Critical elements in accessible tourism for destination competitiveness and comparison: Principal component analysis from Oceania and South America

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ABSTRACT

This paper seeks to construct an exploratory nationally comparative tourism accessibility measure (TAI) through developing an objective set of metrics in the spirit and intent of the international treaties and missions regarding the rights of persons with disabilities. Applied to Australia and New Zealand (Oceania) and Argentina and Brazil (South-America), the TAI draws upon data collected cross-country, cross-continent and for a period of 25 years (1990–2015) based on factor and principal component analysis. Considering accessibility as the conditions that a destination must have in order to be enjoyed by all individuals with access requirements and as a key factor of destination competitiveness, the TAI is developed based on: socio-demographic data; legal framework, political will and policy actions; and access conditions in tourism attractions. This measure is a useful tool to provide information about the critical elements, stages of development, evolution and understanding of the accessible tourism approaches in each of the studied countries.

1. Introduction

According to the World Health Organization (WHO & WB, 2011), more than one billion people live with some form of disability. This means that one out of seven people in the world faces some limitation in their everyday lives, ranging from seniors to families with young children or temporarily injured people (Darcy & Dickson, 2009). "In the years to come, disability will be an even greater concern, because its prevalence is on the rise. This is due to aging populations and the higher risk of disability in older people as well as the global increase in chronic health conditions such as diabetes, cardiovascular disease, cancer, and mental health disorders" (WHO & WB, 2011:5). At the same time, medical technology has improved life expectancy, people with invisible disabilities (e.g., mental health) are more willing to disclose their disability, and the collection of disability data becomes more sophisticated and systematic across developed and developing economies. Disability is part of our lives, directly or indirectly, and in that way, it is characterised as a universal phenomenon that is part of human diversity. It includes not only taking into account physical and mental health conditions, but also characteristics of educational or labor

markets, the role of human rights or even the possibility of a full participation in social, recreational and touristic activities and other areas of disability citizenship (Darcy & Taylor, 2009; Meekosha & Dowse, 1997).

Although the introduction of the *Universal Declaration of Human Rights* in 1948 signaled the importance of equal treatment of all humanity, it wasn't until the 1970s that disability was first identified explicitly as a human rights issue: in 1971 through the *Declaration on the Rights of Mentally Retarded Persons* (intellectual or developmental disability now is the preferred and accepted terminology) and in 1975 through the *Declaration on the Rights of Disabled Persons* (UN, 2006). Moreover, it was only after three decades that the rights for tourists with disabilities were introduced through the *Convention on the Rights of Persons with Disabilities* (CRPD, UN, 2006). At the same time, the UNWTO included "accessible tourism" as part of its vision and led policy considerations to think of the area as more than just the combination of tourism and disability. Accessible tourism has been defined as:

"collaborative processes between stakeholders that enable people with access requirements, including mobility, vision, hearing and

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cognitive dimensions of access, to function independently and with equity and dignity through the delivery of universally designed tourism products, services, and environments. These include people with permanent and temporary disabilities, seniors, obese, families with young children and those working in safer and more socially sustainably designed environments" (Buhalis & Darcy, 2011:11–12).

Accessible tourism has become a developing interdisciplinary, multidisciplinary and transdisciplinary field of industry practice and research; "set within a dynamic social context; influenced by geography, aging and disability studies, economics, public policy", among others (Michopoulou, Darcy, Ambrose, & Buhalis, 2015:179). Tourism was recognized as a fundamental human right that can "improve the quality of life and create better living conditions for all people" (Manila Declaration, UNWTO, 1980). The CRPD considers the right for tourists with a disability to access transport, information and communication technology, the built environment (Article 9) and also to tourism experiences, goods, and services (Article 30).

From the perspective of the political will of governments, accessible tourism has become an evolving field in which some governments have focused policies and marketing efforts. For instance, the European Union has been investing in accessible tourism for the last three decades (Ambrose, 2012); Australia has some of the earliest accessible tourism initiatives (Darcy, Cameron, & Schweinsberg, 2012); and Argentina has a specific law about accessible tourism since 2002 (Law N° 25.643). Recently, accessibility is being considered as a way to increase the tourism destination competitiveness (Dominguez, Darcy & Gonzalez Alen, 2015; Kastenholz, Eusébio, Figueiredo, & Lima, 2012; Madeiro Barbosa, 2008; Porto & Rucci, 2018; Porto, Rucci, & Ciaschi, 2016, 2017; Rucci, 2018; UNWTO, 2015d).

While the WHO recognizes accessible tourism as a global public health issue, the UNWTO identifies it as a public policy. However, both organizations refer to it as a human rights issue. In this context, apart from removing barriers and improving access to health services and programs, one of the main objectives of the *Global Disability Action* 2014-2021 is to strengthen the collection of relevant and internationally comparable data on disability and –support research on disability and its related services (WHO & WB, 2013:3). This paper first, seeks to assist with this objective by proposing an instrument to measure the relationship between disability, tourism, and accessibility, in a broad sense at a national and regional level. Second, the paper proposes a definition and methodology to test globally accessible tourism. The research is built on an examination of overarching tourism destination competitiveness from a disability and broad accessibility perspective. It lays out the conditions of accessibility in the tourism sector showing, on the one hand, political willingness for accessible tourism in a country, and, on the other hand, the consideration of tourism accessibility as a factor to be included into a destination competitiveness measure. The index encompasses four main issues: i) a diagnosis about international tourism and population data within a disability context, ii) legal framework, iii) political will and policy actions, and, iv) access conditions in tourism resources. Therefore, it sets out a logic that shows that, if countries recognize disability as a vulnerable population (WHO & WB, 2011) with needs that must be attended to, the government must guarantee the full exercise of human rights to persons with disabilities, either people who reside in the country, or one-day visitors or long-haul tourists. In particular, the tourism sector is a critical arena for such an achievement in that the lessons learned through countries who have already created inclusive and enabling environments, can provide learnings to be adapted for other countries who are yet to go through accessibility development stages. In this way, the index is a tool that shows: i) the quantitative importance of international tourism and disability in the country; ii) the political will of the countries through the existence of legislation and laws that establish rights; iii) the implementation of such willingness, through the presence of organizations that design and develop policies focusing on persons with disabilities and, iv) the conditions of access at tourism attractions as World

Heritage Sites (UNESCO).

The selection of nation-state case studies (Argentina, Brazil, Australia and New Zealand) was based on the notion that the four countries have backgrounds in accessible tourism policies and resources at different stages of development and formed a convenience sample of the collaborative research team who had in-depth knowledge of the social and tourism data available. Internationally, Australia is considered one of the most significant human rights' proponents: with accessibility being introduced under the Federal Disability Discrimination Act in 1992 after each state in the Federation had developed separate anti-discrimination and disability services legislation. "It has a long history of initiatives involving disability and access provisions in tourism, as well as some of the first accessible tourism initiatives" (Darcy et al., 2012:98). Australia has ratified the UN CRPD in 2008 and its Optional Protocol in 2009, like Argentina and Brazil. As a feature, Sydney held the Paralympic Games in 2000, a fact that makes the city (and arguably the country) to be internationally prepared to deal with disability and access in tourism.

New Zealand has considered the rights of people with disability since 1990 through the New Zealand Bill of Rights Act that includes the rights of people with disabilities. NZ went on to ratify the CRPD in 2008 and its Optional Protocol in 2016. With a relatively strong legislated provision of human rights and the importance of tourism to the New Zealand economy, the country shares many similarities with its closest neighbor Australia. The NZ Human Rights Commission has a complaints base system that includes disability and reports 90% of complaints being handled by a successful mediation process. While not hosting the Olympics or Paralympics, New Zealand has hosted Rugby World Cup 1987 and 2011, and the America's Cup in 2000 and 2003, which brings an international spotlight to major events that facilitate inclusive processes (Darcy, Frawley & Adair, 2017). On the surface, information about accessible facilities is available from the official website of the national tourism organization but the tourism industry has been noted for its omission of strategies for access and inclusion (Gillovic & McIntosh, 2015; Rhodda, 2012).

Similarly to Australia, Brazil has implemented several initiatives in the accessible tourism field being the first South-American country to hold an Olympic and Paralympic Game (Rio de Janeiro, 2016). As well, Argentina has a national law in accessible tourism (Law N° 25,643) since 2002 and has a national program of accessible tourism to encourage the tourism sector to improve its accessibility conditions.

These statistical, political and legislative frameworks and backgrounds throughout the years and the four countries, especially in the period 1990–2000 decade, show the starting points and the different opportunities of each country to develop accessible tourism policies or achievements in this field, leading to a legacy in accessible tourism.

