. EIS – our sole dependent variable, shows significant variability in the environmental performance of the tourism-related companies studied, as indicated by the large standard deviation (St.Dev. = 25.46). Among the independent variables related to sustainable indicators, the environmental score (ENV) holds the highest maximum value (98.15), followed by the social score (SOC) at 95.83, the governance score (GOV) at 93.82, and the overall ESG score at 91.03. There are also substantial discrepancies within these main sustainable indicators, with standard deviations for ESG, ENV, SOC, and GOV at 21.01, 29.28, 23.93, and 22.43, respectively. The governance pillar has the highest mean score of 47.73, followed by the social pillar (mean = 45.02) and the environmental pillar (mean = 37.94). This suggests that the companies studied prioritize the interests of primary shareholders, such as board members and executives, over other stakeholders or environmental management. This observation aligns with the findings of Abdi et al. (2020), who reported a higher mean governance score in the sustainable performance of the airline industry.

In terms of the performance of the main financial indicators, ROA ranges from -2.01 to 0.64, with a mean of 0.01 and a standard deviation of 0.15, indicating a low capability of the sampled companies to convert invested assets into revenues, possibly due to the capital-intensive nature of the hotel and entertainment industries (Vellas & Bécherel, 1995). Tobin's Q ranges from -3.01 to 3.79, with a mean value of 0.00 and a standard deviation of 0.96. Regarding control variables, the leverage ratio, has a mean value of 0.70, ranging from 0.03 to 4.21. This average value suggests an acceptable level of debt for safe investment, appealing to potential investors and shareholders. The mean dividend yield is 0.02, indicating a positive sign for young and forward-looking investors seeking long-term company growth. However, it may not satisfy shareholders who prioritize immediate dividend returns (Kirch & Vancin, 2023).

Table 17. Descriptive statistics of EIS, ESG and CFP variables

Role	Variables	Mean	Median	Max	Min	St. Dev.
Dependent variable	EIS	13.27	0.00	93.75	0.00	25.46
Independent variable	ESG	44.62	43.83	91.03	3.28	21.01
	ENV	37.94	36.33	98.15	0.00	29.28
	SOC	45.02	43.40	95.83	0.66	23.93
	GOV	47.73	46.71	93.82	3.32	22.43
	ROA	0.01	0.03	0.64	-2.01	0.15
	TQ	0.00	-0.04	3.79	-3.01	0.96
	LEV	0.70	0.01	4.21	0.03	0.40

Control variable	DIV	0.02	0.66	0.24	-0.07	0.03

Source: Elaborated by the authors

6.4.2 Correlation analysis

Table 18 presents the correlation matrix of the studied variables, examining the linear relationships between pairs of indicators. Overall, the environmental innovation score (EIS) is positively and significantly correlated with the governance score (GOV) and the leverage ratio (LEV) (p-values < 0.001), showing the higher correlation values, followed by the ESG score (p-value < 0.01). There are also strong correlations between main independent sustainable indicators such as ESG-ENV, ESG-SOC, ENV-SOC, ENV-GOV, and SOC-GOV. The variance inflation factor (VIF) values were calculated (**Table 19**), for independent variables falling below the cut-off point of 4 (O'Brien, 2007), indicating that multicollinearity is not a concern in this analysis.

Table 18. Correlation matrix of EIS, ESG and CFP variables

	EIS	**ESG**	**ENV**	**SOC**	**GOV**	**ROA**	**TQ**	**LEV**	**DIV**
EIS	1								
ESG	0.094**	1							
ENV	0.053*	0.263***	1						
SOC	0.015+	0.247***	0.386***	1					
GOV	0.302***	0.068**	0.105***	0.236***	1				
ROA	0.023+	-0.057*	0.009+	0.022+	0.110***	1			
TQ	0.025+	0.035*	0.033*	0.035*	0.061**	0.008+	1		
LEV	0.127***	0.012+	-0.029*	0.015+	0.066**	0.030*	0.054*	1	
DIV	-0.061*	-0.074**	0.010+	0.036*	-0.015+	0.211***	-0.059	-0.079**	1

Signif. Codes: '***' if p-value < 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '+' If p-value < 0.1

Table 19. Variance inflation factor

Panel with Model 1

ESG	ROA	TQ	LEV	DIV	Period
1.021	1.097	1.075	1.095	1.106	1.011

Panel with Model 2

ENV	SOC	GOV	ROA	TQ	LEV	DIV	Period
1.218	1.301	1.119	1.069	1.016	1.053	1.065	1.046

Source: Elaborated by the authors

6.4.3 Empirical results and discussion

The results of panel data analysis were presented in **Table 20** and **Table 21**. **Table 20** considers ESG and financial indicators as independent variables. In the main effect model (Model 1), ESG score is significantly related to the environmental innovation score (at the 5% level, with a coefficient of 0.1234), indicating that a unit change in the ESG score results in a 0.1234 positive change in the EIS score for hotel and entertainment-related companies, supporting **Hypothesis 1**. Among the main financial independent variables, Tobin's Q and ROA, along with the control variable dividend yield, exhibit a negative and nonsignificant impact on environmental innovation, not supporting **Hypothesis 2**.

