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Study of Web Accessibility Issues in Mozambique

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OSLOMET

A. DECLARATION

This thesis project is my original research work carried out as requirement for the partial fulfillment of master's degree of Computer Science under the faculty of Technology Arts and Design at Oslo Metropolitan University and is submitted as my master's thesis project.

Signature: <u>Suraj Gupta</u>   Date: <u>15-05-2020</u>

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F. ABSTRACT

The World Wide Web, also commonly known as the "web", has become an integral part of everyone's daily life. Yet, it is still inaccessible in many ways for different web users. People with disabilities are found most affected by barriers in websites and other web services. In a similar context, this report aims to study the web accessibility issues for people with disabilities as fieldwork in Mozambique and reviews the factors that contribute to it. The case study is based on the results from 3 perspectives: first, automatic evaluation of five prominent national websites, second, user testing and interacting with people with disabilities, and third, interviewing and interacting with web employees in Mozambique. The study found that none of the websites are WCAG 2.1 compatible. Most of the users (people with disabilities) have limited experience using the web and very few of them use assistive technology. The web employees, in general, do not practice web accessibility in the products. The underlying factors responsible for web inaccessibility are found out to be extrinsic and are discussed in the report.

Keywords: Web Accessibility, Website, Mozambique, Disability, Universal Design, Internet, World Wide Web (WWW).

1 INTRODUCTION

The web has made it possible for digital information and services to reach all corners of the world. The essential element of the web is to allow its users, irrespective of any disability, easily access and share the information on it. In this universality lies the power of the web, once said by Tim Berners-Lee, W3C Director and inventor of the World Wide Web (Noh, Jeong, You, Moon, & Kang, 2015, p. 3). However, the problem of universality on the web, also alternatively referred to as inaccessibility on the web has been long-continuing. Web inaccessibility means the web information and services being inaccessible to diverse web users, albeit sometimes, being available to them. Though the web has grown to become an integral part of everyone's daily life, it's been constantly questioned for its inaccessibility issues. And rightly so, numerous web services, applications, and websites remain inaccessible for people with reduced or limited abilities who by far, form the biggest socially marginalized group among the diverse web user groups (Paciello, 2000). The prevalence of web accessibility is found to be lacking when it comes to countries in Africa (Costa et al., 2013), where around 40 percent of the total population suffers from sort of disability, according to the World Health Organization(WHO) (Leiden, 2020). There are various reasons for web inaccessibility, for example, not wisely considering the diverse abilities of users, prejudicing the product to get complex and expensive while considering the wide variety of user groups, being complacent assuming ad hoc population satisfies the customer base, deliberately ignoring or apathetic to a certain group of users, poor regulations on accessibility standards and anti-discrimination laws and legislation in the country and many more. As a result, the benefits of web information and services have not reached all its users in an equal measure thus leaving them socially excluded; more specifically in technical terms, creating a digital divide; digital gap among those who can use the web with those who cannot.

With the growing number of users (including traditionally marginalized groups such as people with disabilities) interacting the web over time, the increased adequacy of web accessibility has become more relevant as to represent all of them (R. Lopes, Gomes, & Carriço, 2010). Out of various kinds of user groups, People with disabilities are found to be on the serious receiving

end who cannot use the web and being affected by web inaccessibility and especially in the third world countries. Not even adequately being able to use the web causes people with disabilities isolated from society, education, health services, and other fundamentals deescalating further in their life(Sida, December 2014). Though the benefits of the web should be for everyone, people with disabilities are still unable to exercise the benefits of the web because of its dearth in accessibility. Once Mike Paciello, the author of the famous book of its kind, "Web accessibility for people with disabilities" stated making IT accessible, the life of people with disabilities could be improved making them participate in the workforce by increasing their independencies and abilities. The potential of IT in economic and social regard is incredible thus making it important it be accessible for people with disabilities (Paciello, 2000). This citation even after around 20 years remains to be addressed in many third world countries, including Mozambique, the country this research work represents.

The book 'Toolkit on Disability for Africa'[1] cites, throughout the globe, including Africa, people with disabilities encounter discrimination, exclusion, and difficulties to enjoy their fundamental rights and participation in the development (United Nations Department of Economic and Social Affairs, 2019, p. 3). In general, Africa largely faces problems in the field of accessibility in any sector (Oyedemi, 2004). According to WHO, 10 percent of the general African population is estimated to have some sort of disability and even higher, at 20 percent in the poorer regions in Africa (Disabled World, 2018). According to the statistics from the National Census (Maunze et al., 2019) in Mozambique, the country estimates 727620 of its population to have some sort of disability, representing approximately 2.7 percent of the total population in Mozambique. The relevant and mandating area for improved web accessibility, therefore, are the African nations, where the population of disability is relatively higher. On a similar note, this research work presents a case study of Mozambique. In this thesis report, we aim to learn about why the web remains inaccessible for these population groups in Mozambique. National Institute of Statistics of Mozambique defines people disability as,

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[1] The book 'Toolkit on Disability for Africa' is developed by the United Nations Department of Economic and Social Affairs (UNDESA), Division for Social Policy and Development (DSPD) (United Nations Department of Economic and Social Affairs, 2019).

"People with disabilities are those who have impairments of nature physical, intellectual or sensory, which, in interaction with various barriers, can obstruct their full and effective participation in the society like the other people." "[pessoas com deficiência são aquelas que tem impedimentos de natureza física, intelectual ou sensorial, os quais, em interação com diversas barreiras, podem obstruir sua participação plena e efetiva na sociedade como as demais pessoas]" (Maunze et al., 2019, p. 11).

The General Assembly adopted the CRPD resolution, Article 9: Accessibility in 2007 and reissued again as a standalone article in 2014. This article requires its state parties[2] to facilitate the measures to identify and eliminate obstacles and barriers to accessibility in Information, communications and other services, including electronic services (UNCRPD, 2007, p. 8). The convention includes a high proportion of developing countries including Mozambique, as state parties (United Nations Treaty Series, 2006). The UN refers to Information and Communication Technology (ICT) as an umbrella term to include any information and communication devices, applications or its content (Committee on the Rights of Persons with Disabilities, 2014, p. 2). The CRPD focuses to promote a better inclusive society in African regions. The CRPD imparts as to realize the disability as a part of human diversity rather than an individual impairment. Thus the state parties should accommodate all human beings in its diversity by creating an enabling environment that promotes inclusiveness (United Nations Department of Economic and Social Affairs, 2016). Further, Article 21 in The United Nations CRPD[3] defines access to information, as human rights and specifies responsibilities to the government and related authorities in relation to those rights. Availing accessible web information to people with disabilities, therefore, becomes a mandatory aspect on the web. However though, the governments (United States, England, Canada, Portugal, and Australia) mandates some types of government information to be accessible to people with disabilities, thus making the web

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[2] A list of state parties to UNCRPD, can be found at https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=IV-15&chapter=4

[3] "Disability is an evolving concept and that disability results from the interaction between persons with impairments and attitudinal and environmental barriers that hinders their full and effective participation in society on an equal basis with others"(United Nations Department of Economic and Social Affairs, 2016, p. 5). The current convention proposed by the UN emphasizes to "promote, protect and ensure the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities, and to promote respect for their inherent dignity" (United Nations Department of Economic and Social Affairs, 2016, p. 9)

accessibility a requirement for governmental information on the web, setting an example way long before (Slatin & Rush, 2002).

