sustainability

MDPI

Article

Bridging Disciplinary Divides through Computational Social Sciences and Transdisciplinarity in Tourism Education in Higher Educational Institutions: An Austrian Case Study

Thomas J. Lampoltshammer [1,*], Stefanie Wallinger [2] and Johannes Scholz [3]

[1] Department for E-Governance and Administration, University for Continuing Education Krems, 3500 Krems, Austria
[2] Department of Business and Tourism, Salzburg University of Applied Sciences, 5412 Puch/Salzburg, Austria
[3] Research Group Geoinformation, Institute of Geodesy, Graz University of Technology, 8010 Graz, Austria
* Correspondence: thomas.lampoltshammer@donau-uni.ac.at

Abstract: Grand societal issues such as climate change and technological disruption challenge all industry sectors, including tourism. To cope with these challenges, new sustainable business models that not only rely on data-driven technologies but also require new ways of collaboration beyond disciplines and sectors by facilitating the overall conception of transdisciplinarity are essential. One potential way to combine all these requirements is computational social sciences. As a discipline-crossing approach, it should be anchored within tourism education to train the future workforce and experts necessary to realize the needed transformation. Thus, this study explores the status quo of tourism curricula in higher educational institutions in Austria through the lens of computational social sciences. In doing so, a set of core modules of computational social sciences content was developed as an analytical framework. The results show that there is still a significant gap between the demands of the tourism industry and the offered educational programs in Austria. The article concludes with insights on how to close the existing gap and some suggestions for possible foundational steps to support the transformation.

Keywords: computational social science; transdisciplinarity; tourism studies; education; HEI; digitalization; digital transformation

Citation: Lampoltshammer, T.J.; Wallinger, S.; Scholz, J. Bridging Disciplinary Divides through Computational Social Sciences and Transdisciplinarity in Tourism Education in Higher Educational Institutions: An Austrian Case Study. *Sustainability* **2023**, *15*, 8133. https://doi.org/10.3390/su15108133

Academic Editors: Paula Remoaldo, Hélder da Silva Lopes, Vítor Patrício Rodrigues Ribeiro and Juliana Araújo Alves

Received: 21 February 2023
Revised: 27 April 2023
Accepted: 16 May 2023
Published: 17 May 2023

1. Introduction

Society currently faces several grand challenges reflected in the complexity, breadth, and depth of the 17 sustainable development goals (SDGs). When taking a closer look at the definitions and targets within each SDG, the impression might arise that these are, to a more significant extent, isolated issues which can be addressed through dedicated actions alone. However, on second thought, it becomes evident that there are many interdependencies between various challenges and that solutions to one problem might facilitate additional problems, preventing other targets from being reached altogether. Moreover, this entanglement also implies that disruptions in one domain can also have negative spillover effects in other domains. For example, when addressing the issue of inequalities (SDG 10), tourism has great capabilities for engaging local communities and stakeholders. However, if the challenge is not approached holistically, certain goals might be prevented (e.g., responsible consumption and production, gender equality, no hunger, etc.).

Taking the case of the tourism industry as a complex ecosystem, a major disruption is currently being witnessed; the unforeseen impacts of the COVID-19 pandemic [1]. While in the past, the vulnerability of the tourism system continuously dealt with risks such as natural disasters [2], economic shocks [3], and terror attacks [4], the industry was suddenly brought to an unexpected and complete halt during the pandemic. To anticipate future

disruptions and protect the system's vulnerability, strategies and inherent solutions must approach the challenges at hand holistically, with technology and digital transformation at their core [5]. For the tourism industry to undergo a respective post-crisis recovery, the endeavor needs to be addressed from a global and transnational perspective, as potential solutions are not only of economic nature but also deeply rooted within societal and environmental aspects [6,7].

Between the tension of environmental, business, and societal cohesion, the tourism industry is put to a major test by the rapidly changing weather situation [8] brought along by global warming. Several tourism sectors have been severely hit by global warming and extreme weather conditions [9], for instance, the ski industry [10] or events and tours around wine tasting [11,12].

As the examples of the negative impact of climate change on the tourism industry are numerous [13,14], with future impacts on the horizon, mitigation and risk strategies need to address the situation accordingly. In order to achieve the necessary level of system resilience to not only boost recovery but ultimately achieve sustainability [6,15], the perception of risk plays a crucial role [16], and strategies must actively and proactively approach the challenges at hand from a 360-degree perspective [17].

Self-reflection and continuous self-improvement lie at the heart of the solution, as collaborative practices are required to steer tourism development for both urban and rural environments sustainably. Considering the wide range of decision-making actions based on managerial and regulative measures, there is a need for solid governance to achieve the ambition of capacity building [18]. From a technological and educational point of view, the pairing of technology and education has been identified as a vital combination in rethinking existing recovery approaches [19]. However, the push toward sustainable business models via education and technology is not as straightforward [20,21].

Sustainable business models are essential for creating customer value while addressing multiple contexts to ensure economic, ecological, sociocultural, and technical sustainability [21]. However, higher educational programs at universities are not yet adequately aligned with the needs of the tourism industry. Bridging the gap between cutting-edge research and practice is still challenging [22]. It is crucial to embed transdisciplinary approaches in tourism curricula toward the inclusion of domain experts and practitioners for developing new business models to leverage digitalization's full potential [22] and to merge social sciences with computational approaches. This would reflect the current movement, promoting a more technology-based but human-centered sustainable innovation environment [23].

Hence, this paper investigates the current composition of curricula concerning transdisciplinarity and technology—in terms of computational social sciences (CSS)—within tourism education in higher educational institutions (HEIs) in Austria. The concrete research question is:

To what degree do curricula in the tourism education of HEIs in Austria reflect transdisciplinarity and computational social sciences, and how could gaps be filled?

The remainder of the paper is structured as follows: In Section 2, we discuss the relevant related work concerning current data-driven development in tourism, its impact on creating sustainable business models, the arising necessity of transdisciplinarity, and CSS approaches. Furthermore, we address the current lack of digital skills among tourism practitioners and how this demand is reflected in higher tourism education. Section 3 then presents the methodology and data used for the present study and the created CSS framework. Section 4 introduces the analysis of tourism study programs in Austria in the context of the chosen CSS framework, including the identified key themes of the tourism curricula, the identified gaps, and the overall discussion of results. The paper concludes with remarks and suggestions for future work in Section 5.

2. Related Work

As laid out in the introduction, the numerous challenges the tourism industry faces at the moment require the rethinking of existing approaches and methods. Thus, the present article will demonstrate how data-driven tourism impacts the domain altogether and why a new way of working across disciplines and cooperating with experts and practitioners via transdisciplinarity is necessary. We demonstrate how computational social sciences can help bridge gaps and foster communication at the interfaces of domains and disciplines and how this will impact educational requirements.

In theory, data-driven and smart tourism are still not properly defined concepts, and require further research and development [24,25]. Currently, authors of several articles and Special Issues are trying to evolve the field of data-driven tourism. Jackson [26], for instance, approaches the topic from the viewpoint of big data analytics' contribution to the industry's competitiveness. Subsequently, several articles discuss tourism-related data sources, such as geotagged photos and textual content [27–29]. This aligns with the developments in GIScience, notably, data-driven geography, as proposed by Miller and Goodchild [30]. Lv, Shi, and Gursoy [31] summarize the significant topics of data-driven tourism in a review article by suggesting three levels of data-driven research: (a) an individual level, (b) an organization level, and (c) an industry level. The research on the individual level comprises spatiotemporal consumer behavior and attitudes (e.g., [32,33]), whereas the organizational level deals with marketing and financial performance. On an industry level, tourism flow [34,35], demand volume [36–38], and sustainable development [39,40] are of particular interest. Naturally, security and privacy issues are also addressed, especially when dealing with location-based social media [41,42].