The aim is to create a Tourism Accessibility Index (TAI) through which to identify the main variables to be considered part of a measure of tourism accessibility for the four countries identified (Australia and New Zealand from Oceania and Argentina and Brazil from South-America). A general index is built considering the sum of different dimensions summarised in a broad set of data and a poste collection of a smaller number of variables relevant to explain the accessibility in tourism. One important feature of this instrument is that it is useful to position each country in relation to other countries and to compare the situation for countries in different stages of development and their changes over time. Finally, the index was constructed following an extensive data search and using factor and principal component analysis. The process of the index construction will allow replication in future research across more countries. The theoretical foundations of the accessibility in tourism measure is easily extrapolated while the methodology itself must be adapted to each set of country-continent data. Such an index would contribute to the CRPD's (2006) explicit aim to report and compare measures of the signatory nations where tourism and accessibility are identified under Article 9 and 30, respectively; to the disability and the *Millennium Development Goals* (UN, 2010); and to

the objectives of the *Global Disability Action Plan* 2014–2021 in the collection of relevant and internationally comparable data on disability and its related services (WHO, 2013). To date, only the *World Report on Disability* (WHO & World Bank, 2011) has sought to undertake this exercise predominantly on sociodemographic data.

The structure of the paper begins with Section 2 presenting a brief review of the literature about the main items that the disability and the accessibility concepts include, leading to the conceptual underpinnings of tourism accessibility. Section 3 describes the data and section 4 deals with the methodology of the factor and principal component analysis. Section 5 presents the results and Section 6 provides the final discussion.

2. Literature review

According to UNWTO (2014a), the exponential growth of the tourism sector over the last three decades offers immeasurable prospects for socio-economic development and employment, however, it also provides substantial challenges. In addition to concerns about economic and environmental sustainability, some segments of society are not yet able to equally enjoy the rights of citizenship (see Disability and the Millennium Development Goals, UN, 2010) including tourist attractions, facilities, and services. One of those segments is people with access needs. The CRPD (2006: 4) define "persons with disabilities" as those who "have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others", while "people with access needs" considers not only those with disabilities but also includes the aging population, those with temporary disability, pregnant women and families with young children (Darcy & Dickson, 2009; Dickson, Misener, & Darcy, 2017). As stated by WHO (2011:7), "more than a billion people are estimated to live with some form of disability, or about 15% of the world's population (based on 2010 global population estimates)." Other groups that also benefit indirectly from enhanced accessibility include seniors, pregnant women, people with temporary disabilities, families with young children and employees through the benefits of accessible/universal design creating safer working environments. In future years, disability will be an even greater concern, as its prevalence is increasing. "This is because the population is aging and the risk of disability is higher among older adults, and also chronic diseases such as diabetes, cardiovascular diseases, cancer, and mental health disorders are increasing worldwide reaching nearly 2.1 billion of the total population by 2050" (WHO & WB, 2011:8).

Research into tourism and disability has gained increasing attention in academia, amongst policymakers and practitioners over the last two decades; however, it is only recently that accessible tourism, set within a dynamic social context, has become an evolving field of industry practice and research (Michopoulou et al., 2015; UNWTO, 2015a-f). The accessible tourism field is interdisciplinary, multidisciplinary and transdisciplinary, and is influenced by geography, aging and disability studies, economics, public policy, technology, among others. People with disabilities are representative of one market mostly overlooked and omitted by the global tourism industry (Buhalis & Darcy, 2011; Daniels, Rodgers, & Wiggins, 2005; Richards, Pritchard, & Morgan, 2010). Yet, people with disability are not a homogenous grouping with segmentation needing; each one must be considered taking into account the disability type (e.g. mobility, vision, hearing, cognitive et cetera) and the level of an individual's support needs (e.g. independent, low, moderate, profound and severe) (WHO, 2001; Darcy, 2010).

As Dominguez et al. (2015) have identified, there are a series of areas of study that have contributed towards destination competitiveness and management (Table 1).

The UNWTO work identified in Table 1 is a signifier that accessible tourism is now considered mainstream and no longer "special interest". This was reinforced when the UNWTO declared 2016 the year of "Accessible Tourism for All" promoting "Universal Accessibility" to celebrate the 10th anniversary of the adoption of the CRPD. These initiatives are a long way from the humble beginnings examining destination accessibility. Israeli's (2002) early study sought to understand what accessibility factors were required by the group to visit tourist sites. This first attempt to articulate the underlying foundations needed for tourists with disabilities to visit a tourist site or precinct was developed over the coming decade with later studies utilizing a destination competitiveness framework to enhance the theoretical framework and examine accessibility as a component of competitiveness between destinations (Dwyer & Kim, 2003; Ritchie & Crouch, 2003; WEF, 2011). However, only a few authors have studied accessibility in tourism in the context of competitiveness (Porto, Rucci, & Ciaschi, 2017, 2018, 2016; Dominguez et al., 2015; Kastenholz et al., 2012; Madeiro Barbosa, 2008; Rucci, 2018; UNWTO, 2015d). Table 2 summarizes the main results. For instance, Madeiro Barbosa (2008) applied a methodology to measure competitiveness in 65 tourism destinations in Brazil based on five macro-variables: infrastructure (general and access); tourism (tourism infrastructure, tourist attraction and marketing and promotion of destinations); public policies; economy (economic activities and business capacity); and sustainability (social, environmental and cultural aspects) that include a total of thirteen micro-variables. Within one of its macro-variables (tourism), this study consists of the measurement of compliance with the access requirements for people with disabilities. Although the primary objective of the research is not the measurement of accessibility in tourism, it is one of the first competitiveness investigations that include accessibility as a variable into competitive destination measurements. Starting in 2008 and based on the information detailed above, the Ministry of Tourism of Brazil computed the National Tourism Competitiveness Index which incorporates, since 2011, the measurement of accessibility in one of its variables (access). Further to this inclusion, since 2013 accessibility has been incorporated into three other variables: general infrastructure, tourist services and equipment, and tourist attractions. The 2015 index results reflect that the presence of accessibility conditions in the different variables increases the competitiveness value of its variable.

Kastenholz et al. (2012) presented the initiative of the municipality of Lousa in Portugal to become the first accessible tourism destination in the country. Lousa has a long history of supporting efforts regarding people with disabilities, and it was considered a suitable focus given the area's nature and rural tourism potential. The study analyzes the potentialities of the municipality to enhance its competitiveness and the central strategic objective to become an accessible destination. It achieved this by making the accommodation units more accessible; implemented a certification "Lousa Accessible" to award for both recognition and branding of those establishments that have invested in making their products and services more accessible; creating an accessible route to observe the destination's wildlife and many others. Lousa uses accessible tourism as a strategic tool to gain competitiveness through an underserved but typically loyal market, creates a culture of social responsibility and enhances a shared human experience by improving the "vision of the destination amongst stakeholders, including tourists who increasingly value socially responsible positions of economic actors in the tourism industry" (Kastenholz et al., 2012: 369).

Another investigation of destination competitiveness from Dominguez et al. (2015) considered 17 attributes and focused on the measurement of two variables: the level of accessibility (degree of access) and the number of accessibility products and services offered by tourist destinations. The authors analyzed the competitiveness in accessible tourism between Australia and Spain at a country level and, also, on the tourist regions of both countries through a cluster analysis that was facilitated by the availability of national and regional statistics that incorporated disability and other accessible variables. The findings suggest three possible stages based on their accessibility: i) destinations that have advanced tourist accessibility through the offer of specific products; ii) destinations that have identified the accessible tourism

Table 1

Summary of research studies on accessible tourism.

Source: Adapted from Dominguez et al., 2015.

Issue	Studies
Constraints faced by tourists with disabilities	Daniels et al., 2005; McKercher & Darcy, 2018; Nyaupane & Andereck, 2008
Market dynamics	Burnett & Baker, 2001; Domínguez, Fraiz, & Gonzalez Alen, 2013; Dwyer & Darcy, 2011; Van Horn, 2012
Travel motivations	Figueiredo, Eusebio, & Kastenholz, 2012; Shi, Cole, & Chancellor, 2012
Information needs	Buhalis & Michopouloub, 2011; Darcy, 2010; Eichhorn, Miller, Michopoulou, & Buhalis, 2008
Cross-country comparisons	Freeman & Selmi, 2010; Dominguez et al., 2015
Approaches to disability discrimination	Shaw, 2007; Veitch & Shaw, 2011
General attitudes towards people with disabilities	Bizjak, Knezevic' & Cvetreznik, 2011; Daruwalla & Darcy, 2005
Supplier attitudes towards people with disabilities	Darcy & Pegg, 2011; Groschl, 2012; Kim, Stonesifer, & Han, 2012; Ozturk, Yayli, & Yesiltas, 2008; Yaniv, Arie, & Yael, 2011
Whole of life approaches	Darcy & Dickson, 2009; Pagan, 2014
Measuring accessibility into destination competitiveness	Madeiro Barbosa, 2008; Kastenholz et al., 2012; Dominguez et al., 2015; Porto et al., 2016, 2017; Porto & Rucci, 2018
Political will of countries in accessible tourism	Rucci, 2018
UNWTO recognition	UNWTO, 2014a, 2014b, 2015a-e, 2016a, 2016b

Table 2

Model comparison.

Source: Collected by Madeiro Barbosa (2008); Dominguez Vila et al. (2015) and Porto and Rucci (2018).

