An analysis of the most used websites in Portugal regarding accessibility web in the tourism sector

Un análisis sobre accesibilidad web de los sitios web más utilizados en el sector turístico en Portugal

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ABSTRACT. Technologies have been experiencing strong growth in the tourism industry, mainly with the use of emerging technologies. This growing predominance is based on web 2.0 with regard to communication and also the semantic web, allowing an easy integration be-tween the tourist entities involved. However, are web tools designed and coded proper-ly, for use by people with disabilities? This article aimed to present the results of acces-sibility on the websites of tourism. Each home page was analyzed in terms of web ac-cessibility from the World Wide Web Consortium (W3C). It has been found that the ma-jority of home pages fail in one or more W3C web accessibility measures, which means that users with disabilities may have substantial problems accessing the websites. Several suggestions on how to improve the accessibility of the websites are offered. This study contributed to the discussion on the use of tourism technologies by people with disabilities.

RESUMEN. Las tecnologías han experimentado un fuerte crecimiento en la industria del turismo. Este predominio creciente se basa en la web 2.0 con respecto a la comunicación y también en la web semántica, lo que permite una fácil integración entre las entidades turísticas involucradas.
Sin embargo, ¿las herramientas web están diseñadas y codificadas correctamente para que las utilicen las personas con discapacidad? Este artículo tuvo como objetivo presentar los resultados de accesibilidad en los sitios web de turismo. Cada página de entrada se analizó en términos de accesibilidad web del World Wide Web Consortium. Se ha encontrado que la mayoría de las páginas de entrada fallan en medidas de accesibilidad, o sea, los usuarios con discapacidades pueden tener problemas sustanciales para acceder a los sitios web. Se ofrecen varias sugerencias sobre cómo mejorar la accesibilidad de los sitios web. Este estudio contribuyó a la discusión sobre el uso de tecnologías turísticas por personas con discapacidad.

KEYWORDS: Accessible tourism, WCAG 2.0., Websites, Digital transactions, Accessibility web, Semantic Web.

PALABRAS CLAVE: Turismo accesible, WCAG 2.0., Sitios web, Transacciones digitales, Web de accesibilidad, Web semántica.

1. Introduction

Tourism has a strategic importance for the economy and cultural enrichment of the countries. Ac-cording to the World Travel & Tourism Council (WTTC) (World Travel & Tourism Council, 2019), tourism grew by 8.1% in Portugal in 2018, achieving the highest growth rate among European Union (EU) countries and also one of the highest among all European countries. In 2018 the tourism sec-tor represents 8,2% of GDP (Gross Domestic Product) in Portugal.

The Development of tourism is very closely linked to the development of ICT. In fact, since the 1990s, the wide adoption of the internet created new opportunities of communication and ways of approaching tourists directly, causing the Internet to start reconfiguring the structure of tourism sectors (Infante-Moro, Infante-Moro & Gallardo-Pérez, 2020; González, 2019; Ríos, Ortega & Matil-la, 2016; Buhalis & Law, 2008).

They allowed, on the one hand, increased sales, shortening distances with customers and conse-quently improved services and, on the other hand, allowed customers and suppliers to market di-rectly, gaining time and credibility. An example of this transformation is the change in the commer-cialization of tour packages, bookings of hotel reservation flights, among others.

According to Tim Berners-Lee, W3C, Director and inventor of the World Wide Web "The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect". With the Web, the impact of disability is radically changed because the "Web removes barriers to communication and interaction that many people face in the physical world" (W3C, 2019).

According to W3C web accessibility means that people with disabilities can perceive, understand, navigate, and interact with websites and tools and that they can contribute equally without barriers.

Accessibility addresses discriminatory aspects related to equivalent user experience for people with disabilities, including people with age-related impairments.

When it comes to accessibility applied to Tourism, this concept should be seen as a need to adapt the tourism web services, making them more accessible and more focused on the concrete and individual needs of consumers while tourists (Devile, 2009).

Sometimes people just assume that the Internet is accessible to everybody. This is a wrong as-sumption. According to WAI (Web Accessibility Initiative) "when websites, applications, technolo-gies, or tools are badly designed, they can create barriers that exclude people from using the Web" (W3C, Web Accessibility Initiative, 2019).

The present paper is mainly exploratory. As state, above, it focuses on digital services for every-one.

