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Implementation of an Expanded Decision-Making Technique to Comment on Sweden Readiness for Digital Tourism

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Abstract: Tourism provides many advantages for Sweden and the whole world, as well as its travelers. Since almost all types of tourism are currently in crisis as a result of the current COVID-19 pandemic, information and communication technology is expected to play a role, not only during the crisis but also in the post-COVID-19 era. Thus, with no expectations from types of tourism, Sweden needs to broaden its digital tours. As a result, this letter aims to classify the transition readiness of industry clusters for this digitalization move. An extended version of the TOPSIS technique was formulated and validated, plus a new framework for measuring digitalization readiness for this purpose. Lastly, analysis of the collected data proves that business tourism could lead the change, though adventure and rural tourism are at the farthest point from being considered ready to change.

Keywords: tour and traveling; digitalization shift; change readiness; expanded TOPSIS; COVID-19

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1. Introduction

The tourism industry encompasses a broad variety of events, as tourism is described as persons traveling to and staying in places outside their typical environment for a maximum of a year for business, leisure, or any other dedications [1]. Scholars [2] believe that tourism plays a crucial role in the growth and development of all countries. Any crisis for tourism could be a challenge for many subdivisions, as in recent decades, tourism has stretched into various types [3,4]: adventure tourism, urban tourism, cultural tourism, event tourism, etcetera. In 2019, approximately 1.5 billion international tourist arrivals were estimated worldwide, and prior to the 2020 pandemic, international travel was forecast to expand more than three percent per year [5].

The World Health Organization (WHO) announced a worldwide pandemic in March 2020: the COVID-19 pandemic, which was a disease caused by the SARS-CoV-2 coronavirus. The COVID-19 pandemic is still a challenge in 2021 for the whole world. More or less, people are in mandatory quarantine or quarantine of their own volition and travels are minimized due to the pandemic [6]. Accordingly, the tourism industry is facing a crisis due to this virus. It is a serious issue, as Peceny et al. [7] said that even a slight change in this industry has a massive impact on all of society. Although the tourism industry has experienced different crises, the impact of the current crisis is more shocking than any earlier ones, at least from an economical perspective [8]. Thus, many professionals, including Higgins-Desbiolles [9] and Gretzel et al. [8], call for an urgent solution for the industry to handle and recover from this crisis. However, which types of the tourism industry should be targeted for urgent intervention need to be assessed, as well as which types are capable of better adapting to the circumstances.

Scholars argue that tourism is not only generating financial growth and job opportunities, but also significantly contributes to quality of life [2]. However, this pandemic lockdown has caused a negative impact on people's daily lives and several reports have recently alerted us about the mental health burden of this pandemic (i.e., [10–13]). Due to this pandemic, a lot of people are suffering from heightened mental health problems, such as depression, anxiety, and sadness, which have emerged as significant public health

challenges. These can also lead to severe behavioral and physical health issues with serious effects, with both social and personal costs [10]. Therefore, studies to mitigate this mental health burden are called for by many scientists [14,15]. It would be interesting to see how reactivation of the tourism industry can play a role in solving this mental health burden due to the lockdowns. The solution could be transportation-free tourism; however, this has yet to be thoroughly researched.

Clearly, another impact of this pandemic is the extensive rise in the use of ICT [16,17]. Garfin [16] said, while considering possible negative consequences, that a thoughtful approach to using ICT can be effective and necessary for coping during the COVID-19 pandemic and as societies move into a new future. COVID-19 is a psychological framing of what might result in post-pandemic tourism behavior [18]. Garfin [16] believed that the ongoing COVID-19 pandemic provides opportunities to investigate core values for expanding the conscientious use of technology to mitigate the negative impact of stress and improve people's lives. This pandemic heightens the significant importance of ICT, even though this technology had influenced different aspects of people's daily life for a long time [1,19]. However, among the advantages of ICT implementation is permitting processes to be accessible with subordinate cost and additional efficiency [1].

Additionally, Chamarro [20] said it is very clear that people's lives after the COVID-19 crisis will be marked by the experience of intensive use of ICT during the pandemic. In tourism there is evidence for the successful implementation of ICT [21]; therefore, it is predictable that digitalization will remain in tourism, even after COVID-19, as a new normal [8,22].