Models	Tourism competitiveness (Madeiro Barbosa, 2008)	Competitiveness in accessible tourism (Dominguez Vila, Darcy, & Gonzalez Alen, 2015)	Political will in accessible tourism (Porto & Rucci, 2018)
N° variables	13	17	11
Variables and subvariables	*Infrastructure Tourism Public Policies Economy Sustainability*	*Core resource and attractors Supporting factors and resources Qualifying and amplifying determinants Destination planning and management*	*International tourism and disability's importance Legal & Political recognition Accessibility in tourist attractions*
Methodology	Data collection: questionnaire	Principal determinant and cluster analysis	Data collection: statistics, normative and policies
Geographical units	65 destinations of Brazil (capitals and non-capitals)	Australia and Spain (tourist regions and capitals)	Argentina, Brazil, Chile, Paraguay, Uruguay and Venezuela
Period	2013–2015	2014	1990–2015

market as a business opportunity and incorporated accessibility conditions as a point of differentiation; and iii) destinations that are not working to improve tourism accessibility and, therefore, will not have advantages derived from the development of this segment or, indirectly, from the part of family and senior tourism. While the study concludes that tourism destinations in both countries have similar behavior, exciting findings emerge in the detailed comparison. It is observed that intrinsic tourism characteristics such as climate, location or tourism structure are more important for Spain, whereas the quality of services, brand, and infrastructure were more significant for Australia's competitive position. These aspects suggest that the concept of an accessible tourism market is possible in both countries, where there seems to be a concordance of demands to promote the development of infrastructure, products, services, promotion and marketing information, and the provision of adequate information for people with disabilities. Finally, the findings support the idea that the competitive factors of the destination are country-dependent, and that destination competitiveness must be considered according to the different types of disabilities because the needs of people with disabilities vary between each disability type based on their support needs (Darcy, 2010). For instance, larger cities tend to be the main focal points of greater accessibility (for example, Sydney, Melbourne, Madrid, and Barcelona).

Porto and Rucci (2018) collected data from six Latin-American countries (Argentina, Brazil, Chile, Paraguay, Uruguay, and Venezuela) for the period 1990–2015. The data was put through a Political Will Tourism Accessibility Index (PWTAI) as the first step of an exploratory and descriptive methodology. Eleven variables were chosen to determine the political will of a country in the accessible tourism legacy, starting from a diagnosis situation of each country, and taking into account what have governments done to improve the access of people with disabilities to their rights, focusing on tourism and its related services. It showed that Argentina and Brazil have achieved the greatest improvements throughout the years.

Madeiro Barbosa (2008), Dominguez et al. (2015) and Porto and Rucci (2018), have laid out the basis for the development of the Tourism Accessibility Index (TAI) presented in this paper (Table 2). The index is a step forward -regarding data collection and compilation, and the methodology used-in relation to all the background literature.

The importance of understanding this area of scholarship is better demonstrated by the attention paid by the UNWTO to create a global approach to measure the key factors considered determinants of the accessible tourism field. Their efforts over the last decade to study tourism accessibility finished in the publication of a model of indicators to measure accessibility into the tourism value chain (UNWTO, 2015d). UNWTO suggests a definition of the tourism value chain which must be evaluated through the following key-issues: access, cleanliness, common spaces, management, information and communication, mobility, staff training, services, and use. While considered a comprehensive measurement of accessible tourism, this model has the disadvantage of being very difficult to put into practice given all the information required for the components, which exist at the micro and meso levels, rather than at the macro level (Dopfer, Foster, & Potts, 2004).

2.1. Research design and the research problem

Given the literature review, the approach proposed in this paper seeks to draw upon the studies that have been previously identified (summarised in Tables 1 and 2) and develop a comprehensive and operational contribution to the issue. Four countries across two regions of the world were identified as nation-state case studies, seeking to address the issue from a national and regional level in each country. The period of the analysis is a key factor in this research because it shows the change of the disability model paradigm, from a medical/rehabilitation to a social model. In the first one, people with disabilities were considered "abnormal" and requiring normalization to be

included in society. In the second, the social model in which CRPD (UN, 2006) is based upon, it was understood that the social, political and economic barriers that persons with disabilities found in society are the consequence of the interaction between people and society –because of the lack of inclusive practices for accessibility- and they hinder their full and effective participation in society on an equal basis with others. As previously mentioned, CRPD (Articles 30 and 9) include those aspects of the physical environment, information, technology, and transport accessibility that relate to tourism. From this point, the research moved beyond currently available tourism and disability data to construct an innovative and validated approach to a Tourism Accessibility Index (TAI) using the methodology of factor and principal component analysis.

3. Description of the data

3.1. Identification of available and pertinent data

This section seeks to identify the main variables to explain tourism accessibility in broad terms -for four countries, Australia and New Zealand from Oceania, and Argentina and Brazil from South America. A panel database for five periods of five years each, between the years 1990 and 2015, is used. The selection of the countries was based on the previously mentioned accessible tourism backgrounds of each country; and a convenience sample of the collaborative research team who had in-depth knowledge of the economic, legal, social, touristic data availability. The country selection was a challenge to the researchers because of the asymmetric characteristics and the idiosyncrasy of the countries' sociocultural contexts. However, this challenge also brought together a research team that was able to build upon not only English language knowledge but also of knowledge of this area in Spanish and Portuguese languages.

Based on the analysis of the literature of Section 2 and the availability of information, the data collected includes broad information and is grouped into seven categories about: general characteristics of the countries; people with disabilities; importance of the tourism sector; accessibility at the World Heritage Sites (UNESCO); legal framework conditions; infrastructure; availability of publicly accessible data; and availability of the types and kind of information related to accessibility. Each item also includes a set of sub-variables (50 in total). The data is presented in Table 3 and was collected from different national and international organizations.

3.2. Descriptive statistics

3.2.1. General information

By area, Brazil is the world's fifth-largest country, Australia the sixth and Argentina the eighth. However, New Zealand is significantly smaller than the other countries studied. Even though Australia and Brazil both have similar geographical areas, the density of population is eight times higher in Brazil (24.40) than in Australia (3.07). To show some universal indicators across countries, Gross Domestic Product (GDP) and Human Development Index (HDI) were selected for this study. With regards to GDP, Australia is the only country which almost triples data indicators from 1990 to 2015, while the rest of the countries doubled the 1990 period number. Related to the HDI, the four countries have similar increases throughout the years (Table 4).

3.2.2. Population with disabilities

With regards to the population with a disability, not all the countries have census or disability surveys in all periods of time. Also, the measurement of disability population throughout the years in each country is not the same (see the conceptual definitions in Table A1, Appendix). The World Health Organization & World Bank (2011) note a series of measurement and data collection issues that complicate uniform comparisons between countries. The last census shows that people

with disabilities represent 18% of the total population of Australia, 23% of New Zealand, 23% of Brazil, and 12% of Argentina. Australia and Brazil consider those numbers as people with at least one type of disability while Argentina and New Zealand have both, one and more than one disability (Table 4). In 2001, the Washington Group on Disability Statistics (United Nations, 2001) recognized that statistical and methodological work was needed at an international level to facilitate the comparison of data on disability across nations. The set of questions proposed by the Group of Washington was applied in the 2010 Census by Argentina and Brazil; Australia used them in the 2016 Supplementary Disability Survey (SDS) and New Zealand included them in the New Zealand General Social Survey for the 2016/17 collection year (Stats NZ, 2017). In the set of questions people with disability were considered those who declare a difficulty or permanent limitation and restrictions to participate in the daily activities, to see, to hear, to walk, to seize objects, to learn, etc. and that affect a person permanently to be involved in their daily life in their physical and social environment.

3.2.3. Tourism Indicators

Table 4 shows different indicators of tourism performance for the four countries. Australia presents a significant number of international tourist arrivals with, for the 2011–2015 period, 8.26 million tourists per year. The second place is Brazil and third Argentina. Tourists arriving in Australia and New Zealand spend three to four times more than tourists going to Brazil and Argentina. As a consequence, income from tourism represents 4% of GDP in New Zealand, 2.4% of GDP in Australia and does not reach 1% in the Latin American countries. The international tourism receipts as a percentage of total exports has decreased in Argentina, from 10% in 1990 to 6% in 2015, and fell in Australia from 17% in 1990 to 11% in 2015. This value is near to 3% in Brazil in the last two periods and about 20% in New Zealand in 2010. As such, New Zealand is far more reliant on tourism as a major invisible export.