The W3C proposed metrics to evaluate web accessibility. It defined three conformity levels A, AA and AAA that can be assessed by reviewing the Web Content Accessibility Guidelines. Level A is the most basic web accessibility features, level AA is the biggest and most common barriers for disabled users and AAA is the highest and most complex level of web accessibility.

To further promote accessibility on the Web, W3C provides conformance logos for Web Content Accessibility Guidelines. According to W3C and/or WAI these logos "will help raise awareness of accessibility issues., certified with the affixation of one of the W3C logotypes" (see table 1).

WAI-A WCAG 1.0	WAI-AA WCAG 1.0	WAI-AAA WCAG 1.0
Level "A": all Priority 1 check-points are satisfied (NGA Plan Website, Accessibility, 2019).	Level "Double-A": all Priority 1 and 2 checkpoints are satisfied (NGA Plan Website, Accessibility, 2019).	Level "Triple-A": all Priority 1, 2, and 3 checkpoints are satisfied (NGA Plan Website, Accessibility, 2019).

Table 1. W3C Compliance Logos. Source: Self-made.

This study presented the results of an accessibility evaluation of tourism websites through an adap-tation of the WCAG Evaluation Methodology to allow the usage of two automated tools.

After reviewing websites, we find that web accessibility is not yet a concern for webmasters. Alt-hough 4 websites respect the guidelines of the AAA Level (W3C, Web Content Accessibility Guide-lines, 2019).

The present paper is structured in four sections. After the introduction, a brief description of the theoretical background was described, followed by section 4 with the research methodology used. Finally, we close the paper with conclusions and perspectives in Section 4.

2. What does Website accessibility mean?

Web accessibility

Since 1990s the World Wide Web Consortium's (W3C) Web Accessibility Initiative (WAI) set out to provide an international standard defining Web content accessibility for people with disabilities. The term accessibility of digital information was mainly disseminated with the publication of WCAG 1.0.

In 2003, the international standard defined by ISO 16071:2003 considers accessibility to be "the usability of a product, service, environment, or facility by people with the widest range of capabili-ties" (International Organisation for Standardisation ISO 16071:2003, 2003).

In 2006, Hornbaek noted that accessibility must also be measured according to the parameters of efficacy, efficiency, and satisfaction for the type of user (Hornbaek, 2006).

A new concept of accessibility appears is WCAG 2.0. It marks a great change in the philosophy of website accessibility. It defines the context of the software platform, and the accessibility can be evaluated only in this context.

According to the W3C, web accessibility is "universal web access, independent of hardware, soft-ware, network infrastructure, language, culture, geographical localization user capabilities". (Inter-national Organization for Standardization, Ergonomics of human-system interaction - Part 171: Guidance on software accessibility, ISO 9241-171:2008, 2019).

The basic principles of we accessibility allow improving web access not only for disabled people but also for any other individuals that otherwise could be excluded by software, hardware or cultural differences (W3C, Web Accessibility Initiative, 2019).

The WAI defines guidelines for the assessment of accessibility levels of websites, helping not only to improve web accessibility but also facilitating the development of tools for reviewing and even repairing websites. The WAI also advocates the importance of web accessibility and contributes to the education of web developers (W3C, Web Accessibility Initiative, 2019).

WAI provides a development guide for the web and its contents, guiding it to accessible design and reducing the barriers to information access (Reid, Vanderheiden Cooper & Caldwell, 2008). Four basic principles define the basis of the proposed metrics:

Principle 1) Perceivable. Information and user interface components must be presented to the us-ers in a perceivable way.
Principle 2) Operable. User interface components and navigation must be operable.
Principle 3) Understandable. Information and operation of the user interface must be understanda-ble.
Principle 4) Robust. Content must be robust enough that it can be reliably interpreted by a wide va-riety of user agents, including assistive technologies.

Websites can be categorized according to their accessibility rating, that is, their agreement with the WCAG 2.0 principles, guidelines and satisfaction criteria (Reid, Vanderheiden Cooper & Caldwell, 2008; W3C, Web Content Accessibility Guidelines, 2019 & NGA Plan, Accessibility, 2019). These website accessibility levels are:

Level A) Fulfills all satisfaction criteria present in the initial level.
Level AA) Satisfies all the criteria in Level A and AA or provides an alternative version compliant with this level.
Level AAA) Satisfies all criteria in Levels A, AA and AAA, or provides an alternative version compli-ant with this level.

Over the last years, the implementation process of these guidelines into binding regulations within the European Union has started: All member states have committed themselves to transform the WAI guidelines into national law.