The research on web accessibility in the country of Mozambique has not been done in great depth. While abundant research work on web accessibility exists for South Africa, similar research in a neighboring country, Mozambique is scarce and if it exists, vague. Though we have the guidelines and techniques that can be practiced for enhancing web accessibility, we don't have a study that explains or demonstrate the literature on web inaccessibility in Mozambique. We have studies on the disability population or ICT. But a specific study on disability and how inaccessibility on the web is affecting them is lacking. This provides an opportunity for researchers and scholars alike in this field to submerge themselves in this highly untamed subject of research. Considering all the above-exemplified subjects, it reflects the urgency in the need for improved web accessibility in this part of the world.

This thesis work aims to learn and contribute further to the web accessibility context of Mozambique. This research work is part of the research project of MAP, Norway/Mozambique Accessibility Partnership. The research attempts to analyze the case for the web accessibility issues faced by people with disabilities in Mozambique by empirically basing the undiscovered factors for the analysis. The report chooses different models in the form of research questions to gather information on the inaccessibility faced by people with disabilities in Mozambique. Out of many ways to understand web accessibility in a given place and its population, understanding accessibility in web services is important as it gives the idea of how people with disabilities are using or accessing it. Since websites, by far, are considered the most prominent exponent form of web services, we have chosen to evaluate the accessibility level of the top five most-used different purpose websites that are currently being used in Mozambique. The reason to choose different purpose websites is to have a different and diverse user base. Thus, understanding these user's accessibility issues will be a reliable exponent for our result. The first research question thus in our report aims to find the level of accessibility in the most used five websites in Mozambique against the WCAG 2.1 guidelines.

1.1 To what level do the top five most-used websites in Mozambique meet the web accessibility standards (WCAG 2.1)?

In addition, this research work is carried out mainly through the fieldwork to study the problems in web accessibility in Mozambique through different modes and further tries to analyze a case on how web accessibility can be improved or addressed. The fieldwork aims to find the root causes for web accessibility in the region as the fieldwork provides an opportunity to directly communicate with the focus group related to the research. Thus, understanding these focus groups in their shoes avails us with the information and data that is endemic in the region.

Addressing web inaccessibility in Mozambique firsthand, requires an understanding of what exact problem the people with disabilities are facing in the field of web accessibility. Acquisition of proper information in this regard thus remains prerequisite before any analysis or conclusion can be made. To find this, the same five websites are analyzed for user experience upon various people with disabilities using them. Further, the interactions and interviews with these people with disabilities in Mozambique are performed to understand any other issues in web accessibility. By both evaluating these websites with automatic online evaluation tools and observing users' responses upon their user experience on these websites, a detailed understanding of the inaccessibility issues in the websites can be analyzed. This bases our second research question.

1.2 What user experiences the people with disabilities in Mozambique have in using these websites and other web services they use in general?

There exist tools and practical guidelines recommended by W3C in their Web Accessibility Initiative, WAI on web accessibility. This is a widely accepted prerequisite for the web makers, when practicing web accessibility to address the inaccessibility in web for various user groups. It, therefore, becomes more important to exercise the accessibility guidelines that are in place for the very reason as it promotes and guides web contents towards accessibility. These guidelines are proposed by W3C (World Wide Web Consortium) which is responsible for

regulating and developing web technologies. The most accepted and recognized website accessibility guidelines in place are WCAG 2.1 by W3C (World Wide Web Consortium (W3C), 2018c). This set of accessibility guidelines WCAG 1.0 was first introduced in May 1999 by W3C which has then been revised subsequently to WCAG 2.0 in December 2008 and to WCAG 2.1 lately on June 5, 2018. W3C cites in its official webpage, by following WCAG guidelines, the web content will be accessible to various group of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity and combinations of these. This will also increase the usability of web contents for general users (World Wide Web Consortium (W3C), 2018c). "*Web accessibility[4] is the concept of providing web content that is universally accessible to different machines and people with different ages, skills, education levels, and abilities*" (Kamal, Alsmadi, Wahsheh, & Al-Kabi, 2016, p. 113). Web accessibility is an important topic in web development because it empowers people with disabilities or people with special needs to use the web (Kamal et al., 2016). The WCAG v.2 has four principles: Perceivable, Operable, Understandable, and Robust. There are further 12 more specific guidelines under each of these principles. And along with each guideline, there are requirements primarily known as testable success criteria. These success criteria are categorized in three different yet interrelated and dependent conformance levels namely A(lowest), AA (mid), AAA (highest). Thus, satisfying the specific conformance level in the websites fulfills the requirements for the given specific circumstances (World Wide Web Consortium (W3C), 2018c). This approach impels webmaster to universally design their web services and products so that they can be used by the whole population. In addition, there also exist methodologies and approaches emphasizing the disabilities-inclusive design process. Some of the commonly preferred design methodologies are User-Centered Design (UCD), User-Sensitive Inclusive Design (USID), Design for User Empowerment (DUE), Ability-Based Design (ABD), Universal Design (UD). All these methods are centered around focusing on people with disabilities in the design process and emphasize making design accessible (Shinohara, Bennett, & Wobbrock, 2016). Despite having the guidelines and methodologies in existence it is hard to understand why many web services and

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[4] Web accessibility means that people with disabilities can use the Web. More specifically, web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the Web (Henry, 2006, p. 2).

products remain inaccessible in Mozambique. Various research work has also found that the inept knowledge and skills of web developers in the field of accessibility design are to be blamed for the cause of the web is inaccessible most of the time around the world (Baguma, Wanyama, Bommel, & Ogao, 2007), (Lazar, Dudley-Sponaugle, & Greenidge, 2004) and (Costa et al., 2013). Thus, one method to identify the shortcomings of accessibility on the web is to understand what approaches the designers follow that makes web inaccessible and why do they follow. Similarly, to find the case in Mozambique the report also aims to understand the level of knowledge and skills the web employees pose in the field of web accessibility. In addition, this paper also aims to discover the factors that influence their approach and practice towards web accessibility which as a product web remains inaccessible to people with disabilities. This forms our last research question.

1.3   What are the factors that influence the web employees' current practice and approach towards web accessibility in Mozambique?

In a brief, the three questions designed will answer its essence and when their results combined collectively it serves the purpose to analyze and understand our main objective to find the causes of web accessibility issues in Mozambique for people with disabilities. The first question will provide the web accessibility results of 5 prominent websites being used and how this is affecting people with disabilities in Mozambique. The second question is designed to empirically observe the issues the people with disabilities face in web accessibility at the place by interviewing, interacting and user testing. And the third and last question will avail us of the barriers the web employees face in practicing web accessibility by interacting and interviewing them. Through these above designed three questions, this report attempts to provide the insights that shape inaccessibility and usability problems in the web for the various user groups of people with disabilities in Mozambique.

These research questions further requiring their implementation are subsequently discussed in the Methodology section.

2 LITERATURE REVIEW

2.1 Related Work on National Legislation and Policy Making, Promoting Web Accessibility.

There have been instances where many nations have acted with national laws for promoting accessibility in ICT. With different practices and approaches, ICT including the web is been addressed with an increasing number of national laws and policies over time (Abuaddous, Jali, & Basir, 2016). The paper reports few of them collected from different sources.

Many European countries have legislation that requires government websites to be accessible (Costa et al., 2013). In Norway, Ministry of Municipalities and Modernization, in 2013 enacted a law known as "Regulation on the universal design of Information and Communication Technology (ICT) solutions", a non-discrimination law to address inaccessibility in ICT solutions in the country (World Wide Web Consortium (W3C), 2018b).