3.2.4. Accessibility in World Heritage Sites (WHS)

For this item, the World Heritage Sites (WHS) ascribed on the World Heritage List (UNESCO) were considered as the main tourist attractions of the country (UNESCO World Heritage Centre, 2002), for their international recognition, their general attraction for the public (Frey & Steiner, 2011), their significant tourist-enhancing effect (UNESCO World Heritage Centre, 2002; Yang, Lin, & Han, 2009) and the lack of information about other tourist attractions in the countries. For the purpose of this research, we developed a methodology (Table A2, Appendix) to identify the access conditions for people with disabilities to those sites in which three aspects are included: i) information availability, considering if official and non-official websites provide accessibility information; ii) access conditions at the sites, taking into consideration the travel chain (plenty of access to parking, arrival, free circulation, toilets, among others (UNWTO, 2016a)); and, iii) touristic use, considering the ability to participate in the main touristic activity of the site. For example, in the WHS Puerto Madryn of Argentina, the most common recreational activity is whale watching, so, the touristic use will be based on the access and participation of the different types of disability embodiment in that main activity. The collection of data was based on the publicly available information in official and non-official websites, tourist and travel guides and research papers, among others. However, two limitations should be noted. As the data collected was only that which is publicly available, this means that, on the one hand, the absence of publicly available data became a barrier for travel planning for people with disabilities; and, on the other hand, there may be information about other accessible facilities in some WHS that is not documented or easily accessed. As a consequence of this review, Table 5 sets out the accessibility of each country's World Heritage Sites generally, specific to cultural, natural and mixed World Heritage. For example, Australia was found to have the highest percentage of WHS Fully Accessible (FA) for a tourist with disability (26%). Brazil and Argentina have 20% of the total WHS with FA while in New Zealand

Table 3
Variables and sub-variables of the methodology proposed.
Source: Developed by authors

General information	
Population	Gross Domestic Product (per capita)
Areas (km2)	Human Development Index
Density	
Population with disabilities	
Total Population with disabilities	Pw sensory disability (% PWD)
Total Population with disabilities (% Total Pop.)	Pw intellectual impairment (% PWD)
PWD with one type of disability (% PWD)	Pw motor impairments (physical disability) (% PWD)
PWD with more than one type of disability (% PWD)	Pw Psychological/Psychiatric impairments (% PWD)
	Pw other impairments (% PWD)
Tourism	
International tourist arrivals (nº of arrivals)	Inbound in relation to tourism arrivals
Tourist arrivals for 1000 habitants	Tourism inbound (% GDP)
International tourist departures (nº of departures)	International tourism expenditure (% total imports)
Tourism inbound (millions dollars)	International tourism receipts (% total exports)
Infrastructure	
Nº International Airport	Accessible facilities main airline
Nº Domestic Airport	Accommodation with accessibility (% of rooms)
Accessibility in World Heritage Sites (WHS)	
Nº of WHS FA (% WHS FA)	Nº of WHS PA (% WHS PA)
Nº of WHS Cultural FA (% WHS Cultural FA)	Nº of WHS Cultural PA (% WHS Cultural PA)
Nº of WHS Natural FA (% WHS Natural FA)	Nº of WHS Natural PA (% WHS Natural PA)
Nº of WHS Mixed FA (% WHS Mixed FA)	Nº of WHS Mixed PA (% WHS Mixed PA)
Legal Framework	
Adherence to International Treaties	*National-Disability*
Vocational Rehabilitation and Employment	PWD in National Constitution
of PWD (1983)	PWD main Law
Inter-American Convention for the Elimination of	Disability National Organization
all Forms of Discrimination against PWD (1999)	PWD Program-Plan
UN CRPD (2006)	*National-Tourism*
Optional Protocol (2006)	Tourism National Organization
	Tourism accessible Law
	Accessible Tourism Program
Stats and Availability of information	
Accessibility in official web sites	Building Code/Accessible transport law
Information in web sites	Statistics
Books/Guides of Accessible Tourism	

there is not a site identified with these characteristics.

3.2.5. Political will

Table 6 summarizes the political will of the countries regarding adherence to international treaties of disability, national normative related to tourism and disability and the national organizations for the development of policies of tourism and disability.

The measurement of political will in countries is divided into three steps. The first is to identify the international treaties which the countries have adhered to; second, the national legal framework related to tourism and disability; and, third, the implementation of that normative through the existence of a national organization of tourism, disability, and accessible tourism.

Related to international treaties, all the countries have ratified the UN CRPD (2006) in 2008 as well as its Optional Protocol in 2009 except for New Zealand, which did it in 2016. Australia, Argentina, and Brazil have ratified the Vocational Rehabilitation and Employment of PWD (1983) which is one of the only international treaties about disability before the CRPD. Only Argentina and Brazil include the rights of people with disabilities in their Constitution. While Argentina has a general recognition (1994), the Constitution of Brazil includes most of the rights (2009). As well, all the countries have disability laws but Argentina is the only one that has a specific law relating to accessible tourism since 2002.

All the countries have bodies for the treatment and development of disability as well as tourism policies although those from Argentina are the oldest. Likewise, all the countries have developed both disability and accessible tourism programs at a national level.

4. Construction of the Tourism Accessibility Index (TAI) through factor and principal component analysis

The Tourism Accessibility Index (TAI) is a composite indicator that gathers information on a set of available data to construct an exploratory nationally comparative measure through developing an objective set of metrics in the spirit and intent of the CRPD as it relates to tourism and those aspects of the physical environment, information and transport accessibility. The foundation for the methodology to develop the index through a factor and principal component analysis is a methodological step forward from the work of Porto and Rucci (2018). Moreover, the TAI summarizes a more detailed and broader set of information than the one compiled for the previous work, which includes different elements that allow the assessment of the level of development of the country, the number of people with disabilities, the recognition of disabilities in the laws, the role given to the touristic sector, the accessible tourism approach followed by each country, and the information and the access conditions of touristic places. Given the bulk of information, the index is composed of sub-indices, which components are chosen through factor and principal component analysis (PCA). These statistical methods could be used to group individual indicators when correlations between them exist and allow weights to be computed (for more details of both methods see Lawley & Maxwell, 1971; Jolliffe, 1986; Dunteman, 1989; Bryant & Yarnold, 1995).

Prior to the PCA analysis, it must be checked that the data is adequate to carry out this method through the following five assumptions:

- Assumption 1: variables should be measured at a continuous level.
- Assumption 2: there needs to be a linear relationship between all

Table 4

General Information, Population with disabilities and Tourism Indicators about Australia, New Zealand, Argentina and Brazil (1990–2015).

Source: collected by World Bank Group, 2017, INDEC 2001, 2010; IBGE, 1991, 2010; ABS, 1993, 1998, 2003, 2009, 2015; Stats NZ, 1996, 2001, 2006, 2013; Ministerio de Turismo de Brasil, 2015.

Variable	Period	Australia	New Zealand	Argentina	Brazil
Total population (in millions)	1990–1995	18.07	13.67	34.99	162.76
	2001–2005	20.39	4.13	39.15	188.48
	2011–2015	23.78	4.60	43.42	207.85
Population density	1990–1995	2.33	13.67	12.59	19.11
	2001–2005	2.63	15.38	14.08	22.13
	2011–2015	3.07	17.09	15.62	24.40
Gross Domestic Product (usd per capita)	1990–1995	20.384	17.400	7.373	4.840
	2001–2005	34.016	27.750	5.076	4.770
	2011–2015	56.554	38.201	13.467	8.757
Human Development Index	1990–1995	0.88	0.85	0.73	0.65
	2001–2005	0.92	0.89	0.78	0.70
	2011–2015	0.94	0.92	0.83	0.75
Population with disabilities (in millions)	1990–1995	2.92	NI	NI	1.67
	2001–2005	3.96	0.74	2.18	NI
	2011–2015	4.29	1.06	NI	NI
Population with disabilities (% total population)	1990–1995	16.16	NI	NI	1.02
	2001–2005	19.41	17.99	5.56	NI
	2011–2015	18.04	23.11	NI	NI
International tourist arrivals (in thousand)	1990–1995	3.73	NI	2.29	1.99
	2001–2005	5.50	2.35	3.82	5.36
	2011–2015	8.26	2.77	5.94	6.43
International tourism receipts (% total exports)	1990–1995	16.98	NI	10.22	2.06
	2001–2005	14.35	20.16	6.84	3.13
	2011–2015	11.57	NI	6.35	2.80
Tourism inbound (% GDP)	1990–1995	3.23	3.63	0.99	0.14
	2001–2005	2.84	5.65	1.61	0.47
	2011–2015	2.54	4.79	0.89	0.41

Note: NI means No Information.

variables. The reason for this assumption is that a PCA is based on Pearson's correlation coefficients, and as such, there needs to be a linear relationship between the variables. The assumption of linearity is best tested through the inspection of bivariate scatterplots obtained for each pair of original variables (Mertler & Reinhart, 2016). Linear relationships were tested and found, supporting this assumption.

- Assumption 3: there must be sampling adequacy (large enough sample sizes). The Kaiser Meyer Olkin (KMO) test was carried out among the proposed variables as potential components of each sub-index and in all cases, the test was passed.
- Assumption 4: the data should be suitable for data reduction. Bartlett's test of sphericity (whose null hypothesis states that the variables are not intercorrelated) was carried out among the

proposed variables as potential components of each sub-index and in all cases, the null hypothesis is rejected.

- Assumption 5: there should be no significant outliers because these can have a disproportionate influence on the results. In general, the data do not show values that are higher than the average plus three deviations or lower than the average minus three deviations. So, no outliers are identified.

The tests and graphics made to check the assumptions are not presented in the document due to space limitations but are available for those who request it.

Composite indicators or indexes, as those obtained by PCA at different moments of time, and in this case that compare the performance of different countries, are a useful and practical tool because they reduce a large set of data into a single indicator, which enables the study, interpretation, and understanding of a complex situation. However, indexes must be well constructed in order to avoid misleading policy messages (Nardo, Saisana, Saltelli, Tarantola, Hoffman & Giovannini, 2005). So, the construction of the index must respect specific statistical criteria, and the methodology requires compliance with different steps including: 1) developing a theoretical framework; 2) selecting variables; 3) imputation of missing data; 4) normalization of data; 5) multivariate analysis; 6) weighting and aggregation.