Not only now, but even long before COVID-19, the ICT industry began to collaborate with tourism. The phenomenon of digital tours has arisen from the integration of information technology and tourism [5]. Digital tours cannot be a negative trend because they are expected to decrease some of the industry's severe consequences. Traditional tourism contributes significantly to the rising levels of air pollution [23], and the negative result on the host nation includes noise, overcrowding, and pollution with leftovers [24], as well as the probability of losing cultural values and authenticity, as noted by Ogarlaci and Tonea [23]. In addition, traditional travelers are concerned about political risks such as political instability and terrorism, as well as other hazards for travelers due to natural catastrophes, and a lack of healthcare and clean food or water [25]. The entire list of unfavorable industry outcomes is lengthier, and identifying them requires an individual extensive literature study, but the positive outcomes are also numerous.

Nonetheless, for good or bad, the COVID-19 pandemic has rapidly catapulted ICT to the forefront of people's lives. Now it has significantly exacerbated long-foreseen patterns; it has rapidly pushed a lot of industries that have been able to operate remotely. In brief, ICT has made a major impact on the travel industry [26] and now the industry should be based on this consumer-centric technology in order to satisfy the emerging experienced customers [27]. Hence, it is expected that a positive trend of interest in digital tours in the post-COVID era will be seen.

Not only is there a digitalization push from the COVID-19 pandemic, but also from a different perspective, the Fourth Industrial Revolution (also sometimes known as Industry 4.0) in recent years has rapidly been upsetting industries, including the tourism industry [28]. Tourism is greatly involved in Industry 4.0 digital transformation [29]. Tourism 4.0, as defined by Peceny et al. [7], involves reducing the harmful effects of tourism (e.g., tourism's carbon footprint) and simultaneously improving it through the merging of ICT with the tourism experience. This has turned out to be key to resilience in tourism [8].

Considering the fact that digital tours are an essential supplement for the industry not only during the COVID-19 crisis but also for future tourism, the digitalization readiness of the industry is the key foundation of tourism success. In theory, a crucial step to understanding the capacity to launch and accept a change in ways that provide value, limit risk, and sustain performance is referred to as readiness measurement [30]. Despite the importance of the area, very few studies contribute to this important field, especially when it

comes to the different types of tourism in the industry. Although there is attractiveness and pushes for virtual and digital travels, stakeholders' readiness (service supply and travelers' demand) to transition to the modern industry is critical [27], as is technology usability [31]. With regard to the digitalization of tours as a change in an industry system, the author uses a framework with three readiness metrics out of the system theory perspective [32], with input (supply) response, output (demand) response, and process (technology) readiness, as shown in Figure 1, due to the gap in the literature. In a separate article [33], the author gives insight into these readiness metrics.

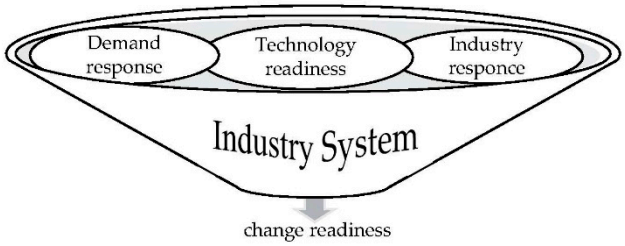

Figure 1. Change readiness from a system approach.

This study focuses on tourism digitalization readiness; however, it is willing to address tourism in Sweden in order to reach a decision on the specific goal of this study. The tourism industry in Sweden has a considerable turnover and plays a noteworthy role in several respects [34]. Sweden is among the top digitalized EU (European Union) economies [35], though there is not enough research focusing on the tourism industry in Sweden. Due to the different characteristics and approaches of societies, studies from other countries may not be fully applicable here. More studies on the tourism industry of Sweden are needed [36], so Sweden's tourism industry is targeted as the scope of this research. Different types of tourism in the industry, with different levels of digitalization readiness, are active in the country. Hence, comparing the readiness for digital tourism could provide a better understanding of capabilities, available benchmarks, and digitalization implementation experiences for Swedish tourism policymaking. In a few words, the main goal of this article is to compare different types of tourism in Sweden based on their readiness for a digitalization shift in order to answer the question, "Which types of tourism in Sweden are more (or less) prepared for the digitalization switchover?"