The study from (Noh et al., 2015) in the Republic of South Korea, shows the Anti-Discrimination Act has improved the accessibility concerns on the web. Article 21 of the "Act on the Prohibition of the Discrimination against the Disabled and the Relief of their Rights" and Article 14 of its enforcement ordinances enforced from 2008, in South Korea, has gradually made it mandatory for the public agencies to meet web accessibility compliance. The act enforcement saw an improvement in the number of websites being granted a web accessibility certification (country-defined certification system) from 15 to 127 from the year 2008 to 2013 respectively. In addition, violations of the act have also saw some lawsuits and compensation suit being filed to many kinds of agencies in South Korea because of their website causing inconvenience to the users (Noh et al., 2015). This principally, shows the country serious approach towards web accessibility and compliances of products towards it.

In The United States of America, The American with Disability Act commonly known as ADA came into existence as a product of, over the years of gradual improvements on the nation's Rehabilitation act of 1973, primarily embraced to prohibit discrimination based on disability.

ADA was signed into law in 1990, the new section 508 was amended into law in 1998 that provisioned the Federal government's electronic and information technology be accessible to people with disabilities and further revised in the year 2008 to provide broad protection from discrimination. The new amendment of section 508 stated the need to eliminate the barriers so the new technologies be accessible for the people with disabilities. From a Federal perspective this was aimed at addressing and promoting unbiased and equivalent participation of the citizens in programs, activities and services (Persson, Åhman, Yngling, & Gulliksen, 2015).

In India, the government enacted an official law in 2009 to require the government websites be mandated with the web accessibility guidelines and tools based on W3C recommended (World Wide Web Consortium (W3C), 2018b). The above countries exemplify few nations practices that have facilitated the web accessibility in ICT.

While many countries have developed their own legislations for accessibility, some developing countries do not have it protecting people with disability's rights (Sloan & Horton, 2014). Developing countries in Africa do have stricter web accessibility legislations mandating governmental websites to be accessible (Kuzma, Yen, & Oestreicher, 2009). In the case of Mozambique, the Mozambican government established a national ICT policy commission in 1998. This facilitated the latter in adopting a national ICT policy, simultaneously supplementing its PARPA (Poverty Reduction Strategy Paper), an Action Plan for the Reduction of Absolute Poverty in 2002. In doing so, Mozambique became the first country in southern Africa implementing such act. This was then done mainly to focus on their priority areas of education, human resource development, health, universal access, national ICT infrastructure, and governance to improve and achieve their development goals further (Isaacs, 2007). As a gradual realization of ICT policy, currently, many ICT initiatives have taken place in the areas of e-government, e-health, digital divide (Initiative, 2019). Provided the Mozambique's brutal, colonial history under the Portuguese until 1975, and followed by a recent devastating post-colonial civil war until 1992, Mozambique is only slowly recovering" (Monteiro, 2005). However, after an end to 16-year civil war in 1992, Mozambique is defining itself as the successful country with an immediate peace building process with the series of productive

general elections in 1992, 1999 and 2004 (Japan International Cooperation Agency). Mozambique have shown some promising steps in the field of ICT since then, with major IT project Initiatives throughout the country and African regions which can be found under the URL http://www.ist-africa.org/home/default.asp?page=doc-by-id&docid=5563 (Initiative, 2019). Despite all, the potential improvements in ICT policy relating to web accessibility in specific have not taken place in Mozambique.

We have inadequate study indicating the web masters practices in web accessibility. In case of Mozambique though, no such study has been conducted, prior. The few peripheral studies in regard to web masters practices in web accessibility are either quite old or represent different geographical locations than Mozambique with different participants/user scope. The study which was carried to understand the webmasters perspective, concluded with rather unimpressive results (Lazar et al., 2004). Out of 138 webmasters who were aware of existing automated tools, respondents, only 98 respondents said that their websites are accessible. Another response to the question, whether they were familiar with the governmental laws relating to accessibility? Even though those laws only applied to 43 of the respondents. What more shocking was the response that stated, only 103 of the respondents (out of 175) indicated that their organizations are planning to have accessible web sites in the future. This study demonstrated the naïve concept of webmasters in web accessibility.

A study from (Baguma et al., 2007), on 30 web masters of governmental agencies in Uganda was carried out to find their web design and perceptions on web accessibility on visual impairments in specific. On a disappointing note, 93% of participants reported they don't create any accessible websites, 63% reported not being aware of any web accessibility guidelines. And only one respondent knew if the tools for checking web accessibility exists. These statistics with other results in the study prompted the author to conclude why web accessibility is failing in Uganda. The author argued the lack of relevant laws and accessibility policies in web and internet contributing to web inaccessibility in Uganda as a cause of mainly web practitioners being unaware of accessibility guidelines (Baguma et al., 2007). Rightly so decades ago, Thomas Kalil once a Special Assistant for Economic Policy to President Clinton

said in the book 'Web Accessibility for People with Disabilities' by Mike Paciello's, accessible web cannot be deployed until and unless the web builders understand the importance of making web-accessible and have the technical know-how to do it (Paciello, 2000).

2.2 Disability, Web Accessibility, Universal Design and Mozambique.

2.2.1 Disability and Web Accessibility.

According to the World Health Organization, about 15% of the world's total population has a disability (World Health Organization, 2019). According to the UN, there are as many as thirty-three least developed countries (LCD) in Africa (UN-OHRLLS) and the remaining are still developing ones. In developing countries, People with disabilities makes significant proportion of the poor population (Venter et al., 2002). This portion of the population without web accessibility remains a major issue.

Many people have disabilities of their own from subtle to severe, affecting their web user experience in some way or other. The disabilities types may be myriad and can clog the user experience when using web services, for example, websites. Some of these disability types include visual (blindness, Kalnienk vision, and low vision), auditory (hard of hearing, deafness, and deaf-blindness), speech (low speech, high speech, stuttering problems, influent, articulation problems), physical (arthritis, Parkinson's disease, essential tremor, multiple sclerosis, broken arm), learning (emotional disturbance, intellectual disability, dyslexia), cognitive, and neurological disabilities (Kamal et al., 2016). Users with disabilities use various forms of assistive technology to allow them to browse web sites. Assistive technology supplements the reduced ability of the users. These different types of assistive technologies include both hardware and software such as screen readers, voice recognition, alternative pointing devices, alternate keyboards, and refreshable Braille displays (Paciello, 2000). A report work from (Eide & Kamaleri, 2009) presented the computer assistive technology used by people with disabilities[5] in Mozambique is lowest among assistive technology used in other fields. This can be depicted from the attached screenshot below from the report.

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[5] The disability or functional limitations, or disablement process is the result produced between the exchange of individual restricted functional abilities with the demands of the society and environment (Eide & Kamaleri, 2009).
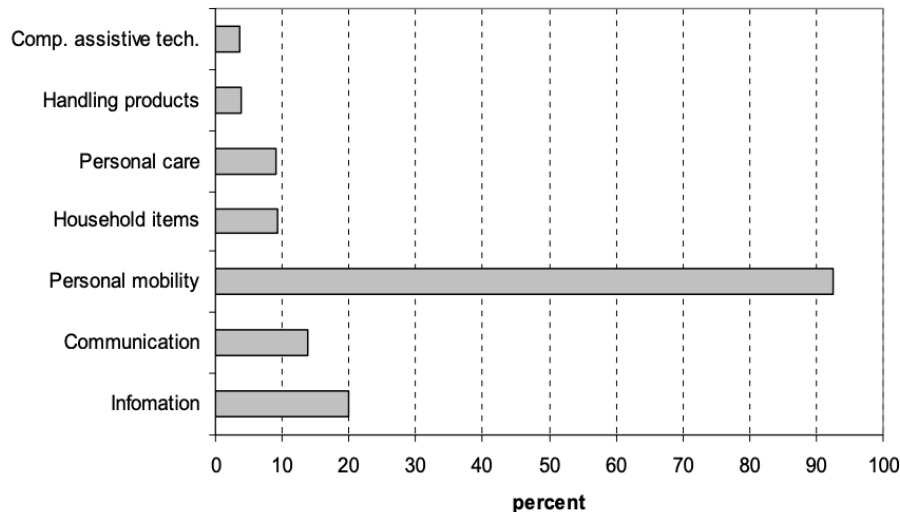
Figure 2-1: A screenshot showing the types of assistive technologies used by users with various functional limitations in Mozambique.