Regarding infrastructure, new developments in federated ecosystems are on the rise. One example can be found in the form of data spaces. These data management platforms for dedicated communities offer possibilities of exchanging data from heterogeneous sources in a distributed, federated approach. Data sovereignty is preserved by enabling diverse contractual possibilities for sharing, selling, and licensing data (see [43] for more details and an in-depth overview of the topic). While some areas have already made significant progress in terms of data spaces, i.e., the health domain on a European level (https://health.ec.europa.eu/ehealth-digital-health-and-care/european-health-data-space_en, accessed on 16 February 2023), the tourism industry is still at an early stage with no equivalent yet deployed, but with preparatory actions underway (https://dsft.modul.ac.at/about/, accessed on 16 February 2023). Such technological advances can provide a solid foundation for developing sustainable business models. However, research alone is insufficient, and the involvement of practitioners and other relevant stakeholders is key [44,45]. The reason why transdisciplinarity is so promising in this context is that it "*[. . .] organizes processes that link scientific, theoretic, and abstract epistemics with the real-world-based experiential knowledge from outside academia*" [46] (p. 375). The interaction between scientific disciplines and societies in the context of tourism has great potential to contribute to resolving aspects associated with the grand wicked problems we face today. Transdisciplinarity can take a leading role in knowledge exchange and conflict resolution, considering aspects such as local tensions, culture, or attitudes [47].

While acknowledging the discussion about whether tourism is its own discipline or an application domain [48], we take the firm stance that tourism is a distinct discipline. As such, the transition from disciplinarity, over interdisciplinarity, to transdisciplinarity is highly relevant to the discipline itself. When taking the case of policy redesign, where the cooperation of researchers, expert practitioners, and policymakers enables a joint understanding of the problem at hand, the development of iterative, inclusive processes and a sustainable long-term strategy [49] showcases the necessity of transdisciplinarity in tourism. Nevertheless, in terms of innovation and entrepreneurial momentum via technology, transdisciplinary research is still underrepresented [50]. With tourism evolving toward more human-centric business concepts [51], we need to bridge social science and

economic aspects with technological aspects in a unified way, where computational social sciences can act as this much-required bridge.

CSS aims to analyze societal challenges from a past and future perspective, with a strong focus on human behavior and the understanding of complex social and system dynamics via information processing and the leverage of computational approaches [52]. New data and the call for qualitative and quantitative policy performance monitoring analysis [53] increase the demand for a CSS-based approach. Thus, the anchoring of CSS to tackle current challenges and required actions around policy agendas impacting tourism is crucial [54]. However, research by Edelmann et al. [55] has shown that CSS in tourism is still heavily underdeveloped, although the tourism industry could benefit significantly from CSS-based approaches.

Relating to this paper's introduction, unintended side effects of technology are a high risk for the tourism industry, with an increasing concern for non-harming business designs that demand enhanced social [science] skills. The continuing advancement in technologies and the aforementioned demand mark a still-unsatisfying level of digital skills in the tourism industry [56]. Insufficient digital skills have also attracted the research community's attention [57]. In their article, Zuccoli and Korstanje describe several issues concerning tourism curricula's current state of affairs. Among others, these issues include a detachment of requirements from the tourism industry and contents taught in educational institutions [58,59]; a strong focus on economics, with little room for alternative methods and approaches [60]; as well as a lack of a fast respond and update process of curricula to reflect global risks for the industry [61].

3. Methodology, Data, and Framework

In an attempt to establish the degree to which curricula in tourism education HEIs reflect transdisciplinarity and computational social sciences, we focused our study on the geographic region of Austria. We analyzed the existing landscape of HEIs and identified all currently available programs at the Bachelor and Master levels in Austria while excluding all available programs solely restricted to distance-learning courses. We gathered information about the modules, the corresponding lectures, and their associated study workload regarding ECTS (European Credit Transfer System) points for each program. Table 1 shows an overview of the identified study programs. Based on the available information, we then decomposed and regrouped the ECTS workload into Bachelor and Master levels, as well as into seven overall thematic groups: Business Administration & Finance, Language & Soft Skills, Marketing, Mathematics & Informatics, Practicals, Scientific Methods & Theses, and Strategic Management & Tourism.

Table 1. Overview of tourism study programs in HEI in Austria.

University	Degree	Study Program
Salzburg University of Applied Sciences	Bachelor	Innovation and Management in Tourism
Salzburg University of Applied Sciences	Master	Innovation and Management in Tourism
MCI Innsbruck	Bachelor	Entrepreneurship, Tourism, and Leisure Business | Major in Tourism, Leisure, and Event Management
MCI Innsbruck	Master	Entrepreneurship, Tourism, and Leisure Business | Master: Entrepreneurship and Tourism
University of Innsbruck	Bachelor	Economy, Health, and Sports Tourism
University of Innsbruck	Master	Sustainable Regional and Destination Development

Table 1. *Cont.*

University	Degree	Study Program
Kufstein University of Applied Sciences	Bachelor	Sport, Culture, and Event Management
Kufstein University of Applied Sciences	Master	Sport, Culture, and Event Management
Kärnten University of Applied Sciences	Bachelor	Hotel Management
Joanneum University of Applied Sciences	Bachelor	Health Management and Tourism
Joanneum University of Applied Sciences	Master	Health Tourism and Leisure Management
FH Wien der WKW	Bachelor	Tourism Management
FH Wien der WKW	Master	Urban Tourism and Visitor Economy Management
IMC Krems	Bachelor	Tourism and Leisure Management
IBS Akademia	Bachelor	Tourism Management
University of Vienna	Master	Tourism and Law
Modul University Vienna	Bachelor	BBA Tourism, Hotel Management, and Operations
Modul University Vienna	Bachelor	BBA Hospitality Management
Modul University Vienna	Master	International Tourism Management
ITM—International College of Tourism and Management	Bachelor	BBA Hospitality Management
Private University Seeburg Castle	Bachelor	Business Administration; Major in Tourism and Hospitality Management
University of Klagenfurt	Master	Tourism Management
Vienna University of Economics and Business	Bachelor *	Tourism and Event Management
University of Linz	Master	MBA Tourism Management

* University study course to obtain academic expert status (counted among Bachelor level in the present study).

Next, we constructed a framework curriculum covering core aspects of computational social sciences, potentially positively impacting tourism study programs. We referred to existing CSS study programs in the D-A-CH (Germany, Austria, Switzerland) region to stay within the same culture and language space. In total, we identified three suitable programs, one program per country. The collected programs can be found in Table 2. This selection does not claim to be complete; it merely functions as a representation comprising core elements for the domain of CSS within the D-A-CH region.

Table 2. Examples of CSS programs in the D-A-CH region.