2. Method

Three criteria were defined to measure the change readiness of the industry—demand response, industry response, and technology readiness—hence, multi-criteria decision-making (MCDM) approaches were targeted for this research. Sweden is active in more than one type of tourism; hence, among MCDM approaches, techniques from multiple-attribute decision-making (MADM) are appropriate. The hierarchical structure of this research is constructed in Figure 2.

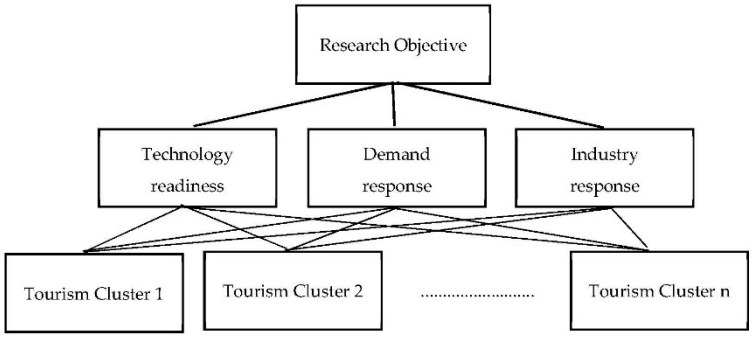

Figure 2. Hierarchical structure of this research.

An ideal tourism cluster that fully satisfies all three readiness measures does not exist practically, so the selected MADM techniques should approximate and list the closest clusters to the ideal. MADM-TOPSIS (techniques for order preference by similarity to an ideal solution) is based on the principle that the listing of the alternatives must be with the concept that priority is given to the option closest to the ideal and the one farthest away from the worst [37,38]. The TOPSIS approach has successfully addressed numerous real-world issues, particularly in recent years, due to its rationality [39]; its accuracy was compared to other MADM techniques and it was recommended [40]. Applied mathematical modeling [38] has communicated the hierarchical structure of TOPSIS per Figure 3. The definition of TOPSIS as ranking the alternatives has received progressive attention from researchers who focus on multiple criteria decision-making approaches [37].

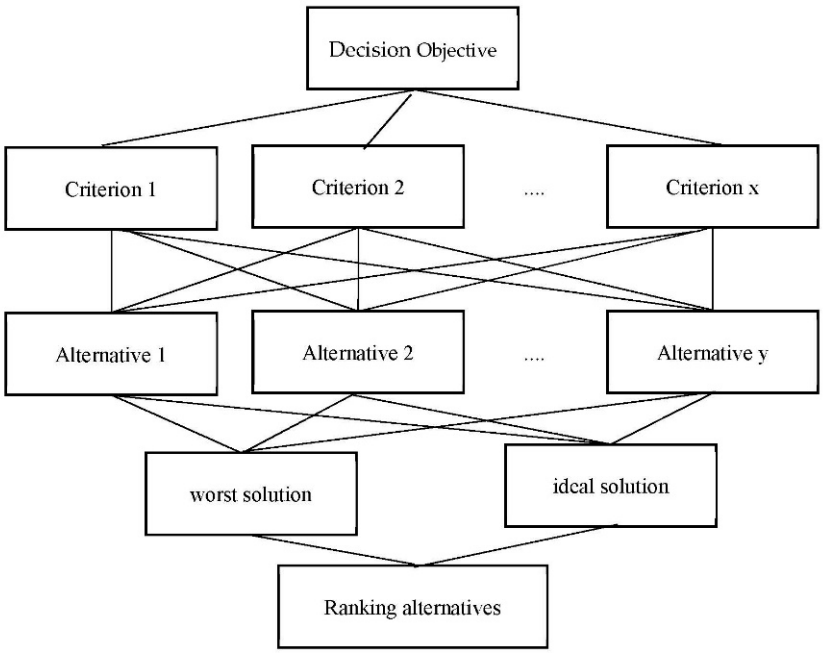

Figure 3. Hierarchical structure of TOPSIS.