The general index and its components (sub-indices) were created following the previous steps. Steps 1 and 2 were developed in the earlier sections. After developing the theoretical framework, some selected variables were chosen to be part of the index according to the theoretical determinants of access to tourism by people with disabilities (Porto et al., 2017, 2018, 2016; Rucci, 2018).

The imputation of missing data (step 3) is needed to provide a complete dataset. The primary method for the imputation of missing values is *the unconditional mean imputation (*Nardo et al., 2005*)* which has the advantage of being a simple method and it performs well when there are no extreme observations or outliers (as it is this case). For each country with missing data, the average value of the variable was calculated. This criterion was used for the imputation of four variables: population with disabilities (% total population), international tourist arrivals (number of arrivals), international tourism expenditure (% total imports) and international tourism receipts (% total exports). The percentage of values lost in each variable is low (30%, 5%, 10%, and 10%, respectively) so they do not generate a problem that could affect the results (Lee & Huber, 2011).

In the cases that there is only information for one period, the same value is imputed for the rest of the years. This approach was used for the infrastructure variables and the index of accessibility in official websites. Finally, for some variables (infrastructure and legal framework), the missing data was completed by recoding specific values.

Table 5

Accessibility in world heritages sites about Australia, New Zealand, Argentina and Brazil (1990–2015).

Source: Identified by authors

Country	Fully Accessible	Partially Accessible	Initiatives of Accessibility	Non Accessible	Fully Accessible	Partially Accessible	Initiatives of Accessibility	Non Accessible
	World Heritage Sites (%)				Natural World Heritages Sites (%)			
Australia	26	16	11	47	25	0	17	58
New Zealand	0	33	0	67	0	0	0	100
Argentina	20	30	20	30	50	25	25	0
Brazil	20	15	10	55	29	0	14	71
	Cultural World Heritage Sites (%)				Mixed World Heritage Sites (%)			
Australia	67	0	0	33	0	75	0	25
New Zealand	0	0	0	0	0	100	0	0
Argentina	0	33	17	50	0	0	0	0
Brazil	15	23	8	46	0	0	0	0

Table 6
Political will in accessibility and tourism in Australia, New Zealand, Argentina and Brazil (1990–2015).
Source: Developed by authors

	Australia	New Zealand	Argentina	Brazil
Variable: Adherence to International Treaties				
Vocational Rehabilitation and Employment of PWD (1983) PWD (1983)	Ratified (1990)	No	Ratified (1987)	Ratified (1990)
Inter-American Convention for the Elimination of all Forms of Discrimination against PWD (1999)	NA	NA	Ratified (2000)	Ratified (2001)
UN CRPD (2006)	Ratified (2008)	Ratified (2008)	Ratified (2008)	Ratified (2008)
Optional Protocol (2006)	Ratified (2009)	Ratified (2016)	Ratified (2009)	Ratified (2009)
Variable: Disability				
PWD in National Constitution	No	No	General recognison into Constitution (1994)	Recognison into Constitution (2009)
PWD main Law	Disability Discrimination Act (1992)	NZ Bill of Rights (1990)/NZ Human Right Act (1993)	Law N° 7,853 (1989)/Law N° 22,431 (1981)	Law N° 13,146 (2015)
Disability National Organization	Australian Federation of Disability Organizations (2003)/Disabled Peoples Organizations (2006)	Office for Disability Issues under the Ministry of Health (2002)	National Advisory Committee for the Integration of Disabled Persons (1967)	Human Rights Secretary (1986)
PWD Program-Plan	National disability strategy (2010–2015)/National Disability Insurance Scheme (NDIS) (2013)	NZ Disability Strategy (2000/2001)	Accessibility Plan (CONDADIS, 2012)	Live Without Limits Plan (2013)
Variable: Tourism				
Tourism National Organization	Tourism Australia (2004)	Ministry of Tourism (1991)	Ministry of Tourism (1942)	Ministry of Tourism (1992)
Tourism accessible Law	Considered into Disability Discrimination Act (1992)	No	Accessible Tourism Law N° 25,643 (2002)	Considered into General Tourism Law (2008)
Accessible Tourism Program	National Information Communication Awareness Network (NICAN) (1988)	Access Tourism NZ (2005)	Accessible Tourism Guidelines Program (2008)	Accessible Tourism Program (2010)

Note: NA means Not Applicable.

These are the cases in which there is no data available because it does not correspond. For example, the Inter-American Convention for the Elimination of All Forms of Discrimination against PWD (1999) does not apply to New Zealand or Australia, so these countries have a missing value in all years. These values were recoded with the number zero.

Normalization (step 4) is required before any data aggregation. Indicators in a data set often have different measurement units and should be normalized to render them comparable. Normalization also converts the variables to a standard scale between 0 and 1, which is necessary to obtain a final measure between these two bounds. Although different normalization methods exist (Freudenberg, 2003; Jacobs, Smith, & Goddard, 2004), this paper chooses the Min-Max criteria which normalizes indicators to have an identical range [0, 1] by subtracting the minimum value and dividing by the range of the indicator values. Min-Max normalization could widen the range of indicators lying within a small interval, increasing the effect on the composite indicator more than the z-score transformation. We proposed an alternative version of Min-Max criteria that allows us to compare the indices across time: it shows that the values for one country are not relative to the achievement of the other countries. Instead, the relative distance to certain reference values is considered. The normalization is made as $I_{j,it} = \frac{V_{j,it} - \min V_{jt}}{\max V_{jt} - \min V_{jt}}$ where $I_{j,it}$ is the indicator j of country i in year t and $V_{j,it}$ is the variable j of country i in year t, min $V_{j,t}$ and max $V_{j,t}$ are the minimum and maximum theoretical values that the variable j can take in year t. In the case of the variables where it is not possible to define the reference values, such as the GDP per capita or tourist arrivals, among others, the standard Min-Max criteria were followed.

In steps 5 and 6, the variables were reduced and the weights were estimated. For this purpose, factor and principal component analysis were used. The weights were determined in a way that maximizes the variation of the resulting principal component so that the indices capture the difference as fully as possible. Table 7 presents the sub-indices with their respective weights.

The Tourism Accessibility Index (TAI) is constructed as:

$$TAI = (0.12 * GII + 0.05 * PWDI + 0.15 * TI + 0.16 * IF + 0.13$$
$$* APSI + 0.32 * LFI + 0.7 * SAII) * 100$$

The index takes values between 0 and 100. Higher values denote a greater level of accessibility -in the way we define it in this paper-for people with disabilities.

We also carried out a robustness exercise to test the sensitivity of the index to changes in the components. We calculate the TAI without the infrastructure and statistics sub-indices using the same methodology and fulfilling the same assumptions as before. The index of infrastructure was eliminated since it is constant throughout the period

Table 7
Tourist Accessibility Index (TAI) and Alternative Tourist Accessibility Index (ATAI). Components and weights.
Source: Developed by authors. Note: The variables included in each sub-index with their weights are shown in Table A3 of Appendix.

Sub- Index	Weight	
	Tourist Accessibility Index	Alternative Tourist Accessibility Index
General Information Index	0.12	0.22
PWD Index	0.05	0.09
Tourism Index	0.15	0.13
Infrastructure Index	0.16	–
Accessibility to World Heritage Sites Index	0.13	0.24
Legal Framework Index	0.32	0.30
Stats & Availability of Information Index	0.07	–

because it was impossible to find information for previous periods than the last one. The statistical index was eliminated because it has the lowest weight in the global index. The components and their weights are shown in Table 7.

The Alternative Tourist Accessibility Index (ATAI) is constructed as:

$$ATAI = (0.22 * GII + 0.09 * PWDI + 0.13 * TI + 0.24$$
$$* APSI + 0.31LFI) * 100$$

As expected, eliminating two components produces a reweighting of the rest. However, the relative importance of each sub-index is maintained in general terms. The Legal Framework Index continues as the sub-index with the highest weight while the PWD index remains as the sub-index with the lowest weight.

5. Results

5.1. Weighting sub-indices of the Tourism Accessibility Index (TAI) and alternative Tourism Accessibility Index (ATAI)

The TAI summarizes a broad number of variables and arises from the weighting of a set of sub-indices, as was explained in the previous section. The Legal Framework Index presents the major weight in the global index (0.32, Table 8): it can be considered that the laws and policies that regulate the rights of residents and tourists are the main variables that affect the level of general accessibility and the specific tourism accessibility in these countries. The infrastructure and the importance of tourism in the economy weight 0.16 and 0.15, respectively. The access of people with disability to World Heritage Sites weighs 0.13 while the measures of the level of development of the country (resumed by general information) weigh 0.12. The sub-index of information available on the web pages and statistics has the lowest relevance in tourism accessibility (0.7). However, this last category is essential for being able to monitor the CRPD as without a baseline and ongoing assessment of progress or otherwise cannot be measured.

When considering the second specification, the Legal Framework Index remains as the main variable that influences the ATAI with a weight of 0.31 while the Accessibility in WHS Index and the General Information Index gain participation in the global index.