(Image source: (Eide & Kamaleri, 2009))

The websites must adhere to certain design principles to make themselves accessible and compatible to assistive technology. Not all websites are compatible with the usage of Assistive Technology. Only a compatible website with various assistive technology can be used by users with disabilities. A web site that is compatible enough to these assistive technologies is considered an accessible website (Slatin & Rush, 2002). Making the mainstream component compatible with assistive technology is very important. It's well-known the technology changes too quickly, and there are always new coming to the market. One good source to know all about assistive technology can be http://trace.umd.edu. There exists a common misunderstanding that accessibility is only for people with disabilities. Yes, to a higher degree this is one of the prominent reasons to practice web accessibility but there are other important reasons too. Leaping beyond this misconception lies the fact that accessible web is very helpful for people without disabilities as the prominent reason for web accessibility is to create web services that are flexible to meet different types of users, their preferences, and the situations they are in. The scenarios may be people using websites in different lighting conditions (bright and dim), a user with a temporary disability or changing abilities due to aging, a user with slow

internet speed (Kurt, 2011). A non-disabled user watching videos in a noisy environment can be benefitted by embedded captions in the videos. Feature to change color contrast helps the user to change lightings accordingly in bright or dark environments. Thus, everyone will experience a better user experience.

Only non-disabled people are the users of the mainstream technology (Shinohara et al., 2016, p. 230). The people with disabilities are often hit hard because of inaccessible physical environments, transportation, and information and communications (ICT) systems and are the causes of deprivation to participate in the society (United Nations Department of Economic and Social Affairs, 2016). Thanks to United Nations (UN) and other organizations like National Disability Authority (NDA), National Council on Disability, to name some, for their generosity who are rigorously working for these demographics lagging and realizing that they need to tandem with the rest (non-disabled users) for the holistic equilibrium in the society to improve and satisfy the socioeconomic status of everyone.

"*The World Wide Web plays an important role in our society—enabling broader access to information and services than was previously available*" (Ivory, Mankoff, & Le, 2003, p. 1). The WWW is a great source of information, and the users using the web are diverse which includes users of all ages, educational levels, and levels of computing experience (Shneiderman, 1999). The web allows its users to have unprecedented access to information in the form of search, navigation, and communication. Web opens the opportunities and possibilities more than ever before for everyone. Websites are an essential repository for digital information and serve as a hub for digital information sharing as it facilitates access to products, information, and services that were otherwise not easily achievable for diverse user groups and user's circumstances (Sierkowski, 2002). While the able-bodied user groups are using the websites for their cause, in contrary the inaccessibility of the web continues to encumber the disabled users. Websites needs to be accessible to all of its users irrespective of people with disabilities (Lazar et al., 2004, p. 270). As explained by Shadi Abou-Zahra who is an accessibility strategy and technology specialist working with the W3C, Web Accessibility Initiative (WAI) explains web accessibility as a means that people with disabilities can use the Web equally. For instance,

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a limb impairment user can use a mouth stick to type, a user with vision impairment uses a screen reader to read out screen, a user with a hard of hearing uses caption to watch videos (World Wide Web Consortium (W3C), 2018a).

There are ways defined to practice and design accessibility on the web as stated by W3C using web techniques such as WCAG (Web Content Accessibility Guidelines), ATAG (Authoring Tool Accessibility Guidelines), and UAAG (User Agent Accessibility Guidelines) (World Wide Web Consortium (W3C), 2018a). Even, DreamWeaver and FrontPage to name some web development tools in the 2000s were available that motivate the web developer to incorporate accessibility in the website and solve issues related to accessibility (Lazar et al., 2004), and help users to dynamically modify sites to accommodate their needs, the practice of web developers and their inept awareness in terms of disability were considered the main reasons to not address disability issues then.

2.2.2   Disability and Inaccessibility in Mozambique.

The National Institute of Statistics of Mozambique (INE), is an independent branch of the Ministry of Planning and Development in Mozambique. INE is also responsible for census reporting (Sida, 2014). According to Sida, INE lacks specific instructions and funding to collect information regarding disability and the different studies results reflect the absence of a commonly agreed definition [6] of disability and poor data collection methods. Sida is a government agency working on behalf of the Swedish Parliament and Government to reduce poverty in the world (Sida, 2014).

As a part of the national census in 2007 in Mozambique; a Household Survey was carried among People with Disabilities, reports the author of the journal book, 'African Disability Rights Yearbook' in his country section, Mozambique report. The survey was a joint effort by Mozambique´s National Statistical Office (INE), the Federation of People with Disabilities in

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[6] The definition of disability differs from the social model to the medical model to other models in practice. Neither in this report nor my wider disability research, do I reject the idea that disability is powerfully shaped by social forces.

Mozambique (FAMOD), and a Norwegian based NGO, the Stiftelsen for Industriell og Teknisk Forskning (SINTEF) (E. C. U. Lopes, 2013, p. 246). This 2007 census recorded the population of 20,366,795 in Mozambique, with 475,011 of them to have some form disabilities representing 2.33 percentage of an entire population (Lord & Stein, 2013). The new census reports of 2017 in Mozambique reports the total country's population as 26,899,105 with 727620 of the them suffering from some form of disability, representing 2.7 percent of the entire population (Maunze et al., 2019). This is a rise of disability population of 252,609 at an increase of 0.37 percent from the previous, 2007 census report. The recent statistics on people with disabilities from the 2017 census report are summarized in table 4.1 below.

Table 2-1 Statistics of people with disability in Mozambique according to 2017 census.

Types of disability		Number of populations	Percentage (out of total disability population)	Percentage (out of total population)
Visual Impairment	Partially Sighted	58,021	8	0.21
	Blind	81,072	11.2	0.30
Hearing Impairment	Hard of Hearing	35,803	5	0.13
	Deaf and Mute	68,326	9.5	0.25
Limb Impairment	Upper	55,670	7.7	0.20
	Lower	115,918	16	0.43
Paralysis		44,875	6.2	0.16
Mental Illness		49,565	7	0.18
Cognitive Impairment		30,173	4.2	0.11
Mobility Difficulty		105,529	14.5	0.39
Other		91,086	12.5	0.33
Total		727,620	-/-	2.70

CRPD reflects as a paradigm-setting instrument in the African regions and as a whole Africa continent is seen enthusiastically embracing it. The study from (Lord & Stein, 2013) state that, though the initiative of CRPD along with its optional protocol was first adopted on 13 December in 2006, Mozambique signed the CRPD and its Optional Protocol later on 30 November 2010, and subsequently ratified both on 31 December 2010 (E. C. U. Lopes, 2013). Looking away from CRPD, the provision in the Article 37 of the Mozambican Constitution states that "*citizens with a disability shall fully enjoy the rights enshrined in the Constitution, and shall be subject to the same duties, except those which their disability prevents them from exercising or fulfilling.*" Article 125 and its subsections further explain the provisions facilitating people with disability with article 125.3.b especially focusing on the 'creation of appropriate

conditions to prevent them from becoming socially isolated and marginalized' (E. C. U. Lopes, 2013, p. 249).