There are no constraints reported on the distribution of data, the number of alternatives and criteria, or the sample size of experts in this method. A report on optimizing the use by an expert panel [41] indicated that even a handful of experts in a panel were preferred in several published studies to reach a consensus decision, as the quality of the experts is deemed to be more significant than the size of the panel. A bigger panel may cause too much variety in the feedback and result in a high degree of inconsistency. Hence, the number of experts should be kept to a minimum.

Based on a previous practice [42], the calculation steps of the classic TOPSIS process are listed in Figure 4.

To utilize TOPSIS and due to a lack of literature and the novelty of the COVID-19 situation, primary data were required for this study. For tourism-related data, a panel of experts was invited for group decision-making (GDM), which makes use of its members' varied experiences and interests. Since the scope of this research was defined for tourism in Sweden, the panel of experts was professionals in the field in Sweden who had studied the industry and were aware of existing tourism activities in Sweden.

The expert selection process is important for enhancing the reliability and validity of the research results. Hence, a list of experts was selected based on the number of indexed publications in the past three years in Scopus, by searching the two keywords of "tour *" in title, keywords, and abstract, and "Sweden" in affiliation. A dozen scholars were listed with the highest publications, though after reviewing the scope and title of their

publications, the eight most relevant authors were invited for data collection regardless of any conciliation such as academic level, gender, or age.

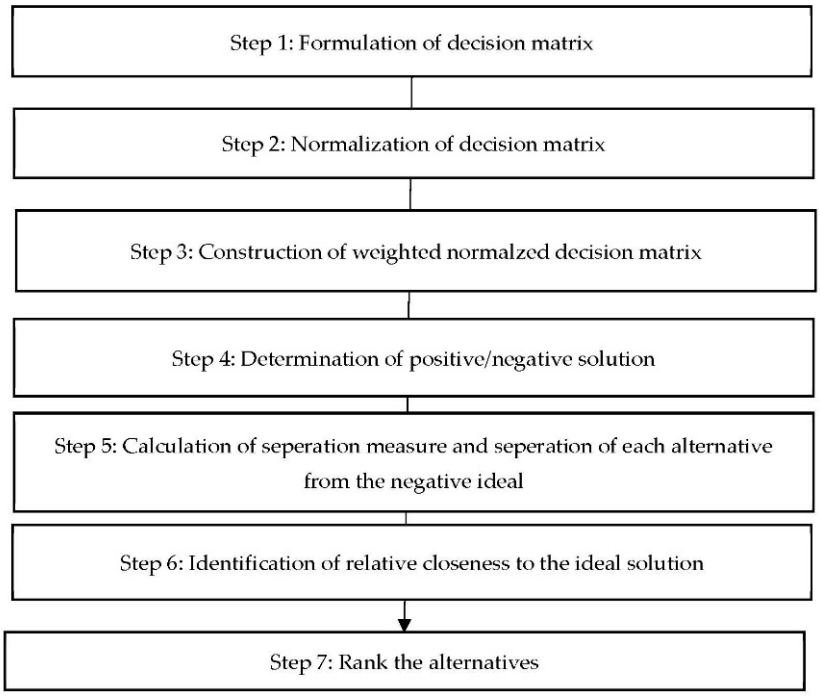

Figure 4. TOPSIS calculations.

Before the data collection in March 2021, in a live online seminar for the pre-study step, a few researchers from the Centre for Tourism (CFT) at Gothenburg University were consulted to comment on the improvement of the prepared data collection tool. In addition, a short follow-up meeting a week later with the seminar chair was organized to review the comments received from the seminar and changes to the data collection instrument. As a result, it was chosen to restrict the spectrum of the study to seven tourism types, and the instrument's framework was designed as shown in screenshot in Figure 5 (for tourism experts). The scales for the answers ranged from −4 to +4, or from "extremely against" to "extremely supportive." The criteria weights were built to accept answers on a 10-point scale, ranging from 10% to 100%.

For technology (ICT) concerns, one expert was invited who had both work-related (nearly 10 years in ICT-related scopes) and related educational backgrounds (with a master's degree in ICT-related fields and a few professional certifications in the area) who also self-reported his awareness of the current ICTs for travel digitalization. Comparably, for ICT-related data collection instruments, there were the same seven types of tourism and similar scales for measuring readiness (technology and user capacity at a fair cost) for digital/virtual travels.