University	Degree	Program	Country
Graz University of Technology/ University of Graz	Master	Computational Social Systems	Austria
RWTH Aachen University	Master	Computational Social Systems	Germany
University of Luzern	Master	Computational Social Sciences	Switzerland

In the next step, we decomposed the three identified CSS programs to distill core modules representing essential contents of CSS, which are valuable for the domain of tourism study programs in the presented context of this paper. The sum of the individual backgrounds of the authors (computer science, tourism and innovation, and governance and policy) serves as a balance to not overrepresent certain aspects while ensuring that the modules keep in touch with the needs of the tourism industry. In addition, to represent the important aspects of transdisciplinarity and practice, we decided to frame the distilled selection with a module for transdisciplinarity and a capstone project. The result of this process can be seen in Figure 1.

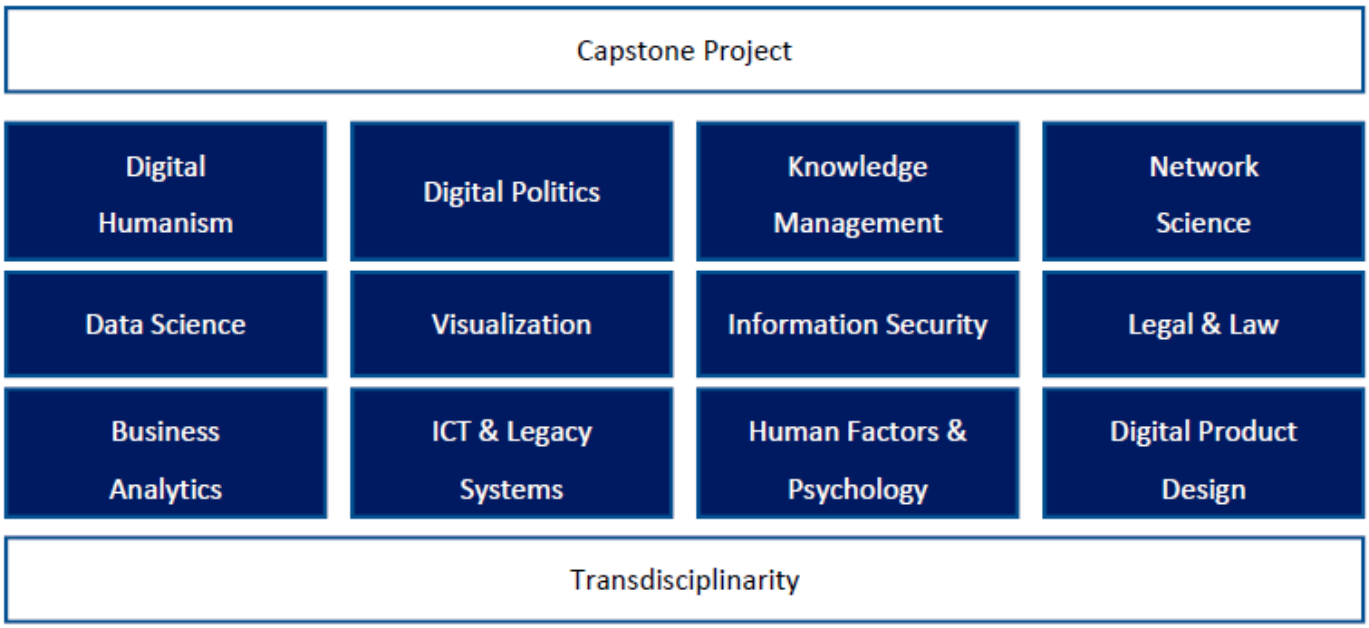

Figure 1. CSS framework for tourism study programs.

In the following passage, we will discuss each module individually within the CSS framework to provide our readers with the necessary background and context.

Digital Humanism: Uses technology and digitalization for both individuals and society to promote growth and development without harming others. A particular focus lies on the risk of unintended side effects and negative spillovers, as well as aspects of (digital) ethics in general (see, e.g., [62]). The relevance of the module for the tourism industry is demonstrated, for example, in using artificial intelligence (AI) models for behavioral simulations for tourist flow control, the associated potential change in regional infrastructure and policy, and the risks for vulnerable or marginalized groups.

Digital Politics: This module covers themes such as digital government, democratic processes in the digital age, and digital participatory processes. Furthermore, the use of social media for political communication and policy purposes of all involved actors is included (see, e.g., [63]). Its relevance for the tourism industry can be found in the development of smart regions, smart cities, and smart villages. Regional development policies significantly benefit from the support and acceptance of the local population. Thus, communication and means of participation in those decision processes are essential for developing sustainable strategies.

Information Security: This aspect concerns all security and protection facets regarding organizations' availability, confidentiality, and integrity of information. However, this is not bound to a particular technology but rather is characteristic of a general attitude and compliance (see, e.g., [64]). The relevance for the tourism industry becomes evident when we consider the move toward data-driven solutions. Examples include dedicated

user profiles for recommender systems, bonus card systems, overnight statistics, and guest feedback.

Network Science: This module covers system modeling, complexity science, and mobility analysis (see, e.g., [65]). Its importance for tourism can be found in policy development and the interdependencies between different entities and their needs within a system. Other scenarios include using mobile phone data for movement and hotspot analysis to fight overtourism.

Data Science: Here, we refer to novel approaches for the analytics of large data volumes, heterogeneous types of data, machine learning, and artificial intelligence, as well as innovative methods of data governance and exchange (see, e.g., [66]). Application within the tourism industry might include behavioral models for agent-based simulations to analyze spatiotemporal phenomena in guest (mobility) behavior.

Visualization: The aspect of visualization covers various approaches, such as spatiotemporal visualizations, maps for density and interpolations, and choropleth and flow maps. In addition, visualizations enable new ways of interacting with data, for example, when combined with geographic information systems (see, e.g., [67]). The benefit for the tourism industry lies within the combination of simulation environments. Geovisualization is a powerful way of communicating changes on different scales, i.e., from micro, meso, and macro perspectives. Moreover, combined with participatory approaches, what-if scenarios can be created and supported by visualization when discussing development options with citizens of a particular village, city, or region.

Knowledge Management: This module covers semantic knowledge management using knowledge graphs (see, e.g., [68]). The tourism industry can leverage this approach for recommender systems of personalized tourist offers. Another possibility is smart knowledge and information management within an organization for analytical purposes.

Digital Product Design: This module includes aspects such as interface design, interaction design, and user experience design (see, e.g., [69]). With more and more tourism offers tending toward a data-driven approach, this module will become important for the tourism industry in the domains of smartphone apps, the inclusion of personal data via wearables or tourism services, and products making use of augmented and virtual reality.

Business Analytics: This module covers new business models based on newly developed analytical processes (see, e.g., [70]). It extends to the data science model but goes beyond pure data analysis. To develop and implement sustainable business models within tourism, it will be crucial to map business process modeling with a data-driven approach and strategic positioning in the market.

ICT & Legacy Systems: This module comprises the tension between new system integration, legacy systems, interoperability, and transitional processes (see, e.g., [71]). The relevance for the tourism industry becomes apparent in light of the technological transition phase the sector is currently approaching. Old "island systems" cannot interconnect with modern systems from other sectors. Used data formats are incompatible with the state of the art, and production systems cannot be replaced simultaneously; they require a staged transitional phase.

Human Factors & Psychology: This module considers technology adoption, cultural specifics, and human interaction (see, e.g., [51]). With the movement of Tourism 5.0, the recognition of human behavior and motivations will increase in importance. Localized services enabled by technology and the preservation of cultural aspects and attitudes within a destination will be key to the sector's sustainability. Additionally, people's awareness concerning their personal data, analytics, and artificial intelligence will present new challenges in accepting services.