In addition to the laws and UN rights working for disabilities, some programs and policies aim to work for people with disabilities and to address their rights and protections directly or indirectly. In Mozambique, some of them are National Disability Strategy, Strategy for People with Disabilities in Public Service, Landmine Survivor Assistance and other health rehabilitation centers. However, National Disability Strategy blames the negative social attitudes and especially the government's insufficient financial resources to avail accessibility to public services, buildings and public transportation for people with disabilities remain the general problem in addressing disabilities issues. There are around 20 DPOs, Disabled people organizations that work to represent and advocate the rights and welfare of persons with disabilities in Mozambique. These organizations work with a specific disability or a combination of two or more disability types. FAMOD (Forum of the Mozambican Associations for the Disabled) established in 1998 is one of popular organization and which functions as an umbrella for DPOs in Mozambique, serves other organizations which work for all types of disability and covers all geographical areas in Mozambique (E. C. U. Lopes, 2013). The study from (E. C. U. Lopes, 2013) finds that the DPOs implementations often fail in Mozambique because of lack of funding, related recourses, qualified personnel, political will and inept awareness of disability issues in society. Mozambique is seen as not realizing and is often late in embracing Disability rights. It is said that it was DPOs' engagement and involvement that helped the country to achieve the ratification of the CRPD. The authorities in the ministry responsible for addressing disabilities blames unstable country movement and civil war as the key reason for erratic and delayed developments in addressing disability (E. C. U. Lopes, 2013).

Impotency to address disability issues remains a major concern in Mozambique where access to education remains one of the critical issues or vulnerabilities for disabled children. According to a report made by the Secretariat of the African Decade in 2007, despite the education is free and compulsory, 80 percent of children with a disability do not go to school. Women with disabilities, in particular, bear the brunt of inequality based on disability, gender, and socio-economic status. Without addressing the rudiments in disability first, accessibility in

Information Technology (IT) for people with the disability remains a far possibility not only in Mozambique but all over Africa. The research carried by Toks Oyedemi explains in his work, how ICT challenges are further affected by other infrastructure. The approach for achieving universality is a chained phenomenon where political, economic, socio-cultural, and technological aspects form the access wheel. To achieve the goal of universal technological accessibility, the social, economic, literacy and political aspects/utilities must extend in parallel with the extension of technological aspects in Africa (Oyedemi, 2004). The real-life case as an example is appropriately put by the same author in his research work generalizes the problem as to why it is difficult to embrace accessibility in IT even by people without disability in Africa. The story reads as, a woman from a rural village without basic social utilities like water supply and electricity, was bought a cell phone to use. But she had a hard time accessing it. She had to travel 50 kilometers away to her nearest town to recharge the battery of her cell phone. Later she chooses not to use it. She blames substandard infrastructure for not being able to use the technology. Furthermore, the report also narrated the story on how the multi-purpose community centers (MPCCs) and tele-centers in rural locales being vandalized and equipment stolen, possibly to be sold to meet more urgent social and other basic needs. This story epitomizes how ICT development must rise in parallel to other social utilities and makes cognizant of the fact that simply availing telecommunication devices and services without first addressing the basic and social requirements is worthless.

2.2.3   Universal Design in ICT.

Universal Design[7] (UD) is sometimes interchangeably perceived as Accessible Design[8] in the field of web. Universal design is not an exclusive concept to address specific kind of users, like

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[7] "Universal Design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. "Universal design" shall not exclude assistive devices for particular groups of persons with disabilities where this is needed." (Department of Economic and Social Affairs (UNDESA), 2018)
Or,

"The current Norwegian definition states that "Universal design" shall mean designing or accommodating the main solution with respect to the physical conditions, including information and communications technology (ICT), such that the general function of the undertaking can be used by as many people as possible". (Act relating to a prohibition against discrimination on the basis of disability (the Anti-Discrimination and Accessibility Act), 2013, p. 3)

[8] "Accessible design is a design process in which the needs of people with disabilities are specifically considered in an exclusive manner. Accessible design is built targeting specific user groups and is exclusive to them." (The center for Universal Design, 2008)

people with disabilities or older persons rather it promotes social inclusiveness, addressing individuals regardless of their ability (Audirac, 2008). Similarly, people with a wide variety of characteristics, including different types of disabilities can use and access the products if they are universally designed. In doing so, the need for assistive technology is eliminated or minimized. Thus, the terms accessible design and universal design aim to address the user needs who are considered beyond the "average" or "typical" (University of Washington (UW), 2018). More products will be accessible to and usable by everyone if people with disabilities are routinely included by user experts in usability tests and if Universal design principles are applied by product designers (University of Washington (UW), 2018). Universal design benefits everyone. Hence, universally designed web content, websites, and applications not only alleviates the hard experience faced by people with disabilities but also benefit all users (World Wide Web Consortium (W3C), 2018a). Ronald Mace, the founder and program director of The Center for Universal Design, indicated that the products be accessible to everyone as a result is it is made more accessible to people with disabilities (The center for Universal Design, 2008).

Although the Universally design website is often used with the word accessible website, the mechanics of the words are not the same. In fact, in an ICT environment the trend of using Assistive Technology for the access of websites and applications are perceived as near meaning to universally designed websites. The concept of Universal Design (UD) and Accessible Designs must come into action for promoting independence for the people with disabilities and thus, in turn, attaining equality in the society they are part of.

Universal design holds a key for improved web accessibility where the needs of all user types can be incorporated as it is inclusive, flexible and cost-effective. However, in an ICT environment, the universal design of the website or web services to be compatible with various assistive technologies will inevitably increase the complexity of the web applications. Applying the concept of universal design in the field of ICT is challenging says the author, Kristin Skeide Fuglerud. Universal design principles were first developed in the other context, in relation to buildings and architecture cites the author in her paper, "Inclusive design of ICT: The challenge of diversity". It's a tough ask whether as if these principles can be applied directly to an ICT

environment or some adjustments or precision regarding the UD of ICT are required (S. Fuglerud, 2014). She writes in her paper, "Some properties of ICT may distinguish UD in ICT from UD in other design areas. As the label of ICT implies, these technologies are, by nature, very information and communication intensive. There is usually a substantial amount of information to take on board, and the user's ability to communicate is often more important when interacting with ICT than when interacting with other designed objects or environments. This suggests that the use of ICT is cognitively demanding." She argues on a couple of principles to emphasize, simple and intuitiveness when aiming at universally designed ICT. The information needed to be perceptible to the user, whom the information is presented. The way the information is presented to the user must match the ability of the user on how he or she perceives it. Thus, the UD in ICT must be flexible enough to address the abilities of various users when presenting the information, in a way that is easy to understand and interpret depending on their abilities. A well-defined statement conveying Universal Design not only being preliminarily for the architectural or structural design but as,

"While the scope of universal design is primarily limited to physical design of infrastructure and products, it is important to reaffirm that universal design is not only an architectural solution to a problem; it is an overall attitude to humanitarian and development aid, a part of an effort to promote inclusive development" (Snider & Takeda, 2008).

In ICT, universally designing products for broader-average users might not consistently accommodate the specific needs of severe or particular user demands. In such a case, accessibility in ICT is achieved by making products acceptable and compatible to assistive technologies or technical aids of specific purposes (Snider & Takeda, 2008).