Web accessibility of tourism websites

Nowadays the preparation of a trip can already be done anywhere in the world, something that was not possible in the past. This is large because technology is in a high state of development and the great importance that Information and Communication Technologies (ICT) currently have in the tourism industry (Koo, Gretzel, Hunter & Chung, 2015). This constant development of technologies will give users greater freedom from the constraints they experience when using the desktop (Abowd, Atkeson, Hong, Long, Kooper & Pinkerton, 1997).

Koo, Gretzel, Hunter & Chung (2015) consider that there has been an evolution of information tech-nology (IT) in the tourism sector, from a wired connection via the Internet to a wireless connection connected by mobile devices. Applications, or also known as App, are software designed for mobile devices that consist of mobile service delivery (Dickinson, Ghali, Cherrett, Speed, Davies & Nor-gate, 2014).

Nowadays, the most common forms of mobile technologies are smartphones/tablets, smart cards (that can run multiple applications but are typically used for payment, travel and secure area ac-cess) and wearable computers (Jhajharia, Pal & Verma, 2014).

However, it is a fact, that technologies are designed in such a way, that they cannot be read or used by everybody. This is especially true for people with disabilities. They need support that is specifically tailored to their individual needs. In this regard, IT offers good possibilities to overcome the limitations of traditional media with the help of disability-compensating techniques and technolo-gies.

Tourists with disabilities come across many barriers when scheduling, booking, and taking a trip. Planning a trip for people with disabilities can be very difficult or even impossible without help from others.

3. Methodology

This study uses an exploratory study, with a qualitative and quantitative approach, to perceive a situation of the tourism websites most used by the Portuguese regarding web accessibility.

The question that needed to be answered to build such a model could be phrased as follows: "Are the tourism websites available for all?"

The methodology used in this study was based on the W3C WCAG 2.0 recommendations. This methodology presents the sequence of actions performed and the adaptations necessary for this particular study.

Phase One) Define the evaluation goals

In this phase, we have to define the compliance level of the evaluation and the tool that will support the evaluation.

For the compliance level, we decided to evaluate the AAA level. We chose an evaluation at the level AAA because if the website satisfies the Level AAA conformance, then it satisfies all the Level A, Level AA and Level AAA Success Criteria.

With regards to the tool, we opted to perform an automatic evaluation using AChecker (Achecker, 2019). It is an online inspection tool of the WCAG 2.0 recommendations (Reid, Vanderheiden Cooper & Caldwell, 2008). It is frequently used by researchers, such as (Gambino, Pirrone & Gior-gio, 2016, Marques, Guilhermino, Cardoso, Neitzel, Lopes, Merlin & Striquer, 2016). When we didn't use AChecker we used Wave. "WAVE is a web accessibility tool that can greatly assist in the eval-uation of web content" (Wave, 2019).

Phase Two) Explore the pages of the websites

Identify which are the main pages of the portal. This study opted to focus on the home page of each website. The criteria used for the page's selection was the URL provided by the SimilarWeb tool.

Phase Three) Sample page selection

As the study had exploratory characteristics, it did not use a survey to define the web pages to analyze. The websites to analyze were selected using the SimilarWeb automated tool. SimilarWeb is a tool which provides web analytics services for businesses such as measurement, collection, analysis and reporting of web data (SimilarWeb website, Market Intelligence Solutions, 2019).

Phase Four) Define the document for data registration

This study used a spreadsheet to consolidate the data generated by AChecker. In the AChecker tool, it is possible to select the compliance level to evaluate (A, AA or AAA). It is also possible to choose the specification to use: WCAG 1.0, WCAG 2.0. In this study, the A, AA and AAA levels were evaluated, based on the WCAG 2.0 specification (W3C, Web Content Accessibility Guidelines, 2019).

Phase Five) Evaluate the selected page sample

The home page for each website was analyzed by AChecker and/or Wave. A summary report of the analysis was generated by the tool, containing the number of known problems to be corrected and other aspects, namely HTML validation and CSS validation. The report information was catego-rized by each

WCAG 2.0 checklists.

4. Analysis and discussion of results

The free use of the SimilarWeb tool gives us an orderly list of the 5 most used websites by the Por-tuguese, grouped by categories (we selected the subcategories: Accommodation and hotels; Air travel; Car rentals; Ground transportation; Tourism attractions; Transportation and excursions from the travel and tourism category).