Legal & Law: Among other things, this module covers aspects of privacy-by-design, data protection, licensing, and liability (see, e.g., [72]). Due to the installment of the EU General Data Protection Regulation, it is important to design tourism products with privacy in mind rather than as an afterthought. Furthermore, the rise in data spaces and other

federal data ecosystems will require knowledge about suitable licensing models and an understanding of automated contracting, e.g., via smart contracts.

We will now continue to analyze the tourism study programs by combining lectures into six main thematic groups: Business Administration & Finance, Language & Soft Skills, Marketing, Mathematics & Informatics, Science Methods & Theses, and Strategic Management & Tourism. We also accounted for the total sum of the respective study workload per group in the form of ECTS points. Consecutively, we then assigned all relevant lectures with a computational aspect (from the group of Mathematics & Informatics) to their respective counterpart within our CSS framework, again including the associated study workload in ECTS points. The results of this exercise are discussed in detail in the next section.

4. Analysis and Discussion of Results

4.1. Analysis of Tourism Curricula in HEIs in Austria

The overall analysis of the identified tourism study programs in Austria at HEIs and our CSS framework for the D-A-CH region can be seen in Figure 2.

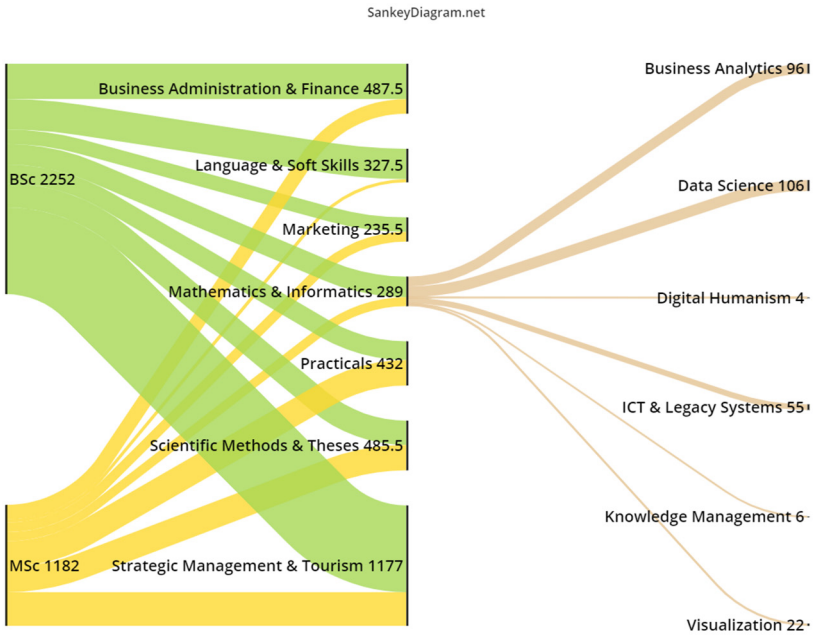

Figure 2. Results of the mapping analysis of Austrian tourism study programs concerning their coverage of core CSS contents.

First, we analyze the general distribution of tourism study programs regarding their internal focus points represented by the respective ECTS points. The majority of courses, with about 34% of the workload, are located within the Strategic Management & Tourism group, followed by Scientific Methods & Theses and Business Administration & Finance, with about 14% each. About 13% of the workload goes into Practicals. The last groups are Language & Soft Skills with about 10%, and Mathematics & Informatics and Marketing with about 8% and 7%, respectively. These results demonstrate the heavy focus of the study programs on domain-specific management topics and on classical operational aspects of running businesses and financial agendas, as we have already acknowledged in the related work. The large amount of science and research workload is not surprising, as this reflects the necessity of acquiring university standards of academic work and science, as well as the training of students to complete their study programs by writing a thesis. Another interesting observation is that Language & Soft Skills are predominantly taught at the undergraduate level and only play a minimal role in Master-level programs. The workload distribution in the other categories is equal between Bachelor and Master levels.

Next, we will discuss the Mathematics & Informatics workload distribution in conjunction with our core CSS contents. Business Analytics and Data Science represent the two predominant groups, with about 33% and 36% of the overall workload. From what we found in our data, this is based on general courses in business informatics and statistics as a part of the economic focus of most tourism study programs. The following largest groups are ICT & Legacy Systems, with about 19%, and Visualization, with about 8%. The remaining groups only have a minimum workload, i.e., about 2% each for Knowledge Management and Digital Humanism.

Altogether, under 10% of ECTS points are dedicated to course contents within the CSS domain. Most content focuses on classical business management, finance and marketing, project management, and foreign language skills. While this makes sense for preparing students to take over a managing job in the tourism industry, it also clearly shows that the current study programs have not yet embraced a disruptive change toward digital technologies and digital sustainability, i.e., the use of digitalization and digital transformation toward solving their own sectoral issues, as well as to contribute to a necessary overall global strategic change.

Another observation is that several of our identified core CSS modules are not covered at all. These include Digital Politics, Information Security, Network Science, Digital Product Design, Human Factors & Psychology, and Legal & Law. While some of these contents are simply missing in the curricula, one might argue that legal aspects, for example, are included within the curricula. Why, then, were they not accounted for? The reasoning behind this is that when we refer to contents in CSS, the driver for addressing a particular topic or field should be situated within the ongoing digital transformation. Law regarding classical contracts, or the founding of businesses, is essential, but it does not reflect the additional needs of the tourism industry, as we have outlined in our paper earlier.

The following observation relates to the embedding of capstone projects and transdisciplinarity. Within the existing tourism study programs, a significant proportion of the workload is dedicated to practical work experience. This is primarily due to the design of the study programs for universities of applied sciences, which usually include extra-occupational training, internships, or practical semesters to introduce students to work in the tourism environment. While practical work experience is an important part of the training, transdisciplinarity is virtually nonexistent. Indeed, what is currently missing is a combination of introducing the topic to the students and bringing them into contact with the underlying processes. Handing over an entire transdisciplinary process would be overwhelming. However, including the first steps within capstone projects would be highly beneficial. Within a capstone project, students would be enabled to outline the transdisciplinary process on a theoretical level while executing a particular practical part at the same time. In combination with larger and multiple groups, peer exchange would ensure the transfer of knowledge and experience, enabling students to get to know the entire process from different angles and perspectives.

Finally, some limitations go along with our results that should be mentioned for the sake of transparency. When we analyzed the Austrian curricula, we could only rely on the existing descriptions, such as syllabi and similar information, on the respective websites of the universities. This implies that if CSS content or—more generally spoken—'informatics' content was not depicted as individual lectures in the syllabus, we could not count it toward our CSS framework. Another noteworthy point is connected to the respective lecturers responsible for the study course design and delivery. As personal interests and backgrounds vary greatly among university teaching staff, some might teach the course because they are obliged to, while others might be highly achieved experts in the field. In addition, while the European Credit Transfer and Accumulation System is clearly defined with a workload of 25h per credit point, the degree to which lecturers stick to this formal condition might vary, consequently affecting the associated difficulty level expressed in the workload. In conclusion, the respective syllabi can only reflect the actual content to a certain degree.