Considering the moderating effect of the global pandemic (Model 2), the significant positive impact of the ESG score on environmental innovation was offset. This result implies that while ESG scores promote environmental innovation in the pre-pandemic period, the disruptive impact of the global pandemic changed this dynamic, negating the positive influence of ESG on EIS.

In addition, there is no direct relationship between ROA and EIS or between TQ and EIS, even when moderated by the global pandemic. These findings do not support **Hypothesis 3**. Only, the control variable leverage ratio shows a positive and significant relationship with EIS (at the 1% level) in both models, Model 1 and 2.

Table 20. Empirical results for the regression analysis (5)

Model 1: Main effect panel

Variables	Coeff.	z-Value	p-Value
Intercept	0.127	1.846	0.065+
ESG	0.123	2.184	0.029*
ROA	-0.122	-1.319	0.187
TQ	-0.011	-0.182	0.855
LEV	0.199	3.045	0.002**
DIV	-0.030	-0.457	0.648
Period pre	-0.009	-0.072	0.943
Hausman test = 0.940			
R-squared = 0.051			
p-value= 0.003			

Model 2: Interacting effect panel

Variables	Coeff.	z-Value	p-Value
Intercept	0.133	2.290	0.022*
ESG (Pre)	0.280	2.798	0.005**
ESG (during)	0.048	0.701	0.483
ROA (pre)	-0.187	-1.009	0.313
ROA (during)	-0.102	-0.977	0.329
TQ (Pre)	-0.106	-1.112	0.266
TQ (during)	0.048	0.663	0.507
LEV (pre)	0.208	3.181	0.001**
DIV (pre)	-0.027	-0.415	0.678
Hausman test = 0.942			
R-Squared = 0.066			
p-value = 0.001			

Signif. Codes: '***' if p-value < 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '+' If p-value < 0.1

For the moderating variable Period, the label "Pre" denotes pre-crisis, while "During" signifies during the crisis and recovery period

Table 21. Empirical results for the regression analysis (6)

Model 1: Main effect panel

Variables	Coeff.	z-Value	p-Value
Intercept	0.199	2.003	0.045*
ENV	0.0002	0.003	0.998
SOC	-0.024	-0.323	0.747
GOV	0.318	4.484	7.321e-06***
ROA	-0.335	-3.103	0.002**
TQ	0.085	1.215	0.224
LEV	0.246	3.191	0.001**
DIV	-0.010	-0.131	0.896
Period pre	-0.100	-0.720	0.472
Hausman test = 0.688			
R-Squared = 0.159			
P-value = 3.1489e-08			

Model 2: Interacting effect panel

Variables	Coeff.	z-Value	p-Value
Intercept	0.151	1.848	0.065+
ENV (pre)	-0.024	-0.229	0.819
ENV (during)	0.0266	0.310	0.757
SOC (pre)	0.0003	0.002	0.998
SOC (during)	-0.039	-0.414	0.679
GOV (pre)	0.371	3.347	0.0008***
GOV (during)	0.294	3.303	0.001***
ROA (pre)	-0.428	-2.439	0.147*
ROA (during)	-0.274	-2.045	0.041*
TQ (pre)	0.006	0.060	0.952
TQ (during)	0.141	1.472	0.141
LEV (pre)	0.231	2.964	0.003**
DIV (pre)	-0.017	-0.219	0.827
Hausman test = 0.839			
R-square = 0.164			
p-value = 7.6695e-07			

Signif. Codes: '***' if p-value < 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '+' If p-value < 0.1

For the moderating variable Period, the label "Pre" denotes pre-crisis, while "During" signifies during the crisis and recovery period

When the three pillars of the ESG dimension are considered as main independent variables (**Table 21**), as Model 1 exhibits, there is a strongly significant positive relationship between the governance pillar (GOV) and the environmental innovation score (EIS), at the 0.1% level. In contrast, the environmental (ENV) and social (SOC) pillars have a nonsignificant impact on the environmental innovation performance (EIS). These findings partially support **Hypothesis 1**, regarding the GOV-EIS relationship. ROA has a significant negative influence on EIS (at the 1% level), while the leverage ratio (LEV) has a significant positive influence, compared with nonsignificant relationships between Tobin's Q (TQ) and EIS, and dividend yield (DIV) and EIS, which also partially support **Hypothesis 2**.