5.2. Results

Table 8 shows the TAI and the ATAI and their sub-indices for Australia, New Zealand, Argentina and Brazil over the five periods. Australia is the country with the highest tourism accessibility in the period. It rose from 45% in 1990 to 60% in 2015 in line with a period of continuous positive economic growth. In turn, Argentina ranks second in 1990 with an index of 25% and, although its index grew to 42% in 2015, the country loses the position in the ranking at the end of the period. Between the years 1996 and 2005, Argentina has practically no improvement in the index, and this may be due to the consequences of the major economic crisis of 2001. Period 2006–2010 coincide with the CRPD ratification for all the countries, the consideration of accessibility into tourism laws (Argentina in 2002) and the creation of accessible tourism programs of countries (NZ in 2005, Brazil in 2008, and Argentina in 2010).

Brazil ranks second in 2015 with an index of 45% and, in contrast to Argentina, it experiences a gradual growth over the period (that is, there are different issues that more or less uniformly mark step by step the improvement of the index). New Zealand occupies the last place in the ranking across all the years. It is interesting to compare the performance of New Zealand with South-American countries. Although at the beginning they have indices with similar values, the South-American countries have a more significant improvement in the TAI. The rises of the TAI from 1990 to 2015 is about 14 percentual points (p.p.) for New Zealand, 17 p.p. for Argentina and 23 p.p. for Brazil. The

Table 8
Tourist Accessibility Index (TAI) and sub-indices. Australia, New Zealand, Argentina and Brazil. Period 1990–2015
Source: Developed by authors

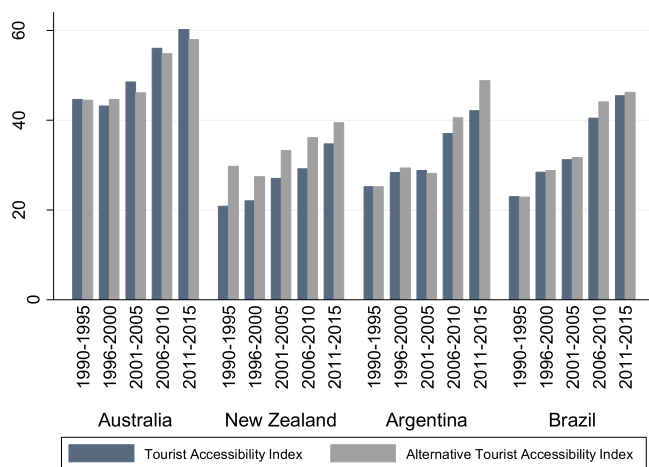| Country	Period	Tourist Accessibility Index	Alternative Tourist Accessibility Index	Sub- indices							
				Alternative global index with city data for last period	General Information Index	PWD Index	Tourism Index	Infrastructure Index	Accessibility to World Heritage Sites Index	Legal Framework Index	Stats & Availability of Information Index
Australia	1990–1995	44.63	44.45		94.10	16.16	50.41	49.76	11.93	40.03	30.11
	1996–2000	43.12	44.57		94.82	18.85	48.20	49.76	11.93	40.03	13.83
	2001–2005	48.49	46.11		95.64	19.41	54.18	49.76	14.00	40.03	58.79
	2006–2010	56.04	54.83		96.26	18.27	53.57	49.76	17.71	65.64	76.65
	2011–2015	60.17	57.95	60.64923	96.87	18.04	53.35	49.76	24.97	69.80	100.00
New Zealand	1990–1995	20.80	29.73		83.01	18.62	12.92	0.74	11.93	15.67	0.00
	1996–2000	22.05	27.43		71.38	18.19	5.86	0.74	11.93	19.83	37.02
	2001–2005	27.04	33.18		83.82	17.99	11.25	0.74	11.93	27.20	45.32
	2006–2010	29.12	36.07		73.63	15.18	7.56	0.74	11.93	46.45	47.97
	2011–2015	34.68	39.45	36.95174	76.93	23.11	8.60	0.74	11.12	52.81	84.95
Argentina	1990–1995	25.21	25.15		45.42	12.70	22.26	24.14	2.08	33.60	28.68
	1996–2000	28.28	29.32		50.20	12.70	25.33	24.14	2.08	42.37	28.68
	2001–2005	28.74	28.16		40.61	5.56	21.37	24.14	2.08	49.46	44.95
	2006–2010	37.03	40.53		41.84	12.41	28.60	24.14	4.37	81.75	36.82
	2011–2015	42.13	48.77	34.03152	47.21	20.13	22.45	24.14	19.17	93.28	36.98
Brazil	1990–1995	22.91	22.85		33.28	1.02	7.77	35.14	2.08	44.78	8.14
	1996–2000	28.38	28.82		35.12	15.59	29.12	35.14	2.08	49.16	8.14
	2001–2005	31.23	31.63		35.79	19.28	28.92	35.14	3.35	55.77	19.12
	2006–2010	40.46	44.04		38.23	22.96	28.39	35.14	4.80	92.29	27.26
	2011–2015	45.40	46.20	41.18954	38.66	19.28	28.30	35.14	12.19	94.37	67.05

TAI for Australia shows a rise of 15 p.p., indicating a smaller increase than the countries of South America.

The ATAI presents similar values to the TAI as is shown in Fig. 1. Australia has the highest values in the five periods, Argentina ranks second, Brazil ranks third and New Zealand takes the last position.

Regarding the main sub-indices, Australia presents the highest value in the General Information Index according to its levels of GDP per capita and HDI. New Zealand also has a high index, as opposed to the low values for Argentina and Brazil. Over the whole period, the four countries present an improvement in their Legal Framework Index, which in part can be explained by the CRPD (2006). For the last period, Brazil and Argentina show values higher than 90% while it is 70% for Australia and approximately 50% for New Zealand. This is a consequence of the fact that only Argentina and Brazil include the rights of people with disabilities in their Constitutions. It seems that a high level of GDP per capita and the HDI (General Information Index) are not

enough to achieve greater inclusion of the people with disability in the legal framework. For example, Australia and New Zealand present high values for the General Information Index but low values for the Legal Framework Index, as previously mentioned. Brazil and Argentina have opposite results: values near 90% for the Legal Framework Index and have a General Information Index below 50% in the last period. This suggests that while the legal framework exists, the political will or resources to implement the legal framework are not evident through the General Information Index (Fig. 2).

Concerning the sub-index related to Tourism, Australia also performs better than the rest (with values of 50% in the last period, beating the value of 28% for Brazil and 22% for Argentina in the same period). New Zealand is the country with the lowest index and presents a decrease from 13% in 1995 to 8% in 2015. When taking into account the level of accessibility to WHS, the countries of South-America have a very low value in the first period, then experienced a jump over the last period. In this way, the first place in the ranking is for Australia, the second for Argentina, the third for Brazil and the last position is occupied by New Zealand, with no improvement at all in this item during

Fig. 1. Tourist accessibility index (TAI) and alternative tourist accessibility index (ATAI).
Source: Developed by authors
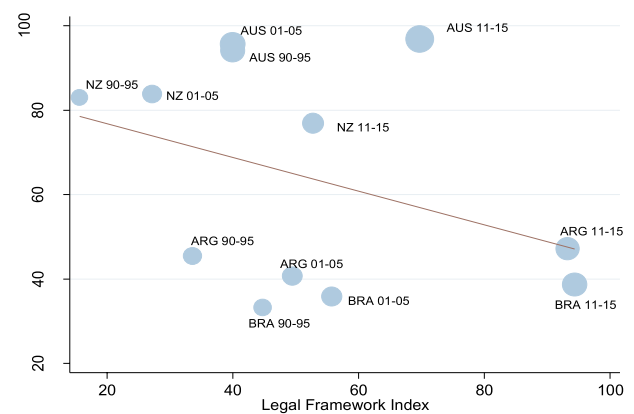
Fig. 2. General information index and legal framework index.
Note: the size of the circle change with the values of the TAI.
Source: Developed by authors
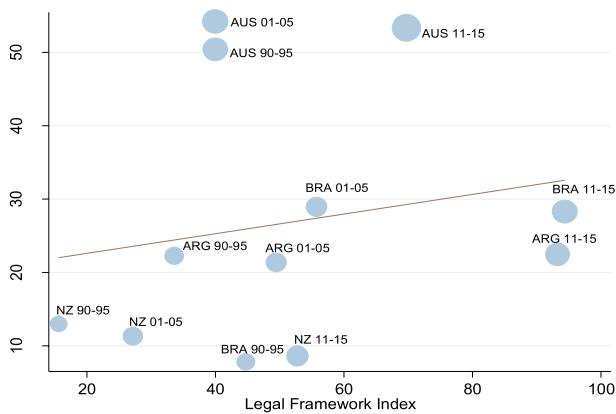
Fig. 3. Tourism index and legal framework index.
Note: the size of the circle change with the values of the TAI.
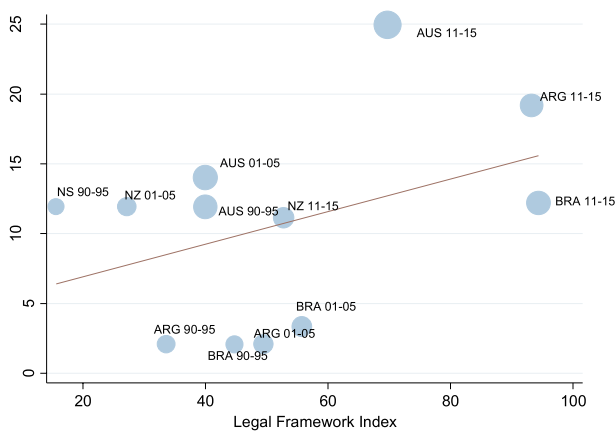Source: Developed by authors

the whole period.