3   ETHICAL CONSIDERATION

Research is a sensitive process. While doing research, the norms and ethics should be carried out to prevent it from plagiarism and the obtained user's information from unwanted exposure and vulnerabilities. Thus, Ethical considerations are vital in research to increase resistance to the false response of the data and encourage the pursuit of valid and reliable data that aids the primary goal of the research (Resnik, 2011). In academics, a lot of information inherited from other different pre-existed research materials must be credited to the original author. Thus, by crediting the researcher for their original work through citations the authenticity and respect for intellectual property in the new work is maintained. Likewise, all the information from preexisting work that helped in writing this report is credited and valued for their original work.

As this report work carries out interviews and interactions with the people with disabilities in the low-income country, the objective and purpose of the study being carried out are explained to all participants for their informed consent in taking part in the research process. The interested participant is provided with a pre-written consent form to validate their participation in the user testing and interview process. This is a voluntary agreement for the participant to participate in the research study. A good procedure for the research in attaining consent for the human subject research in low income and rural African settings is obtained from (Tindana, Kass, & Akweongo, 2006) and (Molyneux, Peshu, & Marsh, 2004). It explains the importance of consent material in participants home language and parents (guardian) involvement in the consent process, and/or need for community leader or representative approval (Tindana et al., 2006). However it is worth noting that, when comprehensively providing proper information to participants in lower income countries, critical challenges can arise in achieving valid consent (De Vries et al., 2011). The authors also provide a brief explanation in the paper further on how to address the challenges and achieving the consent.

According to the authors of 'report of Informed Consent in Human Subjects Research', Informed Consent not only being a signed form but is a process in which the subject

understands the research and risks associated with it. The process of obtaining the consent involves the subjects are informed about their rights, the purpose of the research being carried out, the procedures the subject undergoes and the potential risks and the benefits of the participation process. The participation should be made willingly by the participant. A vulnerable population must receive extra protection (Rose, Aburto, Hagemann, & Shahnazarian, 2009). In recent times, whether it is ethical for vulnerable user groups to be used as research subjects, has grown an increased concern (Fouka & Mantzorou, 2011). These group of people is considered as vulnerable groups of people with the characteristics as they are unable to protect their rights and welfare (Fisher, 1993, p. 4). Being a vulnerable group of people can lead them to think of a greater risk of being deceived. Hence, the need for further protection and prevent them from potential risks is very important. "*The different opinions about vulnerable subject participation in research can be attributed to their inability to give informed consent and also to their need for further protection and sensitivity from the researcher as they are in a greater risk of being deceived, threatened or forced to participate*"(Fouka & Mantzorou, 2011, p. 7).Thus, an analysis of such risks is addressed first before initiating the research process. Otherwise, this can result in their reluctant approach to the interviews which in turn can result in ineffective interviews and interactions. To gain their trust to fully legitimate the process their caretakers, if exists, are also convinced of the ethics involved as part of the research process.

To make the process more comfortable and easier the interviewees are entrusted with the right to terminate the interview if they deem at any point in time.

The first step in research should be the critical analysis of possible risks and benefits. The process of acquiring consent or procedure during the research should be considered carefully. Participants who have diminished autonomy are vulnerable to invasion of privacy as their right to it are limited compared to other's right to know (Fouka & Mantzorou, 2011, p. 7). Therefore, in the case of users with vulnerabilities there increases the need for justification for the use of research subjects (Grove, 2001). This is in all regards to respect and maintain their safety and concern about their privacy. The anonymity of the participants is protected to address their

confidentiality and to their information at hand. This is done by assigning virtual names namely, participant A, participant B and so on in the report to maintain the confidentiality of the participants. However, it is important to note that the report only analyses the data and information given by the subject but not gathers or processes any personal data. The relevant consent form is maintained and signed for all participants to maintain the authenticity of the purpose of research for all the personal/s involved in the research process. The report is carried maintaining the integrity and honesty required for carrying research with ethical code.

4 METHODOLOGY

The research work put in this report empirically examines the problems and it's probable causes in web accessibility for people with disabilities in Mozambique. This section includes evaluation methods using automated tools for the 5 predefined websites. User testing, followed by short interviews and interactions with people with disabilities and finally interviews and interactions sessions with web professionals in Mozambique, for data collection. This is a qualitative research work, preliminarily based on interviews and observations with people with disabilities and web professionals during the 3 months of fieldwork in Mozambique. For the selection of the participants (both people with disabilities and web professionals), the research uses the random sampling technique as it provides convenience, quick and availability of users for data collection to generalize the user experience overall. As we aim to make conclusions on the entire population of the country, the results obtained through the random sampling technique reasonably best fit our study. This is due to its representative characteristics, the results obtained from random sampling technique results can be generalized back to the whole population (Sharma, 2017).

We study a few users as subset which represents the whole user group of its kind. "*Taking a subset from the chosen sampling frame or the entire population is called sampling. Sampling can be used to make inference about a population or to generalize the existing theory*" (Taherdoost, 2016, p. 20). The interviews are carried with people with disabilities living in Maputo, Matola and Xai-Xai cities in Mozambique and with web professionals working in Maputo, as shown in the relative figures in the latter sub sections. The information from interviews and interactions and observations are gathered and compiled in the form of written notes. Earlier we explained how each research question aims at studying accessibility issues for people with disabilities in Mozambique. With all processes involved related to solve research questions, this section explains the method used in the report. The report maintains unique and separate subsections to show how the research methods for each research question are applied and are shown subsequently. This section follows the process of how the results are acquired.

In this research study, a hybrid assessment approach is exercised as it includes; automated testing for websites and semi-structured interviews focus groups: people with disabilities and web workers (web employees), and to analyze the results. The diagram below shows how the report mixes different approaches. This research is mostly a qualitative research work aiming to find 'why' inaccessibility in web still exists and what can be some solutions to address through direct interactions from people with disabilities and web professionals in Mozambique. The sketched figure 4-1 below explains how the whole process of the methodology is carried out in this research report.
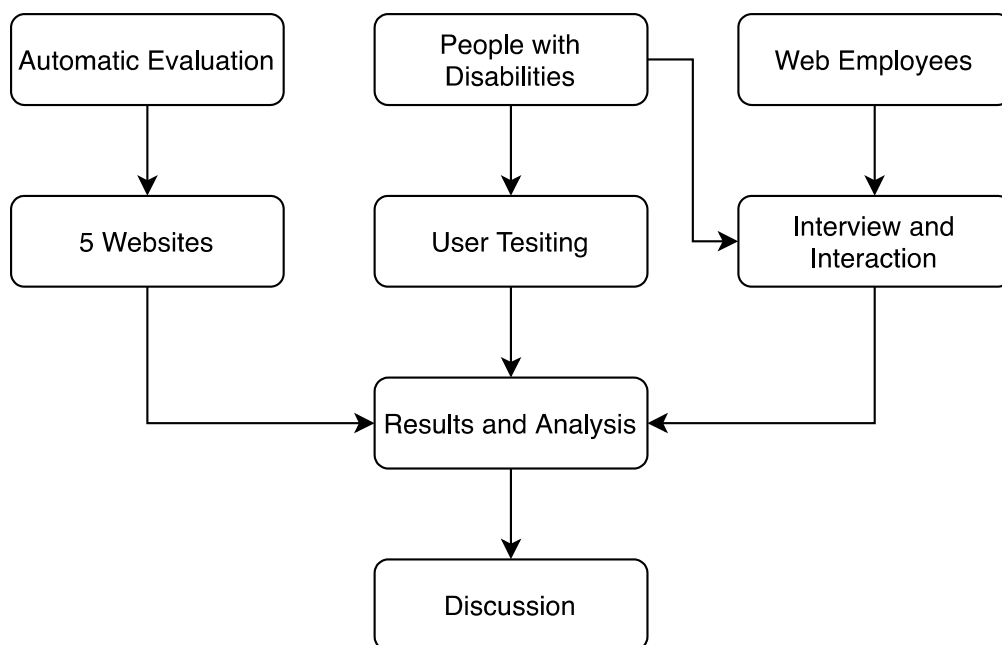
Figure 4-1: Methodological approaches of the study.