The moderating effect model (Model 2) illustrates that the environmental (ENV) and social (SOC) pillars do not exert a significant impact on EIS, independently on the existence of a global industry crisis like the recent pandemic. Only the governance pillar (GOV) has a strong and significant influence on

environmental innovation (EIS) at the 0.1% level both before and during the pandemic. Although the influence in the pre-pandemic period was stronger. Additionally, ROA is negatively and significantly related to EIS at the 5% level in both study periods, being this negative association stronger in the pre-pandemic period. Consequently, the pandemic moderates the relationship between GOV-EIS and ROA-EIS, partially supporting **Hypothesis 3**.

Generally speaking, our results highlight the relationship between corporate sustainable indicators and environmental innovation performance. They illustrate a positive link between ESG score and environmental innovation score that when the crisis is considered, was only significant in the pre-pandemic period. This finding is not in consistent with the idea of Wang et al. (2023), who support that ESG ratings increase green innovation output through the increment of green patents. The use of different variables to refer to environmental innovation could explain this discrepancy.

The lack of significant results for the social and environmental pillars' impacts on environmental innovation could be attributed to their mixed effects. Specifically, for the social pillar, strong social scores within tourism companies might be expected to align positively with better environmental innovation performance. However, these scores are also associated with heavy financial burdens related to employment and human rights inputs, which could discourage environmental innovation investments (Long et al., 2023). Similarly, for the environmental pillar, when the benefits of environmental initiatives (e.g., reducing pollution, carbon emissions, producing green products) do not outweigh the costs of green innovation, managers and executives may opt for easily imitable technologies to achieve sustainability goals. This choice is often driven by the potential inefficiency in long-term resource allocation and the pressure of industry-wide environmental regulations (Li et al., 2023a; Hong et al., 2024).

The governance pillar, showing the most significant and positive impact on the EIS both before and during the pandemic, demonstrates that top shareholders and board members support and make positive financial decisions toward green innovation investments to fulfill social responsibilities and commitments, supporting the “stakeholder theory” (Freeman, 1999; Wang & Chu, 2024). This finding contradicts Ullah and Nasim (2021), who found a nonsignificant relationship between firm-level governance and green innovation. This discrepancy may be due to differences in the variables studied, such as company board size, ethical initiatives, and the proportion of women directors.

Similarly, the main financial indicator, ROA, is found to be negatively related to the environmental innovation score. This suggests that as tourism companies increase profitability, they are less likely to invest in green innovation initiatives. One possible explanation is that technological investments are often costly, time-consuming, and carry high risks of failure, which can result in zero output and low resource effectiveness (Aastvedt et al., 2021). However, in the face of a global crisis, like the recent pandemic, this negative relationship was smaller, showing an improvement in the link between ROA and environmental innovation when comparing the pre-pandemic period with the pandemic and recovery phase, and demonstrating the moderating role of this global crisis.

There is no direct relationship between Tobin's Q (TQ) and environmental innovation, which contrasts with the findings of Wang and Ahmad (2024), who identified a positive relationship between these variables. They pointed out that Tobin's Q reflects a company's capability for green investment and market expansion. This discrepancy suggests that hotel and entertainment companies in our sample may face challenges in pursuing green innovation investments given their low average Tobin's Q.

Regarding the control variables, the leverage ratio (LEV) has a significant positive effect on environmental innovation. This supports the idea that when a company's leverage is at an adequate level (with an average leverage ratio around 0.70), it can contribute more funds and make safer investments in green innovation practices (Wang et al., 2024). Another control variable, dividend yield, does not significantly impact environmental innovation, indicating that current shareholder wealth is not being transferred very clearly to green innovation investments (Wang et al., 2022a). Previous literature demonstrated that a low dividend yield might encourage long-term investment, particularly from far-sighted and young investors, promoting the sustainable development of the entire company (Kirch & Vancin, 2023), although our results could not support or reject this association.