Furthermore, it needs to be mentioned that we intentionally limited our study in two ways to maintain a stronger focus. First, we did not include distance study programs, but only programs that are taught (mainly) in person, as we want to stress the importance of live exchange between staff and students when implementing transdisciplinarity and introducing capstone projects. While there is nothing wrong with blended models, pure distance study programs lack personal interaction, which we deem highly important for mutual in situ learning. Second, this exploratory study demonstrates the status quo as we have identified it for the Austrian HEI landscape. Hence, the identified results are not necessarily representative of programs outside of Austria and might differ between the different Member States within the EU or internationally. Nevertheless, the recognized gaps in CSS-based knowledge and digital skills within the tourism industry are acknowledged within the scientific community, and our study has sketched a possible path toward closing these gaps.

4.2. Dimensions and Measurements for Impact Assessment of the Suggested Curricula Changes

Impact assessment and measurement are challenging as they rely heavily on the respective use case, target audience, or time frame. Referring to our original line of argumentation that CCS within tourism education programs will enable new, innovative, and sustainable business models, we propose the lens of innovation for analysis. In addition to the classical dimensions of economy, environment, and society, we also suggest considering technology and culture.

Regarding the economic impact, innovation can lead to new business models, thus increasing revenue and creating new jobs. To measure the economic impact of tourist destinations, metrics such as the overall number of visitors and their length of stay can be used. Another metric could be the cash flow that visitors generate during their on-site stay. Besides visitor-based metrics, other measures can provide interesting insights as well. The increase in competition within the tourism industry; for instance, they can be expressed by monitoring market share or the overall satisfaction of customers. In addition, tracking increases in investment might also help to identify positive economic impacts.

Concerning the environmental impact, innovation can lead to an overall improvement in the ecological footprint of the tourism industry. For instance, a carbon footprint decrease can be measured via an underlying analysis of respective supply chains or the mobility patterns of tourists. Further insights might be gained by analyzing the amount of food waste measured at hotels and restaurants, combined with the analysis of overall eating and consumption patterns regarding menus or the analysis of LCA data (Lifecycle Assessment).

Considering the social impact, innovation can lead to several positive and sustainable changes within local communities. For example, the number of joint consultations or information flow can measure increased participation within overall decision-making processes. Another example can be found in the success of job creation strategies, e.g., measured by the number of locals working within newly created tourism domains and services.

Moving on to the technological impact, innovation can lead to new ways of interacting with visitors and customers; for instance, customized services or virtual "pre-trips" to a region before the actual stay can significantly increase customer satisfaction. Ways to measure success here would be the customer ratings or reviews of tourist services and statistics concerning usage time or level of interaction.

Finally, the cultural impact can be fostered by innovation as well. Here, examples include activities concerning cultural awareness, community involvement, and the preservation of local cultures. Measurements for impact include the number of exhibits in museums around local culture, guides for cultural etiquette, or the number of local language terms and dialect words in tourist offerings and services.

4.3. General Propositions for the Introduction of CSS to Tourism Curricula in HEI

Our analysis of existing HEI curricula in tourism education in Austria has revealed that the coverage of necessary computational social science approaches and transdisciplinary is

low, while classical economy-/business-oriented teaching approaches still dominate the university landscape. Our study has suggested a set of core modules of CSS, reflecting essential content to be integrated into existing curricula to close the identified gaps. However, the present contribution should not be understood as a call for "every student to study informatics"; but rather as a call to join forces across disciplines, together with practitioners and domain experts, to tackle the challenges of curricula revision and adaption conjointly. Besides the identified gaps, we would like to share some propositions that reflect crucial aspects of starting the necessary transformational process:

1. When performing practice-oriented work, make it problem-based to reflect real-world complexity. This implies that the scenarios used within the curriculum are not purely artificial, and students are actively engaged in creating their learning objectives along these scenarios. According to Wood [73], certain preconditions must be met to guarantee a successful approach. First, knowledge gaps and ambiguities need to be resolved, followed by an open-group approach toward explaining the problem based on individual and group knowledge. From there, students formulate their learning objectives and work toward them individually before sharing results and encountering further challenges with the group. Of course, this demands the provision and preparation of problem scenarios by the teachers/lecturers that are adequate to the students' educational level (e.g., Bachelor vs. Master). Furthermore, they need to ensure that the objectives align with the core objectives of the course's syllabus without restricting the students' individual working approach. Overall, the scenarios need to fuel the students' intrinsic motivation while at the same time building on existing knowledge and individual backgrounds. Therefore, the selection process requires a high level of experience from the concerned teachers/lecturers. Consequently, every taught course is different, demanding constant effort and further development from the teaching staff. To tackle this extra effort on the faculty side, it is recommended to work in teams.
2. Know when to dive deep and when not to, e.g., using transdisciplinarity right. The idea of calling everything "transdisciplinary" might seem very tempting, but it would be too easy to call every workshop with external stakeholders transdisciplinary. In this context, it is crucial to understand the concept in its entirety. First of all, not every project needs to be transdisciplinary; however, if you choose to design a project or a particular part of it in a transdisciplinary way, this also implies that all external stakeholders need to be integrated right from the beginning, starting with the design phase. Furthermore, it is essential to create an environment where the co-ownership of all participants can be developed, as it is the only way to tap into the potential provided by this interaction model fully. Of course, this takes time and resources, again raising challenges for applying transdisciplinarity in HEI study programs. The challenge at hand can be addressed from three angles. First, it depends on the students' individual background (e.g., part-time students already working in the domain), as they might, for example, already bring in practitioners' knowledge themselves. Second, external practitioners can be included in the design of the course/program from the beginning, e.g., via the creation of an advisory board or board of external experts. Lastly, external experts can be included during empirical phases of study work, e.g., through focus groups, workshops, or interviews.
3. Data spaces and ecosystems cannot be ignored and will become increasingly crucial for business sustainability. Data spaces have come to stay and represent a force to be reckoned with. While no large-scale data spaces for tourism existed at the time of writing this paper, and blueprints of how to design and deploy such data space are still underway, it is vital to introduce students to the concept as soon as possible. This is essential for three main reasons. First, the federated aspect of data spaces allows for new thinking methods in data-driven sustainable business models. It becomes possible to integrate even small SMEs at a relatively low cost, and by the joint provision of data, data-driven models and business solutions can significantly increase in quality

and become affordable for smaller companies and organizations. Second, establishing data spaces requires rethinking data and information logistics as mission-critical concepts for strategic decision making within touristic companies. While technology plays an essential role within this context, it is foremost the internal processes that need to be analyzed and, in most cases, revised. Students should also be introduced to this revision process from the perspective of a change management facilitator. Third, new roles will arise due to the increasing importance of data, data management, and data exchange for innovation. Students need to be familiarized with new role concepts within organizations, such as the role of a data steward, taking the pivotal point within a company or organization to facilitate data, information, and knowledge exchange at the intersections of domains within the company/organization, but also toward external cooperations.

4. There are no 'non-spatial' data. Another important aspect is that all data have a spatial reference, regardless of origin. Examples include data collected via street sensors, ticket information from tourist attractions, hotel booking information, public transport, social media, or qualitative interviews. It is imperative to understand that spatial information plays a critical role in modeling, analyzing, and understanding system dynamics, which can lay the foundation for various kinds of simulations targeted at, for example, regional development, customer satisfaction, or destination management in general. Hence, courses and programs need to make students aware of this fact and introduce them to sustainable, longitudinal data governance approaches that consider this aspect.
5. Learn to talk 'policy'. Finally, this aspect might be one of tourism students' most fundamental training facets. Especially in the tourism industry, there are many touching points with policy and decision makers, as sustainable tourism concepts must be seamlessly embedded into governance concepts for regional development. Thus, students need to learn to communicate in a way that is compatible with policy stakeholders and can support the translational process between citizens, tourists, touristic service providers, and politicians.