Fig. 3 shows a positive correlation between the legal framework and the importance of tourism in the economy, and Fig. 4 between the legal framework and the access to the WHS. Australia presents higher than average values in both indices, the South-American countries show a good performance in the last period, and New Zealand has a low Tourism Index and a mean value of the Accessibility in WHS.

Another interesting exercise is to see the relationship between the growth rate of the general index and the growth rate of the different sub-indices, considering the first and the last period (Fig. 5). In this way, countries are located according to whether they have a high growth rate in the two indices (quadrant 1), a low growth rate in two indices (quadrant 4), a high growth rate in ATI and a weak growth rate in sub-indices (quadrant 2), and a low growth rate in ATI and a high growth rate in sub-indices (quadrant 3).

Brazil shows the best performance. The country is located in quadrant 1 for the cases of Tourism Index, General Information Index and Accessibility in WHS Index and it is located in quadrant 3 for Legal Framework Index. Argentina also has a good performance and is located in quadrant 1 for three cases: Legal Framework Index, General Information Index, and Accessibility in WHS Index. The country has a low change in the Tourism Index but presents a high growth rate in the ATI.

On the other side of the world, New Zealand presents an average change rate in the global index and a low growth rate of Tourism Index, General Information Index, and Accessibility in WHS Index while it offers a high growth rate of Legal Framework Index. Australia figures in

Fig. 4. Accessibility in WHS and legal framework index.
Note: the size of the circle change with the values of the TAI.
Source: Developed by authors

quadrant 4 in all cases, so this country presents a low growth rate for all four indices and the general index. This result may be because their indices have high initial values with less room for significant improvement.

6. Discussion

This paper contributes to the literature with evidence for countries with different levels of development, collecting a comprehensive set of data on the major items which perform the disability and accessibility concept related to tourism. This work has extended the early work of Israeli (2002) on the accessibility of tourist sites by examining the factors that contribute towards perceptions of accessibility. By moving beyond individual tourist sites or precincts, this paper has sought to understand the connected components across seven sub-indices involving 50 variables of four nation-states. The research focuses on Argentina, Brazil, Australia, and New Zealand since the four countries had accessible tourism backgrounds at different levels. The selection was based on a convenience sample of the collaborative research team who had in-depth knowledge of the field and the availability of data. As it was shown, statistics, policy and legal frameworks provide the foundations for the implementation of accessible tourism provision in the four countries.

This paper seeks to ambitiously construct an exploratory nationally comparative Tourism Accessibility Index (TAI) through developing an objective set of metrics in the spirit and intent of the CRPD as it relates those aspects of the physical environment, information and transport accessibility (Article 9) to tourism (Article 30). It also contributes in the collection of data, internationally comparable on disability and its related services (Global Disability Action Plan 2014–2021, WHO, 2013), and with Disability and the Millennium Development Goals (UN, 2010).

The methodology proposed provides a contribution to reach an innovative and validated approach to measure Tourism Accessibility in a broad sense for each nation-state. Some research has studied accessibility and tourism cross-country comparison (Domínguez et al., 2015; Freeman & Selmi, 2010; Williams, Rattray, & Grimes, 2007). However, just a few previous studies have examined accessibility in tourism from a competitiveness perspective in a single country and its regions (Madeiro Barbosa, 2008), two countries and their regions (Dominguez et al., 2015), and six countries from the same continent (Porto & Rucci, 2018). This study is the only work that compares four countries from two continents with different statistical and sociocultural contexts and analyzes a period of time of twenty-five years (1990–2015), which allows the analysis of the change of the disability paradigm through the accessible tourism performance of countries. In doing so, this study involves information that is regarded as comparable across the nation-states. Hence, methodologically one of the main complexities of such an exercise is the challenge of the availability of similar data across countries. This contribution was also made possible by having a research team able to scan the literature across English, Spanish and Portuguese languages and using insights from sources that would otherwise have been unavailable to any single language study.

The construction of the index deals with the theoretical issues discussed in the literature review. The index computes problems related to the importance of international tourism and population with disability, the legal framework, the political will and policy actions of governments, and the access conditions to touristic attractions. Hence, the index is a tool that shows: i) the political will of the countries through the existence of laws that establish rights; ii) the implementation (or not) of such willingness, through the presence of organizations that design and develop policies with persons with disabilities in mind; and, iii) the conditions of access at tourism attractions and World Heritage Sites (UNESCO). The tourism sector is a critical stakeholder to deliver products and services to this group. Nevertheless, sometimes, attitudes of the industry, and their product and experiential offerings could not reach the minimum standard of what is regarded as accessible and
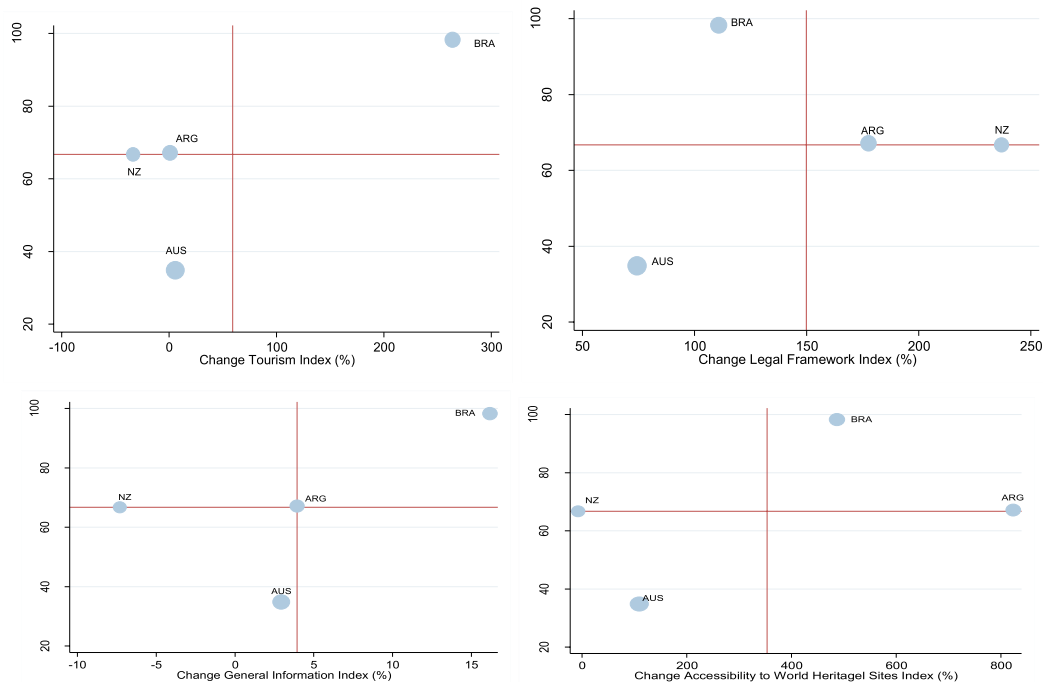
Fig. 5. Change in Tourism Accessibility Index (%) and change in the main sub-indices (%).

inclusive for people with mobility, vision, hearing and cognitive disabilities. For the products and services to offer a requisite level of equitable, dignified and independent access, all stakeholders must be deeply engaged across government, the private sector and the non-for profits. In this way, access and inclusion move beyond compliance to our valued series of market segments based on embodied experiences. For example, specialist providers for people with mobility, vision, hearing and cognitive disabilities have developed across many destination regions to service the influx of people with disability traveling. However, unless the requisite components identified by the TAI are present, then the provision of products and services is lacking (see Small (2015) for innovative business development for people with vision impairment).

The results indicate that Australia has the highest accessibility value of the index for tourists with disabilities in the five periods. Argentina ranks second in 1990 but loses its position after 2001 as a consequence of the major social-economic crisis of that year, so the country ranked third in 2015. Brazil has the second place in 2015 while New Zealand has the lowest ranking of the TAI from 1990 to 2015. Although the four countries have improved their levels of accessibility, the countries of South America have performed better.

As discussed in the methodology, this paper was reliant on the information for the components to be available. New Zealand proved to be the most difficult of the case areas to collect data and the awareness of these issues may in themselves create an environment for improving the situation in its context. This is not dissimilar to the major improvement in global disability statistics that occurred with the publication of the World Health Organization and World Bank publication of global disability statistics (2011). However, this ranking for New Zealand is consistent with the only two previous studies examining disability, tourism and accessible tourism (Gillovic & McIntosh, 2015; Rhodda, 2012). Given New Zealand's reliance on tourism and international reputation for tourism marketing, and its human rights legal framework, this is somewhat perplexing.