PART IV. CONCLUSIONS

Chapter 7. Conclusions

As the pandemic spread, tourism and COVID-19 research greatly increased. The first research objective was to find out how the topics evolved and developed within this area. In this sense, we conducted a bibliometric approach (the first theoretical research in **Chapter 2**) in employing both scientific collaboration and thematic analyses to better understand the intellectual base and complement previous literature by providing analysis of knowledge structure in this area. Through the comprehensive review of 1,063 academic articles in Web of Science from 2020-2021, our findings demonstrated that global academic interest and connections in tourism and COVID-19 increased strongly especially in the USA, China and European countries. Also, the results provided a global view of multidisciplinary research focusing on the tourism, hospitality, information technology, marketing, and environmental sciences fields. Adopting a bibliometric approach enabled us to better understand the scientific collaborative relationships among authors, research ideas and trends, guiding tourism researchers in identifying and finding future collaborations and relevant sources and references.

Moreover, knowledge trends and patterns were identified through keyword co-occurrence analysis and the construction of a knowledge map, which helped us to sketch future research lines, and contributed to a greater comprehension of the intellectual structure of the field. Our findings confirmed the place of sustainable tourism development in the center of the knowledge map, appearing in all the most influential articles. Although it was not a novel topic (Niñerola et al., 2019), there still remained a need to investigate it further, especially in the context of public health crisis. The main value of our research was its contribution in the identification of new venues for future research to advance in tourism transformation facing this kind of crisis, by integrating social, environmental, cultural and governance dimensions of sustainable tourism. Several key issues involving low carbon imperatives, overtourism solutions, stakeholder collaborations, tourist experiences, social justice, human rights, and health issues, were also emphasized as relevant aspects to contribute to sustainable tourism which deserve future reconsideration.

The pandemic also imposed new challenges on the global sustainable tourism development, as one of the most debatable issues under this pandemic background. In this dimension, we proposed the second research objective in finding the thematic development in tourism sustainability and COVID-19 issues, as one of the most debated research areas drawn from the first theoretical research – tourism and COVID-19. We found out that the collaboration of all the relevant stakeholders, whose mutual communication and human caring - not only out of their own benefits, but also contributed to the reconstruction of the whole society become vital importance in overcoming the pandemic and maintain the long-term longevity and sustainability of the tourism industry. The pandemic was still undergoing, thus further investigations on the tourism sustainable practices and their significance in handling upcoming problems induced by the pandemic should be expected in the future. In addition, new growth potentials in high technologies utilization, especially the utilization of virtual tools, social media, artificial

intelligence; strategic planning and management in promoting the general efficiency and stability of the whole industry were expected to gain further attention.

In the same vein, another important topic that was highly correlated to the tourism development would be the recovery and resilience perspectives. Tourism resilience was also paid special attention in the second theoretical research in enhancing the crisis preparedness, mutual communication and belongness, as well as flexible strategies and responses from a macro level (Altshuler & Schmidt, 2021; Sharma et al., 2021). As one of the most collaborative countries focusing on the tourism studies within this pandemic background, China's rapid response and recovery to the global pandemic also aroused worldwide attention. In this sense, we also concentrated on another theoretical research in terms of the China's tourism cities' recovery and resilience studies. Our findings revealed that top-down prevention and control measures were implemented by the Chinese central and local governments during the stage of mass infection provoked by the pandemic. The promotion of international image through reemployment under governmental financial supports to re-boost China's tourism also gained great attention. New trends in tourism based on risk avoidance, digitalization, close-to-nature and cultural heritages have become crucial factors in the future development of China's tourism. Dark tourism, as a potential tourism recovery strategy, appeared with strength, not only for the memory of people deceased in the pandemic, but also for the inheritance of national patriotism.

Previous theoretical findings based on theoretical research upon tourism, sustainability, resilience and COVID-19 also brought about empirical studies. On one hand, investigations of tourism sustainable performances were emphasized as the research focus as a possible solution for the resilience of strict financial conditions of the whole industry. In this dimension, our study focused on the discussion of the empirical parts of tourism and hospitality companies in finding possible sustainable protocols when faced with severe financial status under the influence of the global pandemic. In specific, we would like to discover the research objectives as: if tourism and hospitality companies would pay special attention to the development of sustainable performances particularly when faced with severe global crises, such as the pandemic. If so, whether their sustainable performances (encompassing environmental, social, and governance (ESG) aspects) would be influenced by firms' characteristics (firm size) and financial performances (ROA and Tobin's Q); if the influences could be differentiated between the hospitality companies and other tourism related companies; and if COVID-19 would moderate the abovementioned effects.