The primary spoken language in Mozambique is Portuguese. During the fieldwork in Mozambique, the language translations for focus groups (people with disabilities and web employees) from Portuguese to English and vice-versa was therefore provided by a hired official language interpreter. An additional sign language translator was hired in the research responsible to translate sign language used by few participants into English needed for the research writing. In addition, some quotes and definitions from sources in Portuguese language are translated using online google translator.

4.1   Approaching Research Question 1: Automatic Testing,

This research question aims to discover and evaluate the accessibility barriers of websites against the web accessibility requirements, WCAG 2.1, conformance level AA. This is to understand the accessibility flaws and shortcomings that the websites might have. This is done with automated testing using three online web evaluation tools. The purpose of these assessments is to evaluate the scope of the problems of accessibility in the websites. The whole process conducted in the testing is presented in this section.

The main idea is to collect information regarding accessibility. 5 prominent websites of different categories are chosen from SimilarWeb.com for the Mozambique region. The selection of websites for evaluation is done by a popular website called SimilarWeb.com which performs web analytics services. It is an Israel based company owned by SilmilarGroup. This is an online competitive intelligence tool that provides traffic and marketing insights for any website. Out of many of its core features, it has one of them; to provide Website rank: an estimate of a website's popularity among other websites in any region/s (Offer & Cohen, 2019). The 5 websites used for our evaluation are selected based on this tool. These 5 websites of its kind records for highest web traffic and highest popularity in Mozambique.

The study for automatic testing is carried out using the evaluation and testing of five prominent national websites in Mozambique. The prominent five websites that are mostly used throughout Mozambique are evaluated and checked for accessibility. The webpages are checked using various evaluation and automation tools which are free and provided online. The WCAG and WAI guidelines which aid accessibility design is used for comprehensively examining the websites. The list of prominent websites used specifically in Mozambique are as follows:

http://www.portaldogoverno.gov.mz/ (governmental website.)

https://www.olx.co.mz/ (shopping website)

https://www.bci.co.mz/ (finance and banking)

https://www.movitel.co.mz/ (travel, hotel and accommodation)

https://www.mmo.co.mz/ (news and media.)

This is worth mentioning that this report is not a comparative study for the websites mentioned above. Rather it is a generalization from these websites as a whole, about web accessibility in Mozambique. The degree of accessibility performances shown by these websites is learned from the web accessibility evaluation tools and the users' view implicitly. This report selects the following 3 online tools for this purpose. However, we customize our testing tool to test for major AA compliance levels as in table 4-1 below.

1. Web Accessibility Checker (achecker): This tool checks the HTML pages of the website for conformance with accessibility standards. Simply, the webpage URL is entered, and it gives the results. The reason why we chose this tool as it appropriately matches our testing areas systematically as described in the table 4-1 below for the WCAG AA conformance level. The areas it checks for are coding errors in the page, standard compliance issues, accessibility problems, missing images, or its alt tags or broken links any many more ("Web Accessibility Checker," 2011).

2. SortSite Tool: This web service also available in web application check WCAG and Section 508 guidelines. The home website for SortSite reads as the tool is used by federal agencies, Fortune 100 corporations, and independent consultancies ("SortSite - Accessibility Checker and Validator," 2020).

3. WAVE, Web AIM Online Tool. This is the Web Accessibility Evaluation Tool. It generates the inaccessible web content results by simply entering the website URL (Smith & Whiting, 2020).

Table 4-1 below shows the major AA compliance level, which is at least needed to pass the accessibility benchmark as suggested by WCAG2.1. We check the following guidelines as parameters for each website through the above-mentioned automated tool.

Table 4-1: Table showing major AA compliance level

WCAG 2.1 (AA conformance level)	Guidelines	Guideline description
1.1	Text Alternative	Provide text alternatives for the non-text content, picture, table etc.
1.2	Time-Based Media	Provide alternatives for time-based media
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 foreground from background
2.1	Keyboard Accessible	Make all functionality available from a keyboard.
2.2	Enough Time	Provide users enough time to read and use content.
2.3	Seizures	Do not design content in a way that is known to cause seizures.
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.
3.2	Predictable	Make Web pages appear and operate in predictable ways.
3.3	Input Assistance	Help users avoid and correct mistakes
4.1	Compatible	Maximize compatibility with current and future user agents, including assistive technologies.

4.2 Approaching Research Question 2: User Testing and Interview/Interaction with People with Disabilities.

This section covers a thorough field research details carried on a visit as fieldwork with the disabled user groups in Mozambique. The people with disabilities included are Disable School students, people with disabilities organized by FAMOD, and disabled officials working in an organization. The participants have been recruited by FAMOD, a national DPO and various disability communities for coordination and data collection. The number of participants aimed for this purpose are 30 with an effort to incorporate users of different types of age groups and gender for a robust and equitable research study. The table 4-2 below depicts the participants involved in the research and their disability nature. The participants selected for the research are 4 housewives, 6 school students, 6 elderly people, and 14 adults, all of whom claim to use digital services and all among low to medium-income families. The purpose to exempt participants from high-income families is to have the observation of the general dominant group of population in the country, i.e. low- and medium-income populations. The approach or practice, the people with disabilities from high-income families might have towards web accessibility may not be convincingly common among the dominant group of people with disabilities from low- and medium-income populations in the country. Doing so, the report tries to accentuate in maintaining a strong general subjective group.

Table 4-2: User participants for research

User participants group	Number of users
Housewives	4
Secondary school students	6
Elderly people	6
Adults	14

Firstly, this methodology aims for having people with disabilities in the test procedure inclusively to test the 5 described above the website's usability and accessibility. Thus, the user testing on these websites are performed; users are asked to use the websites. The users are

asked to use the websites to describe their experience in terms of accessibility and usability. This test is done to recognize the explicit nature of major accessibility flaws that cannot be identified simply through web experts or web developers on a glance. The users are allotted with some basic random tasks over different webpages (of the pre-defined 5 websites) as described below,

- User profile registrations
- Login and log out of their profile.
- Reserve or purchase of an item
- Navigation to some specifics in the webpage.

However, in this paper, we do not discuss in detail what specific task/s is given to any individual user. This is because our aim in the paper is to focus on the type of behavior and approach these users to perform for their given task/s. The visual observation is done to closely understand their web accessibility approach and behavior when using the websites. The users were not provided any additional assistive technology aid or devices, apart from if they own any for their routine use. The users were left to their own as to how they use the web generally.

Secondly, a short interview and interaction session is done post user testing of the websites with the same users. This is a discrete task to get their views on user experience on the recent task they performed in the websites and other web services they use in their daily life apart from recently concluded sessions of user testing of websites.