5. Conclusions

As society faces the grand challenges of today, represented by the SDGs, so is the tourism industry. Global phenomena such as the COVID-19 pandemic and climate change keep disrupting the tourism industry. A proper post-crisis recovery demands a change toward more resilient and sustainable business models and a need to embrace digitalization and technology to realize them. However, the current status quo of technology usage and digital skills in touristic job environments demonstrates a challenge in HEIs' tourism studies curricula. To overcome these challenges, we suggested introducing computational social sciences, paired with transdisciplinarity, to actively involve practitioners as a bridging element between the existing curricula content and the identified gaps. In the present study, we particularly investigated the situation within tourism education in higher educational institutions (HEIs) in Austria.

The results revealed that the primary focus of Austrian tourism education in HEIs is still on classical economics, which confirms the situation described in the current literature. Only about 10% of the overall ECTS points are dedicated to topics within computational social sciences, leaving much room for future development. The identified situation demonstrates that the necessary shift within higher education programs in the tourism domain has yet to happen to reflect the demands and necessities postulated by the disruptive changes to the tourism ecosystem, e.g., in the form of climate change and digitalization. As changes within curricula take several years (program design, accreditation of programs, first cohorts to finish, implementing learned changes to the tourism industry), time is pressing. However, this pressure should not lead to repeating old patterns, for example, losing the contact points with experts and practitioners in the field over an academic and

scientific discussion. Thus, transdisciplinarity will be a cornerstone for solving the grand challenge of future education in the tourism industry.

Based on the results of our research, several paths for future curricula development and integration of a CSS framework and transdisciplinarity within higher tourism education open up. Building on the lessons learned, it would be advisable to conduct a qualitative interview series, comparing reflections of the results of this work from different angles, i.e., teaching staff as well as from tourism destination and hotel managers in Austria. This interview series would help obtain some valuable feedback on the content of the proposed CSS modules and provide prioritization to emphasize locally specific needs of individual destinations or study programs. Furthermore, future research should address the understanding and attitude of tourism professionals and practitioners concerning using and implementing transdisciplinary processes. Here, it would be interesting to compare core elements of transdisciplinary processes with current projects and working processes in the tourism industry and to analyze attitudes, drivers, and barriers to implementing transdisciplinary working styles. Finally, a follow-up study in imitation of this initial study but with an extension to different countries in the D-A-CH region, in Europe, or internationally would provide the opportunity to compare HEI tourism curricula on a broader level, identify thematic focus areas in different countries, and analyze the status quo of CSS and transdisciplinary integration.

Author Contributions: Conceptualization, T.J.L.; CSS framework design, T.J.L. and J.S.; analysis, evaluation, and interpretation, T.J.L., S.W. and J.S.; data collection, S.W.; visualization, J.S.; writing—original draft preparation, T.J.L.—with contributions from S.W. and J.S.; revisions, T.J.L.—with contributions from S.W. and J.S.; funding acquisition, T.J.L. and J.S.; project coordination, T.J.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research was made possible through the project "Data-driven Tourism for Sustainability (dTS)", funded in the program "ICT of the Future" by the Austrian Research Promotion Agency (FFG) and the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation, and Technology (BMK) under grand no. FO999887513.. The authors thank the three anonymous reviewers for their valuable feedback. Open Access Funding by the University for Continuing Education Krems.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Duro, J.A.; Perez-Laborda, A.; Turrion-Prats, J.; Fernández-Fernández, M. COVID-19 and Tourism Vulnerability. *Tour. Manag. Perspect.* **2021**, *38*, 100819. [CrossRef]
2. Rosselló, J.; Becken, S.; Santana-Gallego, M. The Effects of Natural Disasters on International Tourism: A Global Analysis. *Tour. Manag.* **2020**, *79*, 104080. [CrossRef] [PubMed]
3. Perles-Ribes, J.F.; Ramón-Rodríguez, A.B.; Sevilla-Jiménez, M.; Rubia, A. The Effects of Economic Crises on Tourism Success: An Integrated Model. *Tour. Econ.* **2016**, *22*, 417–447. [CrossRef]
4. Schmude, J.; Karl, M.; Weber, F. Tourism and Terrorism: Economic Impact of Terrorist Attacks on the Tourism Industry. The Example of the Destination of Paris. *Z. Wirtsch.* **2020**, *64*, 88–102. [CrossRef]
5. Lampoltshammer, T.J.; Scholz, J.; Wallinger, S. Data-Driven Tourism for Sustainability: The Role of Transdisciplinarity and Computational Social Sciences in Tourist Studies Programs. In Proceedings of the 1st CloudEARTHi Conference on Academic Education and its Impact on Entrepreneurship and Sustainability: CloudEarth Conference 2022, Eisenstadt, Austria, 18–19 May 2022.
6. Ahmed, M.G.; Sadaa, A.M.; Alshamry, H.M.; Alharbi, M.A.; Alnoor, A.; Kareem, A.A. Crisis, Resilience and Recovery in Tourism and Hospitality: A Synopsis. In *Tourism and Hospitality in Asia: Crisis, Resilience and Recovery*; Springer: Singapore, 2023; pp. 3–19.
7. Khan, M.A.A.; Hashim, H. The Effect of COVID-19 on Tourism and Hospitality Industry in Malaysia, Resurgence in the Post-Pandemic Era: A Conceptual Criterion. *Int. J. Tour. Hosp. Rev.* **2020**, *7*, 54–62. [CrossRef]
8. Dogru, T.; Marchio, E.A.; Bulut, U.; Suess, C. Climate Change: Vulnerability and Resilience of Tourism and the Entire Economy. *Tour. Manag.* **2019**, *72*, 292–305. [CrossRef]