In general, our panel data analysis revealed a significant, positive relationship between firm size and ESG scores. However, we found limited evidence supporting a strong association between CFP and sustainability performance, with the only exception of a significant negative relationship between ROA and ESG, environmental, social, and governance scores during the pre-crisis period. The moderating effects of the recent global pandemic, serving as a proxy for a global industrial crisis, accentuated a stronger positive association between the size and leverage of hospitality firms and their ESG, environmental, social, and governance scores during the crisis and recovery period compared to pre-pandemic times. This highlighted the profound impact of crises in incentivizing sustainability initiatives within the tourism industry. Our findings also shed light on industrial differences in the effects of

corporate financial impacts and firms' characteristics on sustainable practices between the hospitality sector and other tourism-related subsectors, with more pronounced results observed for hospitality companies.

On the other hand, another empirical research was also constructed based on one of the most interesting research potentials drawn from tourism and COVID-19, tourism resilience theoretical studies, related to innovation and technological transformation issues. This piece of study was also an extended research based on the last empirical research who laid special focus on the relationship between tourism sustainable and financial performances when influenced by the global pandemic.

In the last empirical research, it was also testified that in previous studies that sustainable behaviors would contribute to tourism resilience especially when faced with severe health crises (Al Amosh & Khatib, 2023; Chen et al., 2022; Clark et al., 2021). The recent global pandemic crisis raised many debates towards industrial resilience and development, particularly in severely impacted sectors like tourism, from which environmental innovation emerged as a crucial factor for the long-term sustainability of companies.

In this sense, our last research concentrated on the investigation of the innovative performances of tourism companies to find out how could they survive when involved in severe global health crises, and in a further step, in finding the relationship of sustainability and financial performance with environmental innovation under the framework of a global industrial crisis. In this sense, our study explored the differences of innovative performances (using environmental innovation as the main metric) of tourism related subsectors in - the relationship between environmental innovation and ESG and corporate financial performances, as well as the moderating effect of the global pandemic on these relationships.

A panel data analysis was conducted on a total of 165 hotel and entertainment companies, covering the years 2017 to 2023. Our findings indicated that companies aiming to enhance their ESG scores were also inclined to invest in green innovation initiatives, especially with support from top shareholders and board members, being the governance pillar the one with stronger impact on environmental innovation. Additionally, as companies increased profitability, they were less likely to invest in green innovation initiatives, although this negative relationship was reduced in the face of a global crisis like the recent pandemic, confirming that in times of crisis, environmental innovation was viewed as a safe and potentially favorable investment for the future.

Chapter 8. Implications

8.1 Academic implications

Academic implications could be summarized based on the first two theoretical bibliometric studies. The first theoretical research in terms of “tourism and COVID-19” provided relevant contributions for academics in tourism related studies. As the pandemic spread, global attention was paid to rethink how to tackle the issue and its impacts on the whole tourism industry (Elkhwesky et al., 2022; Ntounis et al., 2022). Our findings revealed some realistic problems induced by the pandemic, like tourist discriminative experiences, unequal hospitality employment, overtourism, balance over stakeholder wellbeing and economic profits (Colmekcioglu et al., 2022; Song et al., 2022). It contributed to a better comprehension of knowledge sharing in leading countries and regions, and provided guidance to researchers in establishing future collaboration. More research dedication can be addressed in establishing a solid and in-breadth communication and networking among not only the identified leading countries but also those more vulnerable developing regions.

We also found the most co-cited sources, which not only revealed the main avenues of knowledge dissemination of top-tier publications upon tourism, the pandemic and multidisciplinary fields, but also offers implications for scholars to find the relevant journals for their papers (Pelit & Katircioglu, 2022). The proposed construction of the integrated knowledge map contributed to improving the comprehension of tourism research by linking four different dimensions and drawing reflections in various realistic issues (Colmekcioglu et al., 2022) as the counterbalance over tourism staff rights and the utilization of modern technologies (Lu et al., 2022); equal communication and interaction among different entities within the tourism system (Balakrishnan & Sambasivan, 2022; Jamal & Budke, 2020); and practical solutions in the realization of sustainable tourism governance and responsible behaviors (Elkhwesky et al., 2022; Hall et al., 2020).

The stage of research in terms of “tourism sustainability and COVID-19” contributed to enriching the existing literature in tourism sustainability studies, highlighting the current academic interests in tourism resilience sustainable tourism, and tourism sustainable transformation, especially in the face of the global severe health crises like the COVID-19. Generally speaking, a synthesis upon previous research would not only contribute to the better understanding of the prevailing knowledge, but also identify potential themes and areas in tourism sustainability under the pandemic background. We embraced a bibliometric study method to further illustrate the current state of art, knowledge domains, thematic correlations, as well as valuable research opportunities within the fields of tourism sustainable issues to be discovered during and in the post-pandemic era. It also provided implications for future researchers, tourism practitioners and local destinations in finding possible way-out, research and investment potentials in the resolution of social problems, improvement of satisfied tourism experience and responsible destination marketing, by embracing possible technological innovations as a vital element in the construction of sustainable tourism governance and long-term local development.