The Legal Framework Index has the highest weight in the global index. In this way, it can be considered that the laws and norms that regulate the rights of tourists (with and without disabilities) are the main variables that affect the level of tourist accessibility in these

countries. This finding reinforces the importance of the CRPD as both a foundation for having the necessary legal frameworks in place to have an environment where the political will can be tested through human rights actions. While the CRPD assists advocates to put pressure on nation states to provide the relevant accessibility requirements under Articles 9 and 30, it also creates a similar environment as long as the metrics collected can be compared. This paper offers an opportunity for the international community to have such an understanding of the tourism and transport area for people with disability. Further, these then create the environment for the next two areas of the importance of infrastructure and the importance of tourism in the economy that also have a high weight in the index.

6.1. Limitations and conclusion

The main limitation of this research is the availability of information about disability, tourism, and accessible tourism issues. The analysis was based on the information that was publicly available, but as stated, this first attempt needs further investigation and development (e.g., the inclusion of accessibility to public transport, airport, among others). Although those things are on the political agenda and the collection of data and statistics is a requirement of different international organizations (UN CRPD, 2006; WHO, 2011), the absence of accessibility information is a noted omission by authorities that creates a barrier for people with disabilities in planning their trips. The other noted limitation was to focus wholly on World Heritage Sites as an indicator of tourism accessibility. The rationale was that these sites are standardized across national boundaries by having the same set of criteria for designation and management. For further studies, touristic elements could be expanded to include major cultural venues, a top ten of attractions visited in each country, hotels as facilitators of stays for a high proportion of people with a mobility disability or other such metrics that would be comparable across nations.

The limitations of this study will also show that there is an opportunity for the National Tourism organizations to show leadership to improve the sector's approach to addressing these significant issues across all areas of accessible destination competitiveness. Specific and detailed information is required by people with disability in order to

make an informed consumer choice to travel to a region. If that information is not available for travel planning then the intention to travel is not converted into a purchase decision. As such, it is an opportunity for tourism organizations, both public and private sector, and the non-for profit sector (disability and tourism related) to enhance accessibility and open their markets to the world with a well thought out a strategic approach to the different market segments of the group.

methodology to measure the accessibility of tourism throughout the countries and collaboratively wrote the first draft of the manuscript. Ana Clara Rucci worked on the collection of data from the different countries, helped by Barbara Almond and Simon Darcy. Natalia Porto and Noelia Garbero carried out the implementation of the methodology and the analysis of the dataset. All authors provided critical feedback and helped shape the research, analysis and manuscript.

Author contributions

Natalia Porto, Ana Clara Rucci and Simon Darcy developed the

Appendix

Table A1
Conceptual definitions

1990–1995		1996–2000		2001–2005		2006–2010		2011–2015	
Australia									
Source	Categories	Source	Categories	Source	Categories	Source	Categories	Source	Categories
1993 Australia Social Trends	Disability	1998 Disability, Ageing and Carers, Australia Survey	Physical	2003 Disability, Ageing and Carers, Australia Survey	Physical	2009 Disability, Ageing and Carers, Australia Survey	Physical	2015 Disability, Ageing and Carers, Australia Survey	Sensory (Hearing, Vision)
	Handicap		Mental		Mental		Mental		Intellectual
+65		All population		All population		All population		All population	Physical Psychosocial Head injury, stroke or acquired brain injury
New Zealand									
		1996 NZ Disability Study	Sensory (Hearing, Vision)	2001 NZ Disability Study	Sensory (Hearing, Vision)	2006 NZ Disability Study Highlights	Sensory (Hearing, Vision)	2013 NZ Disability Study Highlights	Sensory (Hearing, Vision)
		+15		+15		+15		All population	
		The data for total population includes adults and children	Physical (Mobility, Agility)	The data for total population includes adults and children	Physical (Mobility, Agility)	The data for total population includes adults and children	Physical (Mobility, Agility)		Physical (Mobility, Agility)
			Intellectual Psychiatric/psychological Other		Intellectual Psychiatric/ psychological Other		Intellectual Psychiatric/ psychological Other		Intellectual Psychiatric/ psychological Other
Argentina									
		Complementary Disability Survey 2002	Disabilities:			INDEC (2010)	Difficulties in:		
			Visual (blind, difficulty in seeing)				Seeing, even if wearing glasses* Hearing, even if using a hearing aid* Walking or climbing steps*		
			Hearing (deaf, difficulty in hearing)						
			Speaking difficulty						
		Not all population	Physical (inferior, superior, both)			All population	Doing daily activities. Mental/ Intellectual 2 difficulties or more (with/ without mental problems)		
			Mental (developmental delay, mental problems)						
			Other 2 disabilities/3 disabilities or more						

(*continued on next page*)

Table A1 (*continued*)

1990–1995		1996–2000		2001–2005		2006–2010		2011–2015	
Australia									
Source	Categories	Source	Categories	Source	Categories	Source	Categories	Source	Categories
Brazil									
IBGE 1991 All population	Mental	IBGE (2000) All population	Disabilities: Mental			IBGE 2010 All population	Difficulties in: Doing daily activities. Mental/ Intellectual		
	Sensory (blinds, deaf-and-dumb)		Able to see**				Seeing, even if wearing glasses*		
	Physical		Able to hear**				Hearing, even if using a hearing aid*		
	2 disabilities or more		Able to walk/climb?**				Walking or climbing steps*		
			Other (Total/Leg/in both sides of the body paralysis, lack of body, none of them)						

Source: Developed by authors based on INDEC 2001, 2010; IBGE, 1991, 2000, 2010; ABS, 1993, 1998, 2003, 2009, 2015; Stats NZ, 1996, 2001, 2006, 2013.
Notes: * no difficulty, some, a lot, cannot do at all; ** inable, a lot of difficulties, some difficulty, no difficulty.

Table A2
Methodology to measure accessibility in WHS.

Criteria	Yes	No	NA*
Information availability			
Is accessibility information available on the official website? (e.g. official website of the local/provincial/national tourism organization, WHS website, research publication, travel guide, etc.)			
Is accessibility information available on non-official websites? (e.g. blogs, social networks, etc.)			
WHS facilities			
Is the staff trained to attend people with disabilities requirements?			
Access facilities are provided? (e.g. PWD parking, accessible seating, ramps, accessible toilets, etc.)			
Touristic Use			
Are mobility aids, devices, assistive technologies, or other forms of assistance, support services and facilities provided for people with physical disabilities? (e.g. caddy, wheelchairs loan, etc.)			
Are mobility aids, devices, assistive technologies, or other forms of assistance, support services and facilities provided for people with hearing disabilities? (e.g. Signal Language tours, videos with subtitles, tactile sign language, Hearing Loop, etc.)			
Are mobility aids, devices, assistive technologies, or other forms of assistance, support services and facilities provided for people with visual disabilities? (e.g. audio-guide tour, tactile sign language, Braille, tactile maps, etc.)			
Are specific tourism activities for people with disabilities? (e.g. activities for children with mental disabilities, access program, adapted activities, etc.)			

Source: Rucci, 2018.

Table A3
Tourist Accessibility Index. Components and Weights

Sub-Index	Weight
General Information Index (GII)	0.12
Per capita GDP	0.48
HDI	0.51
PWD Index (PWDI)	**0.04**
Tourism Index (TI)	**0.15**
International tourism expenditure (% total imports)	0.20
International tourism receipts (% total exports)	0.31
Tourism inbound (millions dollars)	0.15
Tourist arrivals	0.21
Tourist departures	0.10
Accessibility to World Heritage Sites Index (APSI)	**0.13**
World Cultural Sites PA (% World Cultural Sites)	0.07
World Natural Sites PA (% World Natural Sites)	0.08
World Heritage IA (% World Heritage)	0.09
World Cultural Sites IA (% World Cultural Sites)	0.10
World Natural Sites IA (% World Natural Sites)	0.08

(*continued on next page*)

Table A3 (*continued*)

Sub-Index	Weight
World Heritage FA (% World Heritage)	0.06
World Cultural Sites FA (% World Cultural Sites)	0.10
World Natural Sites FA (% World Natural Sites)	0.08
World Heritage PA (% World Heritage)	0.06
World Mixed Sites PA (% World Mixed Sites)	0.08
World Cultural Sites NA (% World Cultural Sites)	0.02
World Mixed Sites NA (% World Cultural Sites)	0.11
Legal Framework Index (LFI)	**0.31**
Vocational Rehabilitation and Employment of PWD (1983)	0.13
PWD main Law	0.13
Tourism accessible Law	0.07
Accessible Tourism Program	0.07
UN CRPD (2006)	0.12
Optional Protocol (2006)	0.12
Inter-American Convention for the Elimination of all Forms of Discrimination against PWD (1999)	0.08
PWD in National Constitution	0.13
Tourism National Organization	0.06
PWD Program-Plan	0.04
Infrastructure Index (II)	**0.16**
Nº Domestic Airport	0.32
Accommodation with accessibility (% of rooms)	0.33
Nº International Airport	0.34
Stats & Availability of Information Index (SAII)	**0.06**
Information in web sites	0.16
Books/Guides of Accessible Tourism	0.20
Statistics	0.24
Building Code/Accessible transport law	0.38

Source: Developed by author

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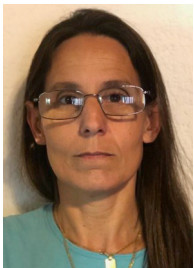
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