9. Atasoy, M.; Atasoy, F.G. The Impact of Climate Change on Tourism: A Causality Analysis. *Turk. J. Agric. Food Sci. Technol.* **2020**, *8*, 515–519. [CrossRef]
10. Steiger, R.; Damm, A.; Prettenthaler, F.; Pröbstl-Haider, U. Climate Change and Winter Outdoor Activities in Austria. *J. Outdoor Recreat. Tour.* **2021**, *34*, 100330. [CrossRef]
11. Irimia, L.M.; Patriche, C.V.; Roșca, B. Climate Change Impact on Climate Suitability for Wine Production in Romania. *Theor. Appl. Climatol.* **2018**, *133*, 1–14. [CrossRef]
12. Sottini, V.A.; Barbierato, E.; Bernetti, I.; Capecchi, I. Impact of Climate Change on Wine Tourism: An Approach through Social Media Data. *Sustainability* **2021**, *13*, 7489. [CrossRef]
13. Scott, D. Sustainable Tourism and the Grand Challenge of Climate Change. *Sustainability* **2021**, *13*, 1966. [CrossRef]
14. Scott, D.; Gössling, S. A Review of Research into Tourism and Climate Change-Launching the Annals of Tourism Research Curated Collection on Tourism and Climate Change. *Ann. Tour. Res.* **2022**, *95*, 103409. [CrossRef]
15. Wut, T.M.; Xu, J.B.; Wong, S. Crisis Management Research (1985–2020) in the Hospitality and Tourism Industry: A Review and Research Agenda. *Tour. Manag.* **2021**, *85*, 104307. [CrossRef] [PubMed]
16. Santana, G. Crisis Management and Tourism: Beyond the Rhetoric. *J. Travel Tour. Mark.* **2004**, *15*, 299–321. [CrossRef]
17. Carty, K.S. Towards a Proactive, Capabilities-Based Continuity Framework for the Hospitality and Tourism Industry. *Worldw. Hosp. Tour. Themes* **2021**, *13*, 418–430. [CrossRef]
18. Lopes, H.S.; Remoaldo, P.C.; Ribeiro, V.; Martin-Vide, J. Pathways for Adapting Tourism to Climate Change in an Urban Destination–Evidences Based on Thermal Conditions for the Porto Metropolitan Area (Portugal). *J. Environ. Manag.* **2022**, *315*, 115161. [CrossRef] [PubMed]
19. Mensah, E.A.; Boakye, K.A. Conceptualizing Post-COVID 19 Tourism Recovery: A Three-Step Framework. *Tour. Plan. Dev.* **2023**, *20*, 37–61. [CrossRef]
20. Broccardo, L.; Zicari, A.; Jabeen, F.; Bhatti, Z.A. How Digitalization Supports a Sustainable Business Model: A Literature Review. *Technol. Forecast. Soc. Chang.* **2023**, *187*, 122146. [CrossRef]
21. Nosratabadi, S.; Mosavi, A.; Shamshirband, S.; Kazimieras Zavadskas, E.; Rakotonirainy, A.; Chau, K.W. Sustainable Business Models: A Review. *Sustainability* **2019**, *11*, 1663. [CrossRef]
22. Lampoltshammer, T.J.; Albrecht, V.; Raith, C. Teaching Digital Sustainability in Higher Education from a Transdisciplinary Perspective. *Sustainability* **2021**, *13*, 12039. [CrossRef]
23. Carayannis, E.G.; Dezi, L.; Gregori, G.; Calo, E. Smart Environments and Techno-Centric and Human-Centric Innovations for Industry and Society 5.0: A Quintuple Helix Innovation System View towards Smart, Sustainable, and Inclusive Solutions. *J. Knowl. Econ.* **2021**, *13*, 926–955. [CrossRef]
24. Gretzel, U.; Sigala, M.; Xiang, Z.; Koo, C. Smart Tourism: Foundations and Developments. *Electron. Mark.* **2015**, *25*, 179–188. [CrossRef]
25. Ardito, L.; Cerchione, R.; Del Vecchio, P.; Raguseo, E. Big Data in Smart Tourism: Challenges, Issues and Opportunities. *Curr. Issues Tour.* **2019**, *22*, 1805–1809. [CrossRef]
26. Jackson, S. Prediction, Explanation and Big(Ger) Data: A Middle Way to Measuring and Modelling the Perceived Success of a Volunteer Tourism Sustainability Campaign Based on 'Nudging'. *Curr. Issues Tour.* **2016**, *19*, 643–658. [CrossRef]
27. Satta, G.; Parola, F.; Penco, L.; Persico, L. Word of Mouth and Satisfaction in Cruise Port Destinations. *Tour. Geogr.* **2015**, *17*, 54–75. [CrossRef]
28. Kirilenko, A.P.; Stepchenkova, S.O.; Kim, H.; Li, X. (Robert) Automated Sentiment Analysis in Tourism: Comparison of Approaches. *J. Travel Res.* **2018**, *57*, 1012–1025. [CrossRef]
29. Kim, H.; Stepchenkova, S. Effect of Tourist Photographs on Attitudes towards Destination: Manifest and Latent Content. *Tour. Manag.* **2015**, *49*, 29–41. [CrossRef]
30. Miller, H.J.; Goodchild, M.F. Data-Driven Geography. *GeoJournal* **2015**, *80*, 449–461. [CrossRef]
31. Lv, H.; Shi, S.; Gursoy, D. A Look Back and a Leap Forward: A Review and Synthesis of Big Data and Artificial Intelligence Literature in Hospitality and Tourism. *J. Hosp. Mark. Manag.* **2022**, *31*, 145–175. [CrossRef]
32. Salas-Olmedo, M.H.; Moya-Gómez, B.; García-Palomares, J.C.; Gutiérrez, J. Tourists' Digital Footprint in Cities: Comparing Big Data Sources. *Tour. Manag.* **2018**, *66*, 13–25. [CrossRef]
33. Liu, Y.-Y.; Tseng, F.-M.; Tseng, Y.-H. Big Data Analytics for Forecasting Tourism Destination Arrivals with the Applied Vector Autoregression Model. *Technol. Forecast. Soc. Chang.* **2018**, *130*, 123–134. [CrossRef]
34. Wallinger, S.; Grundner, L.; Majic, I.; Lampoltshammer, T.J. Agent-Based Modelling for Sustainable Tourism. In *Information and Communication Technologies in Tourism 2023: Proceedings of the ENTER 2023 eTourism Conference, 18–20 January 2023*; Springer: Cham, Switzerland, 2023; pp. 355–360.
35. Majic, I.; Scholz, J.; Bulbul, R.; Wallinger, S. Tourist Flow Simulation in GAMA Using Historical Data Parameters. In *Information and Communication Technologies in Tourism 2023: Proceedings of the ENTER 2023 eTourism Conference, 18–20 January 2023*; Springer: Cham, Switzerland, 2023; pp. 255–260.
36. Gunter, U.; Önder, I. Forecasting City Arrivals with Google Analytics. *Ann. Tour. Res.* **2016**, *61*, 199–212. [CrossRef]
37. Huang, X.; Zhang, L.; Ding, Y. The Baidu Index: Uses in Predicting Tourism Flows—A Case Study of the Forbidden City. *Tour. Manag.* **2017**, *58*, 301–306. [CrossRef]
38. Scholz, J.; Jeznik, J. Evaluating Geo-Tagged Twitter Data to Analyze Tourist Flows in Styria, Austria. *IJGI* **2020**, *9*, 681. [CrossRef]