8.2 Theoretical implications

Theoretical implications were drawn from two empirical studies in terms of tourism sustainable performances, financial performances and innovative behaviors perspectives. One of the empirical research projects offered significant theoretical contributions by delving into the intricate relationships between firm characteristics and sustainable performance, with a specific focus on hospitality companies within the tourism industry amidst global industrial crises. Our findings advanced the resource-based theory and stakeholder theory within the hospitality domain, underscoring the pivotal role of corporate sustainable competitiveness (Zhang et al., 2021b). By highlighting the transformative power of assets into ESG, environmental, and social initiatives, particularly facilitated by economies of scale, we emphasized the broader objectives beyond mere economic profitability in fulfilling stakeholders' goals. Furthermore, our study enriched the discourse on institutional theory by presenting crucial insights into the industrial comparison of sustainable performances, particularly between hospitality firms and other tourism-related subsectors. We underscored the heterogeneous effects of firm-level characteristics on sustainability across various segments of the tourism industry, illuminating the complex interplay of organizational dynamics in shaping sustainable practices. Moreover, our findings illuminated the moderating effect of severe financial constraints induced by global industrial crises, particularly evident in the hospitality sector. This underscored how crises potentiate sustainability practices, highlighting the resilience and adaptive capacities of hospitality firms in navigating turbulent economic landscapes.

Another empirical paper based on tourism sustainability and innovation offered several academic implications by enriching the current state of the art on the relationship between corporate green innovation, ESGs, and financial performance, while also considering the moderating effect of the global pandemic. Given the substantial impact of stakeholder pressure on global climate change and the sustainable development of the entire tourism industry, it was crucial to focus on corporate green governance and the implementation of environmental innovation (Hong et al., 2024; Ullah & Nasim, 2021). It offered insightful theoretical implications for scholars studying the relationships between green innovation, sustainable initiatives, and firm-level financial performance, particularly in the under-researched field of tourism-related companies, such as hotels and entertainment firms. Additionally, it extended existing theories by considering the moderating effect of global industry crises, such as the recent pandemic. Our findings specifically supported the assumptions of stakeholder theory and highlight the increased significance of resource-based theory during times of crisis. This approach can serve as a valuable model for future investigations addressing potential similar severe health emergencies.

8.3 Practical/managerial/policy implications

Practical implications were concluded from the first and third theoretical research. From a practical perspective, drawn from the first theoretical research in terms of tourism industry and COVID-19 topics, managers and practitioners in different sectors of the tourism industry may need to consider the

proposed aspects in the social dimension to enhance equality and efficiency in employee management so as to better understand and adapt to the dynamics of the industry to uncertainties. Moreover, based on the perspective of governance dimension, all stakeholders of the tourism industry, as tourist boards and convention and visitors' bureaus, may consider promoting tourism destinations with empathy strategy (Xie et al., 2021) and tourist reconnections and trust (Song et al., 2022), aiming to arouse tourists' emotional attachment and confidence to traveling again (Balakrishnan & Sambasivan, 2022; He et al., 2022). Finally, upon the proposed knowledge map, one of the key necessities was to take local resilience and sustainable transformation into consideration. It was advisable that positive policy changes could be realized to fulfill this agenda, particularly in the efforts of implementing a multi-stakeholder regulatory strategy (Abdi et al., 2022a) to create both internal resilience and external defense to unforeseen global health disasters (Ntounis et al., 2022).The third theoretical research enriched the literature in the context of the global tourism and resilience, through filling the gaps around Chinese recovery of tourism cities, recognized worldwide by their effectiveness and speed. Our research provided a more holistic and complete view on the measures applied in the pandemic scenario, showing both, prevention measures and recovery strategies, to observe the adaptation of these measures and policies over time, in accordance with the evolution and different waves of the pandemic. Some strategies and trends were already stated by other studies, like the use of new technologies and the thoughts on new approaches for obtaining a more sustainable tourism model. In our study we complemented these strategies with those applied in Chinese cities, based on financial support and on the benefits of natural, cultural and identity heritages to boost tourism under adaptive and control measures to restrain contagion. Our results also highlighted the pandemic as a driver of dark tourism, that could be extrapolated to other global severe health emergencies.