Next, to improve the consensus in the data collection phase, a list of an operational definition of key terms presented to the panels was included in the prepared questionnaires, as shown in Appendix A. Additionally, in the absence of standard terminology in the tourism research literature, it was predicted that supplying this list would yield more reliable results.

Even so, when using MADM techniques such as TOPSIS, it is often assumed that decision-making is conducted with a panel or a task group, and still further work is needed to improve a comprehensive problem-solving technique [39]. Hence, for the analysis of the collected data, classic TOPSIS was not capable to consider inputs from two groups of experts. Sorooshian and Parsia [43] also explained this as one of the constraints of existing MADMs; they suggested a supplementary procedure for solving this issue, called decisions

with altered sources of information, which will be included in this study. This procedure adds a few sub-steps to the MADM data entry of that can be summarized as: Step 1, construction of a decision matrix with inputs from the main source of information; Step 2, completion of the decision matrix with inputs from the altered source of information; and Step 3, normalizing the decision matrix.

QUESTION	ANSWER
In ***Urban Tourism***, does Demand (**tourists)** support the digitalization of travelings?	Choose an item.
In ***Urban Tourism***, does Industry (**service providers)** support the digitalization of travelings?	Choose an item.
In ***Cultural Tourism***, does Demand (**tourists)** support the digitalization of travelings?	Choose an item.
In ***Cultural Tourism***, does Industry (**service providers)** support the digitalization of travelings?	Choose an item.
In ***Rural Tourism***, does Demand (**tourists)** support the digitalization of travelings?	Choose an item.
In ***Rural Tourism***, does Industry (**service providers)** support the digitalization of travelings?	Choose an item.
In ***Adventure Tourism***, does Demand (**tourists)** support the digitalization of travelings?	Choose an item.
In ***Adventure Tourism***, does Industry (**service providers)** support the digitalization of travelings?	Choose an item.
In ***Event Tourism***, does Demand (**tourists)** support the digitalization of travelings?	Choose an item.
In ***Event Tourism***, does Industry (**service providers)** support the digitalization of travelings?	Choose an item.
In ***Business Tourism***, does Demand (**tourists)** support the digitalization of travelings?	Choose an item.
In ***Business Tourism***, does Industry (**service providers)** support the digitalization of travelings?	Choose an item.
In ***Entertainment Tourism***, does Demand (**tourists)** support the digitalization of travelings?	Choose an item.
In ***Entertainment Tourism***, does Industry (**service providers)** support the digitalization of travelings?	Choose an item.

Figure 5. Instrument framework.

Additionally, considering the fact that the research focus of the tourism experts might not cover the whole industry, an add-on consideration of unbalanced expertise was added to the TOPSIS process. For this, experts were asked to refer to the questions asked about each cluster of the tourism industry, and grade their level of expertise. The confidence level for each aspect of the tourism industry was designed to accept scales from 0% to 100%. Sorooshian [44] suggested the application of this confidence/level of expertise through a weighted average of inputs when dealing with group decision-making with a panel of experts with unbalanced expertise.

For the ICT expert, since the needed information was collectible, an assignment was designed and the expert was asked to have the questions but, if needed, answer them after a mini-research (internet search and asking his colleagues) with updated relevant information.

After the above-listed considerations, an expanded TOPSIS, TOPSIS for group decision-making with multiple sources of data through panels of experts with unbalance expertise, was taken into consideration for the data analysis. Figure 6 presents the summary of the steps taken for this study.

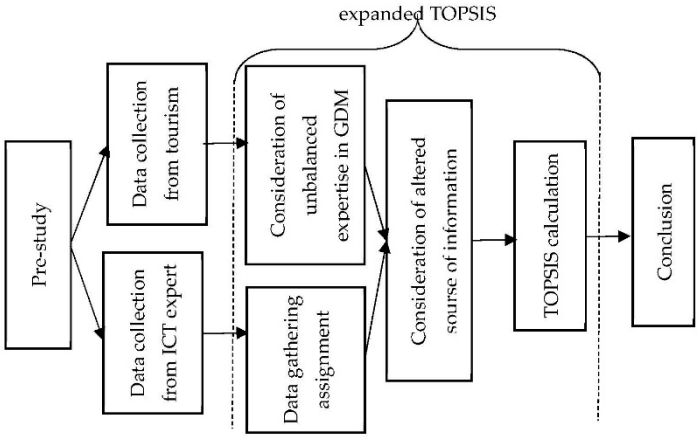

Figure 6. Research flow.