39. Xu, F.; Nash, N.; Whitmarsh, L. Big Data or Small Data? *A Methodological Review of Sustainable Tourism. J. Sustain. Tour.* **2020**, *28*, 144–163. [CrossRef]
40. Yao, Q.; Shi, Y.; Li, H.; Wen, J.; Xi, J.; Wang, Q. Understanding the Tourists' Spatio-Temporal Behavior Using Open GPS Trajectory Data: A Case Study of Yuanmingyuan Park (Beijing, China). *Sustainability* **2020**, *13*, 94. [CrossRef]
41. Vu, H.Q.; Law, R.; Li, G. Breach of Traveller Privacy in Location-Based Social Media. *Curr. Issues Tour.* **2019**, *22*, 1825–1840. [CrossRef]
42. Keßler, C.; McKenzie, G. A Geoprivacy Manifesto. *Trans. GIS* **2018**, *22*, 3–19. [CrossRef]
43. Otto, B.; ten Hompel, M.; Wrobel, S. *Designing Data Spaces: The Ecosystem Approach to Competitive Advantage*; Springer: Cham, Switzerland, 2022.
44. Lüdeke-Freund, F.; Carroux, S.; Joyce, A.; Massa, L.; Breuer, H. The Sustainable Business Model Pattern Taxonomy—45 Patterns to Support Sustainability-Oriented Business Model Innovation. *Sustain. Prod. Consum.* **2018**, *15*, 145–162. [CrossRef]
45. Breuer, H.; Fichter, K.; Lüdeke-Freund, F.; Tiemann, I. Sustainability-Oriented Business Model Development: Principles, Criteria and Tools. *Int. J. Entrep. Ventur.* **2018**, *10*, 256–286. [CrossRef]
46. Scholz, R.W.; Binder, C.R. *Environmental Literacy in Science and Society: From Knowledge to Decisions*; Cambridge University Press: Cambridge, UK, 2011.
47. Pachoud, C.; Bruley, E.; Grosinger, J.; Crépeau, A.-S.; Salim, E.; Savre, C.; Vialette, Y. Joint Problem Framing: A Transdisciplinary Methodology for a Sustainable Future in Mountain Areas. *Sustain. Sci.* **2023**, *18*, 1291–1309. [CrossRef]
48. Volgger, M.; Pechlaner, H. Interdisciplinarity, Transdisciplinarity and Postdisciplinarity in Tourism and Hospitality Education. In *The Routledge Handbook of Tourism and Hospitality Education*; Routledge: London, UK, 2014; pp. 85–102.
49. Lampoltshammer, T.J.; Maurer, H.; Pulda, N.; Klimek, P.; Hurt, J.; Rosenbichler, U. Challenges toward Evidence-Based Policymaking Using Agent-Based Modeling for Federal Sports Grants: A Self-Reflection from a Transdisciplinary Project. *Sustainability* **2023**, *15*, 2853. [CrossRef]
50. Ratten, V. Tourism Entrepreneurship Research: A Perspective Article. *Tour. Rev.* **2020**, *75*, 122–125. [CrossRef]
51. Carbone, F. Tourism Destination Management Post COVID-19 Pandemic: A New Humanism for a Human-Centred Tourism (Tourism 5.0). *Tur. Mund. Cris. Sanitária Futuro* **2020**, *43*, 43–56.
52. Zhang, J.; Wang, W.; Xia, F.; Lin, Y.-R.; Tong, H. Data-Driven Computational Social Science: A Survey. *Big Data Res.* **2020**, *21*, 100145. [CrossRef]
53. Romanillos, G.; Moya-Gómez, B. New Data and Computational Methods Opportunities to Enhance the Knowledge Base of Tourism. In *Handbook of Computational Social Science for Policy*; Springer: Cham, Switzerland, 2023; pp. 361–379.
54. European Commission; Joint Research Centre; Fontana, M.; Bertoni, E.; Vespe, M.; Gabrielli, L.; Signorelli, S. *Mapping the Demand Side of Computational Social Science for Policy: Harnessing Digital Trace Data and Computational Methods to Address Societal Challenges*; Fontana, M., Bertoni, E., Vespe, M., Gabrielli, L., Signorelli, S., Eds.; Publications Office of the European Union: Luxembourg, 2022.
55. Edelmann, A.; Wolff, T.; Montagne, D.; Bail, C.A. Computational Social Science and Sociology. *Annu. Rev. Sociol.* **2020**, *46*, 61–81. [CrossRef]
56. Zaragoza-Sáez, P.; Marco-Lajara, B.; Ubeda-Garcia, M. Digital Skills in Tourism. A Study from the Next Tourism Generation (NTG) Alliance. *Meas. Bus. Excell.* **2022**, *26*, 106–121. [CrossRef]
57. Zuccoli, A.; Korstanje, M.E. The Future of Tourism Education Just after the COVID-19. In *The Role of Pleasure to Improve Tourism Education*; Springer: Cham, Switzerland, 2023; pp. 93–107.
58. Ruhanen, L. Bridging the Divide between Theory and Practice: Experiential Learning Approaches for Tourism and Hospitality Management Education. *J. Teach. Travel Tour.* **2006**, *5*, 33–51. [CrossRef]
59. McCartney, G.; Kwok, S.S.H. Closing the Gap between Hospitality Industry and Academia Research Agendas: An Exploratory Analysis Case Study. *J. Qual. Assur. Hosp. Tour.* **2022**, *24*, 192–210. [CrossRef]
60. Airey, D.; Tribe, J.; Benckendorff, P.; Xiao, H. The Managerial Gaze: The Long Tail of Tourism Education and Research. *J. Travel Res.* **2015**, *54*, 139–151. [CrossRef]
61. Chathoth, P.K.; Sharma, A. Core Curricular Issues in Hospitality and Tourism Education-Present Structure and Future Directions. *J. Hosp. Tour. Educ.* **2007**, *19*, 10–19. [CrossRef]
62. Werthner, H.; Prem, E.; Lee, E.A.; Ghezzi, C. *Perspectives on Digital Humanism*; Springer Nature: Cham, Switzerland, 2022.
63. Postill, J. Digital Politics and Political Engagement. In *Digital Anthropology*; Routledge: London, UK, 2020; pp. 165–184.
64. Von Solms, R.; Van Niekerk, J. From Information Security to Cyber Security. *Comput. Secur.* **2013**, *38*, 97–102. [CrossRef]
65. Baggio, R. Network Science and Tourism–the State of the Art. *Tour. Rev.* **2017**, *72*, 120–131. [CrossRef]
66. Mariani, M. Big Data and Analytics in Tourism and Hospitality: A Perspective Article. *Tour. Rev.* **2020**, *75*, 299–303. [CrossRef]
67. Yang, Y. Spatial Analytics and Data Visualization. In *Handbook of e-Tourism*; Springer: Cham, Switzerland, 2022; pp. 595–616.
68. Kejriwal, M. Knowledge Graphs: Constructing, Completing, and Effectively Applying Knowledge Graphs in Tourism. In *Applied Data Science in Tourism: Interdisciplinary Approaches, Methodologies, and Applications*; Springer: Cham, Switzerland, 2022; pp. 423–449.
69. Wu, Y.-C.; Lin, S.-W.; Wang, Y.-H. Cultural Tourism and Temples: Content Construction and Interactivity Design. *Tour. Manag.* **2020**, *76*, 103972. [CrossRef]
70. Marcolin, C.; Becker, J.L.; Wild, F.; Schiavi, G.; Behr, A. Business Analytics in Tourism: Uncovering Knowledge from Crowds. *BAR Braz. Adm. Rev.* **2019**, *16*, 1–22. [CrossRef]

71. Rejeb, A.; Keogh, J.G.; Treiblmaier, H. The Impact of Blockchain on Medical Tourism. In Proceedings of the Smart Business: Technology and Data Enabled Innovative Business Models and Practices: 18th Workshop on e-Business, WeB 2019, Munich, Germany, 14 December 2019; Springer: Cham, Switzerland, 2020; pp. 29–40.
72. Yallop, A.C.; Gică, O.A.; Moisescu, O.I.; Coroș, M.M.; Séraphin, H. The Digital Traveller: Implications for Data Ethics and Data Governance in Tourism and Hospitality. *J. Consum. Mark.* **2023**, *40*, 155–170. [CrossRef]
73. Wood, D.F. ABC of Learning and Teaching in Medicine: Problem Based Learning. *Br. Med. J.* **2003**, *326*, 328–330. [CrossRef]