These strategies involved some practical implications for tourism cities, destinations and local governments in finding possible way-outs in controlling the local pandemic and boosting tourism activities and could be further expanded to local tourist attractions and scenic spots. Among these implications, it was worthy to mention the growth opportunities in exploiting traditional cultural and natural resources with the combination of modern technologies. It was also anticipated the suitability of a sustainable transition in the future of China's tourism recovery, particularly through the promotion of characteristic tourism, accommodations in some rural and suburban areas, that might boost tourism activities and impact positively cities' and destinations' image and sustainability. The exploration of dark tourism also emerged as a relevant solution for the tourism industry in Chinese tourism cities, with special emphasis on the inheritance of national patriotism and marketing opportunities in the promotion of historical stories and campaigns.

Our thesis also provided some practical and managerial implications based on the findings in the two empirical studies. In specific, our study offered practical insights and actionable recommendations for managers and executives in the hospitality sector. Firstly, our findings underscored the importance of allocating resources towards the development of sustainable protocols, alongside continuous improvements in corporate financial performance. Stakeholders, particularly those with influential power, prioritized ESG practices across environmental, social, and governance pillars (Abdi et al., 2022c).

Therefore, it was imperative for hospitality companies to align their strategies with these stakeholders' expectations. Moreover, the profound impact of the recent global industrial crisis, exemplified by the COVID-19 pandemic, highlighted the inherent challenges in balancing profitability with sustainable investments. This served as a wake-up call for large hospitality firms to prioritize the formulation of effective sustainable business strategies. From an institutional standpoint, companies must meticulously evaluate their financial status, debt obligations, and shareholder wealth optimization to drive profitability through sustainable practices and decision-making processes. By enhancing corporate resilience in the long term, these measures can mitigate risks associated with future crises while fostering sustainable growth (Habib & Mourad, 2023; Zhang et al., 2021b).

Our thesis also provided valuable insights for tourism managers, executives, and decision-makers in addressing green innovation challenges. It demonstrated that green innovation receives significant attention from the boards of directors and major shareholders in the hotel and entertainment sectors. However, these efforts were constrained by the substantial negative impacts of the global pandemic crisis. Interestingly, while high costs associated with green innovation can deter investment from the most profitable companies, the situation diminished during a crisis. In such times, more profitable companies showed greater motivation to invest in environmental innovation, proving that flexibility in the utilization of dynamic resources contributed to maintaining company stability and recovery when faced with global challenges (Hermundsdottir et al., 2022). Furthermore, sustainable engagement provided external defense against extreme shocks due to better innovation, risk avoidance capabilities, and fulfillment of stakeholder commitments (Al Amosh & Khatib, 2023; Umar et al., 2020). Therefore, promoting green innovation initiatives was of vital significance for companies aiming for long-term resilience and sustainable development (Lin et al., 2019).

It also offered several policy recommendations. First, in light of the low profitability that may be caused by a global industry crisis, companies should focus on improving their overall financial performance by enhancing internal resource allocation efficiency and seeking external resources and opportunities. This can include governmental financial support, incentives, and collaborative relationships with local academia, research institutions, and government agencies to bolster future green innovation investments (Hong et al., 2024; Wang & Chu, 2024; Zhang et al., 2024). Second, managers and company decision-makers should adopt a more forward-looking approach and translate their commitment to green innovation into practical strategic protocols. This involved considering social commitments, green management, innovative capabilities, and long-term company development in their decision-making processes (Aastvedt et al., 2021; Iqbal et al., 2022; Mansour et al., 2024; Wang et al., 2023; Zheng & Zhang, 2023).

Chapter 9. Limitations and future research

9.1 Limitations

Despite the contributions drawn from the thesis, several limitations should be noted. First, in terms of theoretical parts in bibliometric studies, our single database might be extended to others, such as Scopus, ScienceDirect, etc. to increase scope of scientific materials. In the analytical dimension, scholar and institutional co-authorships could be supplemented by future knowledge creation and project-designs (Pelit & Katircioglu, 2022). In the light of the recency and limited duration of our work on the topic, a longer up-to-the-minute data tracking might be organized, as a resource for researchers to follow the time-based thematic evolution through overlay visualization. The last perspective lay in the invariability of keyword co-occurrences. In addition to analysis of top cited articles, we could extend the research into text-mining aspects, including the discussion of titles and abstracts, which would result in a more holistic study overall.

In terms of the theoretical research on China's tourism cities under the pandemic lens, there were also some limitations and future research directions as follows. As the third wave of domestic pandemic occurred in September 2021, it would be of crucial importance to extend the research timespan and scope in investigating new policies, measures and tourism growths. Our research method, content analysis in social media platforms, can be combined with analytical software to make it more systematic and precise (Trinh et al., 2022). Moreover, we only concentrated on the supplier side – local tourism administrations and industrial practitioners, whereas other stakeholders like tourists and local community could also be included in future research.