3. Results

After collecting the required data, the calculation steps of the expanded TOPSIS resulted in the following outcomes:

By calculation of the mean, the weights of the decision criteria based on inputs from both panels of experts were calculated: demand response (5.67), industry response (2.67), and technology readiness (7.67).

Part A of Table 1 shows the average inputs from the tourism-panel decision matrix after the consideration of unbalanced expertise for group decision-making. However, part B shows the average input from the ICT-panel decision matrix after the consideration of unbalanced expertise for group decision-making.

Table 1. Decision matrix.

Alternatives	Part A		Part B
	Demand Response	Industry Response	Technology Readiness
Urban tourism	0.43	−1.3	2
Cultural tourism	0.9	0.27	3
Rural tourism	−0.13	−1.17	0
Adventure tourism	−0.67	−0.13	1
Event tourism	1.47	0.53	4
Business tourism	2.03	1.03	4
Entertainment tourism	−0.4	0.27	2

Appendix B shows the output from the application of a web-based software, Decision Radar Ez-TOPSIS (https://decision-radar.com/Topsis.html (accessed on 30 April 2021)), for decision-making with the TOPSIS method.

Finally, Table 2 reports the results of the hierarchy ranking of the tourism clusters starting from the closest to the ideal (fully ready to be digitalized).

Table 2. Results.

Rank	Cluster	Score
1	Business tourism	1.00
2	Event tourism	0.84
3	Cultural tourism	0.67
4	Urban tourism	0.43
5	Entertainment tourism	0.38
6	Adventure tourism	0.24
7	Rural tourism	0.20

Therefore, here in this study, from the analysis of the collected data, business tourism followed by event tourism seems to be more ready than other clusters of the industry for a digitalization shift whenever it is needed. With many of us moving our business work online as a result of COVID-19 and social distancing, the use of video conferencing programs has grown exponentially. Video conferencing promotes long-distance and international connectivity and improves teamwork while minimizing travel costs [45]. There are many video-conferencing programs available, including Skype, Zoom, Facetime, Zoho Meeting, Highfive Meeting, GoToMeeting, Google Hangouts Meet, Slack, Cisco WebEx, and Eyeson, to name a few [46]. For instance, although only 10 million people attended Zoom meetings before COVID-19 became widespread at the end of 2019, consumption had skyrocketed to 300 million by April 2020 [47].

With many cross-country examples, Arshad [46] explained that ICTs have allowed business meetings and events to retain a semblance of normalcy during quarantine, enabling them to transfer their meetings electronically while maintaining transportation-free tours. Hence, this motivates the scores from this ICT expert's research, where the maximum technology readiness is given to business and event tours. The usage trend during the COVID-19 pandemic presents support for positive support for both demand and the industry. Many ICTs are available for free, but paid programs are available that even can enable individuals to communicate in a virtual meeting room. Participants can appear as full-body avatars, replicating much of the body language that is often missed via regular video-conferencing software. Undoubtedly, demand for these services has also jumped dramatically since the start of COVID-19 [45].

Additionally, although cultural, urban, and entertainment types of tourism are less ready than business and event tourism, the results of this study indicate that adventure and rural tourism are far from ideal in terms of digitalization change readiness. Not only is there a high cost of technology for the satisfaction of the travel motivation of these groups, in proving the input data (with negative values) from expert panels, one article [48], for instance, analyzed the impact of real nature experiences against virtual nature experiences on well-being. Although the results show that interactive digital nature experiences may have comparable recovery effects to physical nature experiences, they offer only virtual reality where physical nature opportunities are limited, and there are many health benefits to aiming for a real walk in physical nature. The article argued that there also might be positive effects of light, physical activities (such as differences in seating and walking possibilities), and other moderating factors while traveling to real nature. Similarly, despite the existence of adventure virtual reality programs, a muscle-function analysis revealed that activation grades during such virtual reality programs were generally mild [49], which is not fully aligned with the travel motivation of adventure or rural tourists.