We tested the 30th most used tourism websites in Portugal, according to the SimilarWeb tool (see table 2). The accessibility analysis tools used AChecker and Wave, as mentioned in the methodolo-gy section.

Category	Order number	Web address	Responsive (Y/N)	Accessibility errors
Accommodations and Hotels	1	https://www.booking.com	S	180
	2	http://airbnb.pt	S	0
	3	http://TRIVAGO.PT	S	6
	4	https://www.airbnb.com	S	0
	5	https://pt.hotels.com/	S	1
Car Rentals	6	https://www.rentalcars.com/	S	26
	7	https://www.europcar.pt/	S	551
	8	https://www.autoeurope.pt/	S	3
	9	https://www.algarserra.com/	S	60
	10	https://www.avis.com.pt/	S	0
Air Travel	11	https://www.flytap.com/en-pt/	S	144
	12	https://www.ryanair.com/ie/en/	S	0
	13	https://www.easyjet.com/en/	S	39
	14	https://www.amadeus.net/home	S	3
	15	https://www.flytap.com/en-pt/	S	*
Travel and Tourism	16	https://www.cp.pt	S	23
	17	https://viagens.sapo.pt/	S	68
	18	https://www.edreams.pt/	S	58
	140	https://www.tripadvisor.pt	S	*
	20	https://www.momondo.pt/	S	*
Travel and Tourism > Tourism Attrac-tions	21	https://www.viator.com/	S	89
	22	https://www.zoomarine.pt/pt/	S	29
	23	https://www.getyourguide.pt/	S	6
	24	http://www.disneylandparis.pt/	S	11
	25	https://www.algarvefun.com/	S	*
Travel and Tourism > Transportation and Excursions	26	https://www.megabus.com/	S	4
	27	https://www.sleepinginair-ports.net/	S	16
	28	https://www.itasoftware.com/	S	7
	29	https://new.mta.info/	S	2
	30	https://www.thetrainline.com/	S	15

* Unable to parse

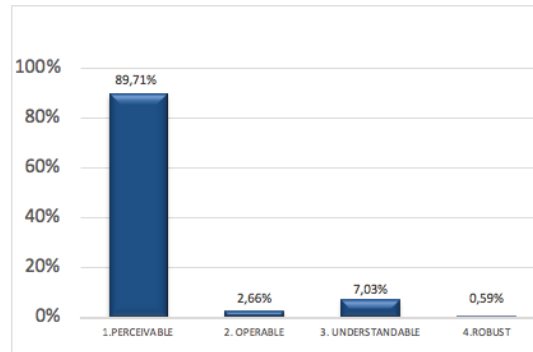Table 2. Websites analyzed. Source: Self-made.

Preferably the analysis tool used was AChecker. The wave was only used when AChecker was unable to be used due to an error in the website or because it did not present errors in AChecker. The data was collected in 2019, from May to July.

Our study aimed to analyze the accessibility and responsiveness of websites. As for responsive-ness, all sites showed positive results.

As for accessibility, we chose to use the more advanced level WCAG 2.0 (Level AAA), we found several sites with errors, but we also found sites without errors and with a recommendation for their certification. The AChecker tool itself recommends that sites that do not have any errors apply for certification and put this information on the website itself.

About the principles, the highest frequency of errors found corresponds to principle 1 "1- PERCEIVABLE", as illustrated by Graphic 1 – Type of errors.
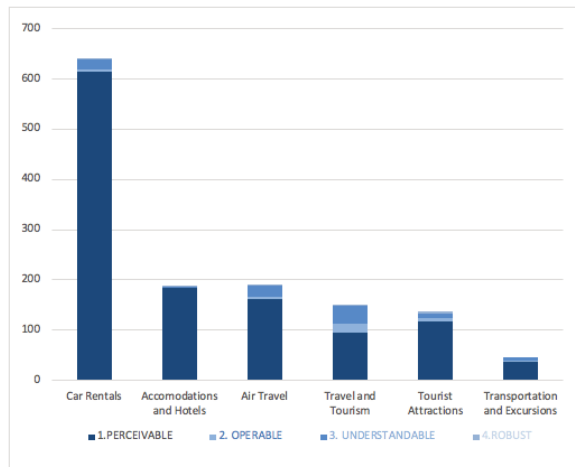

Graphic 1. Errors by Principle. Source: Self-made.