In terms of the parts of empirical studies, the main limitation of the research lied in the scope of the firms' characteristics and financial indicators retrieved in this thesis, which could be extended to other categories, like firm age, ROE, etc. (Al Amosh & Khatib, 2023; Franco et al., 2020; Jyoti & Khanna, 2021). Research scope might also be expanded to a longer timespan, which might contribute to the comprehension and investigation of other similar previous industrial crises like the 2007–2008 Global Financial Crises, the European sovereign debt crisis, etc. (Al Amosh & Khatib, 2023; Dogru et al., 2022; Hwang et al., 2021; Shi et al., 2023; Umar et al., 2020). Our thesis focused on investigating major tourism-related companies, using data retrieved from the Refinitiv Eikon database—a widely used platform for financial data. Future research thus could be expected to expand this scope by incorporating other platforms that emphasize innovative information, such as R&D investments and green patents. (Dicuonzo et al., 2022).

9.2 Future research

For future researchers, we provide some directions based on the constructed knowledge map from the perspectives of social, environmental, cultural and governance dimensions under the main theme of

sustainable tourism development. In terms of social dimension, future research can study the implementation strategies over public health crisis management and how these crisis management practices may impact on social concerns in tourism industry. There is the need to explore the resolution of employment problems in various tourism sectors during the crisis and post-crisis era, and prevent their reappearance. Future research may investigate the counterbalance of tourism staff rights and employment problems in the tourism industry to proactively tackle them in similar crisis. Finally, researchers may study how tourist experiences and sense of participation can be improved by promoting equal communication and interaction among different entities within the tourism system.

In the environmental dimension, we could also find some research potentials in terms of the environmental protection and resource utilization perspectives. Specifically, future research may focus on the role of technology and its impact on issues as tourism volume management and environmental conservation, analyzing the key factors that contribute to the control of overtourism and environmental deterioration. Scholars can also ask how regulatory apparatus can promote technology and innovation to help environmental conservation. Finally, more research work can address the issue of efficient energy consumption to promote the low carbon imperatives, considering which incentives and conditions would be necessary for the transformation towards a green energy model in distinctive tourism sectors so as to achieve the sustainable development of the industry.

In terms of cultural and governance dimension, reflections are demanded in studying the impact of cultural and governance aspects during crisis in tourism industry. Some questions can be raised for future research as: What are the factors that may contribute to a good cultural-sensitive guidance in tourism industry? How cultural sensitivity related factors may influence tourists' restoration both physically and mentally in the public health crisis? What are the key elements in planning and implementing a multi-stakeholder regulatory strategy to achieve sustainable governance? How to effectively promote responsible behaviors from different entities in tourism industry? How can tourism entities in a proactive and collaborative way design and incorporate protocols and strategies for confronting any public health crisis?

In terms of the theoretical study upon tourism resilience and recovery strategies, future research might concentrate on empirical studies, such as case studies in terms of local tourism development protocols, under the conjoint efforts of tourism practitioners, government and local communities. Research and development potential could focus on the exploration of undiscovered areas with abundant nature and cultural resources so as to bring about local employment, development of destination image and so on (Jiricka et al., 2021; Liu et al., 2021a; Pasquinelli et al., 2022). Other possibilities include further investigation on the comparison of dark tourism during different periods, such as Nanjing Massacre in China (Wang et al., 2021), or Sichuan earthquake (Tang, 2014) with the current dark tourism influenced by the global pandemic.

Also, investigations upon corporate sustainable performances could be further combined with the discussions of political, educational, cultural, technological variables, such as regulations, norms, workforce protection, labor productivity, cultural orientations, social cohesions, R&D, and so on (Baldini et al., 2018; Daniel et al., 2012; Reverte, 2022). It would also be advisable to develop more specific

studies from tourism and hospitality-related entities, such as transportation, tourist spots, travel agencies that haven't been included by this thesis, to be investigated through using different ESG and financial indicators (Abdi et al., 2022c). Finally, faced with the global catastrophic health emergency, it could be possible to rise more attention towards how to construct the long-term development of the whole industry to handle with both possible external shocks and internal efficient company management. Future research could focus on the sustainable transformations of tourism companies, relevant stakeholders and the whole industry, through embedding more strategical investments into more competitive elements, like socio-technological transitions, ecological resilience, and optimization of organizational systems (Penna et al., 2023).

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