Last but not least, as the journal of the CiTUR Centre for Tourism Research, Development and Innovation recently expressed, contemporary and future tourism is expected to be dependent on two tendencies, development of technological innovations and sustainability [50]. This research is predicted to guide contributions to ICT-related innovations in tourism. It was stated [51] that ICT has the potential to lower travel costs, increase liquidity, and increase stability. It could also aid in the maintenance of social distancing in the pandemic, as ICT will link individuals again with no direct presence. As a result, this technology will deal with COVID-19-specific issues.

Now the public's confidence in this technology has grown, as has their ability to communicate and shift their attitudes toward technology. People have begun to disregard privacy concerns in order to reap greater technological benefits [51]. However, only those aspects of the tourism industry that recognize the benefits of ICTs and have effective management would be capable of improving their innovation and resistance [27]. Considering that theories on change management have highlighted the benefit of ensuring readiness for any change [52], as a roadmap for tourism strategists, this study is predicted to contribute to the concept of change management prior to formulating an action plan to encourage (or even discourage) a digitalization shift due to the COVID-19 crisis, post-COVID-19

trends, Fourth Industrial Revolution, environment and tourist attraction protection, or any other reason.

4. Conclusions

In response to the present tourism industry crisis, the purpose of this research was to comment on the readiness of tourist sector clusters for digital transformation. To do so, an expanded version of the TOPSIS technique was proposed to tackle MADM problems when working with altered and unbalanced inputs from expert panels. The proposed new approach converts the classic decision matrix to a multi-level, multi-panel, multi-criteria, and multi-alternative decision matrix. This expanded method was implemented to compare change readiness for transforming travel in tourism industry clusters for inbound and domestic Swedish tourism. Furthermore, due to a shortage of literature, a framework for measuring change readiness with a system perspective was adopted as an additional contribution to this work. Next, this research finding shows that business and event tourism can lead the transformation during and after the COVID-19 crisis. These two can better deal with the crisis because of their potential to serve the transition. However, adventure and rural tourism are the furthest away from being ready to adjust, and therefore suffer the most from the current crisis. Hence, it is to be expected that the findings of this study will assist authorities in assisting the industry with smarter decision- and strategy-making.

However, to fully understand the potential of the digitalization of travel, more studies are needed. Among the limitations of this study were the general questions asked about the readiness measures, as was commented on by one of the experts in response to the invitation to participate in this study. Hence, future works may use a qualitative approach to data collection through open-ended questions to bring more details to the analysis. When transitioning to digital tours, researchers may also suggest findings on the resilience management of tourism services (hotels, travel agents, etc.).

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Data Availability Statement: Not applicable.

Conflicts of Interest: The author declares no conflict of interest.

Appendix A

Table A1 shows definition of the terminology used in this research.

Table A1. Operational definitions.

	Definition	Presented to Experts of:	
		Tourism	ICT
Digital tour/traveling	Any virtual (computer-generated) and/or online visits that reduce the need for travel and/or transportation	X	X
Demand response	Tourists' reaction to the digitalization shift for virtual and/or online travels	X	
Industry response	Industry (service providers of the industry) reaction to the digitalization shift for virtual and/or online travels	X	
Technology readiness	Availability of suitable technology infrastructure and knowledge to change to virtual and/or online travels at a reasonable price		X
Urban tourism	Includes visits to cities, towns, and the like	X	X
Cultural tourism	Travel to learn about other people, see architecture, art, history, etc.	X	X
Rural tourism	Undertakings in a non-urban territory, including coastal and nature tourism, stays in the countryside and rural retreats, national parks, etc.	X	X
Adventure tourism	It characteristically needs professional skills or physical exertion, and has some amount of risk.	X	X