Analysing each of the categories of sites and according to table 3, the most common errors are type 1, as mentioned earlier, followed remotely by type 3.

Site Type	Total	1.Perceivable	2. Operable	3. Understandable	4.Robust
Car Rentals	640	615	5	20	2
Accommodations and Hotels	187	184	1	2	1
Air Travel	186	162	5	21	1
Travel and Tourism	159	96	17	36	2
Tourist Attractions	135	118	6	10	2
Transportation and Excursions	44	37	2	6	0
Total	1351	1212	36	95	8
Percentage	100%	89,71%	2,66%	7,03%	0,59%

Table 3. Errors by principle. Source: Self-made.

The category with the most accessibility issues is "Car Rentals" with 640 errors, 615 Type 1 and 20 Type 3, followed by Accommodations and Hotels with 187 of which 184 are Type 1 and 2 Type 3, Air Travel with 186 errors, of which 162 Type 1 and 21 Type 3, Travel and Tourism with 159 Errors, 96 Type 1 and 36 Type 3, Tourism Attractions with 135, 118 Type 1 and 10 Type 2 and finally the category with the least errors - Transportation and Excursions with 44 errors, 37 Type 1 and Type 3 6, as also illustrated in Graphic 2.

Graphic 2. Errors by Category and Principle. Source: Self-made.

We can also analyse for each category, which guidelines have the highest incidence of errors for each type of error, according to table 4.

Site Type	Nr.Errors	1.PERCEIVABLE	1.1	1.3	1.4	2.OPERABLE	2.4	3.UNDERSTANDABLE	3.1	3.3	4.ROBUST	4.1
Car Rentals	640	615	505	53	57	5	5	20	3	17	2	2
Accomodations and Hotels	187	184	104	20	60	1	1	2	0	2	1	1
Air Travel	186	162	115	27	20	5	5	21	2	19	1	1
Travel and Tourism	159	96	11	25	60	17	17	36	0	36	2	2
Tourist Attractions	135	118	105	4	9	6	6	10	4	6	2	2
Transportation and Excursions	44	37	4	18	15	2	2	6	0	6	0	0

Table 4. Errors by Guideline/Type of error. Source: Self-made.

Guidelines descriptions:

1.1) Text Alternatives: Provide text alternatives for any non-text content
1.3) Adaptable: Create content that can be presented in different ways (for example simpler layout) without losing information or structure
1.4) Distinguishable: Make it easier for users to see and hear content including separating fore-ground from background
2.4) Navigable: Provide ways to help users navigate, find content, and determine where they are
3.1) Readable: Make text content readable and understandable
3.3) Input Assistance: Help users avoid and correct mistakes
4.1) Compatible: Maximize compatibility with current and future user agents, including assistive technologies

From the table presented (table 4), we can see that for the type of error Perceivable, the occur-rences of error occur mainly in guideline 1.1 (69.6%), followed by guideline 1.4 (20%) and guideline 1.3 (10%). As for the Operable type errors, all errors occur in the guideline 2.4 (100%). For Under-standable type errors, almost

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all errors are focused on the guideline 3.3, with 90% and only 10% occur on guideline 3. 1. Type 4 Robust errors appear in their entirety on guideline 4.1.

5. Conclusions and future work

In this study, we used an exploratory study, with a qualitative and quantitative approach, to perceive the situation of tourism websites regarding Web accessibility. A website accessibility evaluation tool was used in the analysis, according to Web Content WCAG 2.0, Conformance Level AAA (W3C, Web Content Accessibility Guidelines, 2019).

Regarding website responsiveness, we found that all sites were indeed responsive.

Considering web accessibility assessment, the study proposed an adaptation of the WCAG Evalua-tion Methodology to apply one or two automated inspections of tourism websites based on the de-fined satisfaction criteria.

The results of the study showed that the most violated principle on tourism sites is "PERCEIVABLE". However, we found 4 websites without errors. Achecker (2019) recommends certification for these sites. It also allowed us to conclude that using these tools allows, with little effort, to improve the web accessibility of websites.

Much remains to be done in this area, such as implementing more prescriptive laws and regula-tions, complying with mandatory benchmark standards and/or having external agencies audit web-site designs.

Technology needs to be put at the service of people namely the people with disabilities. This tech-nology may include text alternatives for any non-text content; creation of content that can be pre-sented in different ways; provide ways to help users navigate, find content, determine where they are and navigate websites to maximize compatibility with assistive technologies.

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