Table A1. *Cont.*

	Definition	Presented to Experts of:	
		Tourism	**ICT**
Digital tour/traveling	Any virtual (computer-generated) and/or online visits that reduce the need for travel and/or transportation	X	X
Demand response	Tourists' reaction to the digitalization shift for virtual and/or online travels	X	
Industry response	Industry (service providers of the industry) reaction to the digitalization shift for virtual and/or online travels	X	
Technology readiness	Availability of suitable technology infrastructure and knowledge to change to virtual and/or online travels at a reasonable price		X
Urban tourism	Includes visits to cities, towns, and the like	X	X
Cultural tourism	Travel to learn about other people, see architecture, art, history, etc.	X	X
Rural tourism	Undertakings in a non-urban territory, including coastal and nature tourism, stays in the countryside and rural retreats, national parks, etc.	X	X
Adventure tourism	It characteristically needs professional skills or physical exertion, and has some amount of risk.	X	X
Event tourism	Attending any event or exhibition	X	X
Business tourism	Travel for business	X	X
Entertainment tourism	To enjoy entertainment activities, such as the circus, concerts, and clubbing	X	X
Travel motivation	Any specific reason, needs, or desires of tourists as the primary reason for traveling		X

Appendix B

The output from Decision Radar Ez-TOPSIS presented in Figure A1.

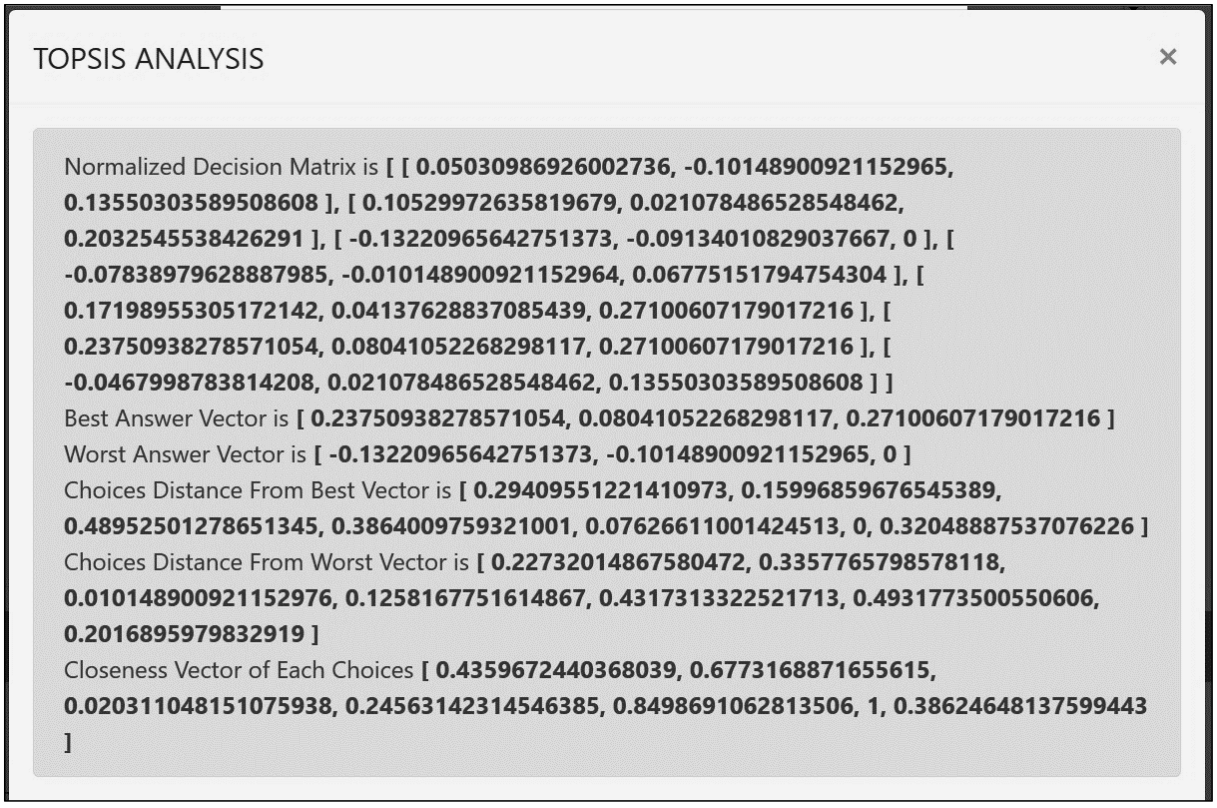

Figure A1. Software report.

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