This study does not focus on specific disability types rather embraces all types of disabilities. Interviews as a data collection method provides an in-depth understanding and direct feedback from participants which is fundamental to HCI research (Lazar, Feng, & Hochheiser, 2017). Semi structure interviews are performed with people with disabilities by asking more open-ended questions to obtain in-depth answers, information, and opinions. This allows the users to freely express their views in their terms. The set of questions for the interviewees are

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as follows. (As the interview follows an open structure pattern, the order and nature of questions is altered and customized depending on the situation). These interview questions are mentioned in the appendices[i] below. Table 4-3 below shows the number of people with disabilities used for interview, interaction and user testing for the research.

Table 4-3: Data collection mode used for different types of people with disabilities.

Types of disability		Number of populations
Visual Impairment	Partially Sighted	3
	Blind	3
Hearing Impairment	Hard of Hearing	3
	Deaf	3
Speech Impairment		2
Manual Dexterity Impairment		3
Lower levels of literacy		2
Learning Difficulties		4
Mental Health Conditions		3
Multiple Impairments		4
Total		30

4.3   Approaching Research Question 3: Interview and Interaction with Web Employees.

The response for research question 3 is the part of fieldwork in Mozambique where web professionals working in web development companies are interviewed and interacted. This section explains the process and methods used in the fieldwork with the web professionals and the results obtained through it.

The selection of these companies, however, pose some selection criteria and are selected based on good ratings over the internet. These selected companies also had a decent reputation for their work, but not necessarily the same for their employees which is further studied in detail.

The web professionals chosen for the research are working in the role of software developer, web developer, web designer, webmasters. However, it is to be noted that each of these professionals has a different level of responsibilities and skills. For example, a webmaster can be a web developer and designer with added responsibilities of being SEO specialist, and/or editor and/or marketer whereas a web developer can merely be responsible for working backend and/or frontend functionalities and/or installing themes and plugins. So, in the practical scenario, we assume that any web professionals can have any level of knowledge irrespective of their job title as the knowledge of technology is open and free to access. In addition, as the web employees are selected exclusively working in either full or part-time role in the role of software developer, web developer, web designer, webmasters and explicitly contributing to the web development products or services, and not working in the field of data science, network or database management we assume they are supposed to pose more or less knowledge about web accessibility. And thus, perception of the ideas and challenges in implementing accessibility in the web is learned from these web employees who work in the relevant field that incorporates or indicate web accessibility. This report calls these personals involved as the participants for the research as 'web employees', collectively. Thus, the word web employees will be used to refer them in this report, hereinafter. Interviewing these web employees holds a key to understand what practices they follow for web accessibility and what

influences them to follow this. This factor will help us know about their web accessibility approaches they incorporate in their web design and development, which makes the report come closer to fathom the answers to understand if exists any, how their approach is directly or indirectly affecting people with disabilities in Mozambique in web accessibility. This will help the report to understand the cutting edge that is applied in the field of web technology for users with disabilities in the context of Mozambique if it exists.

A total of fifteen (15) web employees were chosen from six (6) different companies. The number of web employees belonging to their respective companies is shown below in the table 4-4. The alphabetical and alpha-numeric nomenclature in the table 4-4 anonymously represents the companies and their web employees respectively.

Table 4-4: Naming web employees anonymously

Companies	Company A	Company B	Company C		Company D			Company E				Company F			
Employees	A1	B1	C1	C2	D1	D2	D3	E1	E2	E3	E4	F1	F2	F3	F4

To investigate the designer's perception and approach towards web accessibility, a set of interview questions focusing to elicit their knowledge, experiences, and practices were composed. The open structure interview is carried out with web employees to generate extensive and more comprehensive results regarding web accessibility. The questions are made for qualitative research purposes to understand how the responses of the web employees factor in the web accessibility in Mozambique. Pre-defined interview questions for these groups of interviewees are shown at the end of the report in the Appendices[ii] section. Before we go through the results sections, we encourage the readers to fully understand the questions at the end of the report in the same Appendices section.

5   RESULTS AND ANALYSIS

This part forms the basis for discussion as we identify and collect data as a result. This section reports the results or findings that were discovered from the methodological section. The results from the evaluation of the website through automatic testing, the interview result information from the users and web professionals is presented in the subsequent separate sections.

5.1   Website Evaluation Test Results

The results for all the websites through three automated testing tools are presented systematically along with the table. The derivation of the results is shown in the tables. The types of accessibility issues found by these automated tools for 5 websites are mentioned under a similar section in the table. The results are not described in the literature form rather it is presented in tabular form in accordance with table 4-1. Only some of the websites being evaluated are shown in the form of the screenshot picture to show how the tools show the results of websites being evaluated. PASS and FAIL describes the accessibility test of the website and holds true for each conformance level test according to results from the tools. 'N/A' in the table represents the data not available for that section.

5.1.1   Test results from automatic evaluation tool, Achecker

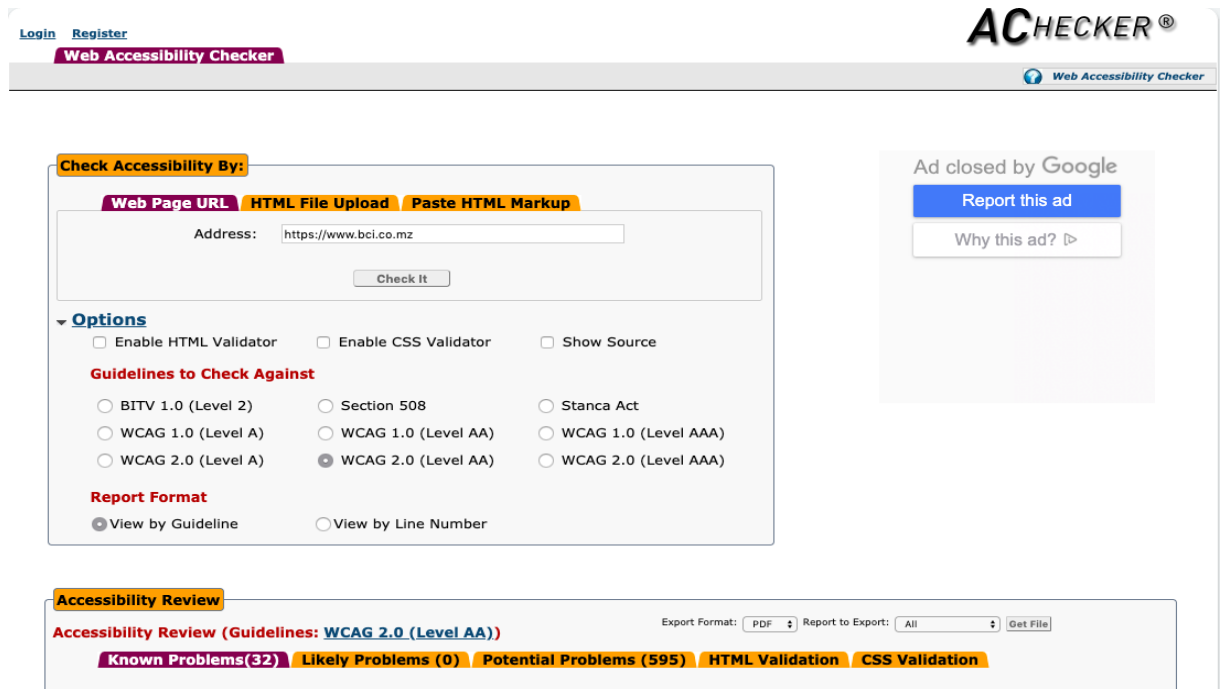Figure 5-1: The screenshot of www.bci.co.mz being evaluated automatically using Web accessibility checker (achecker).
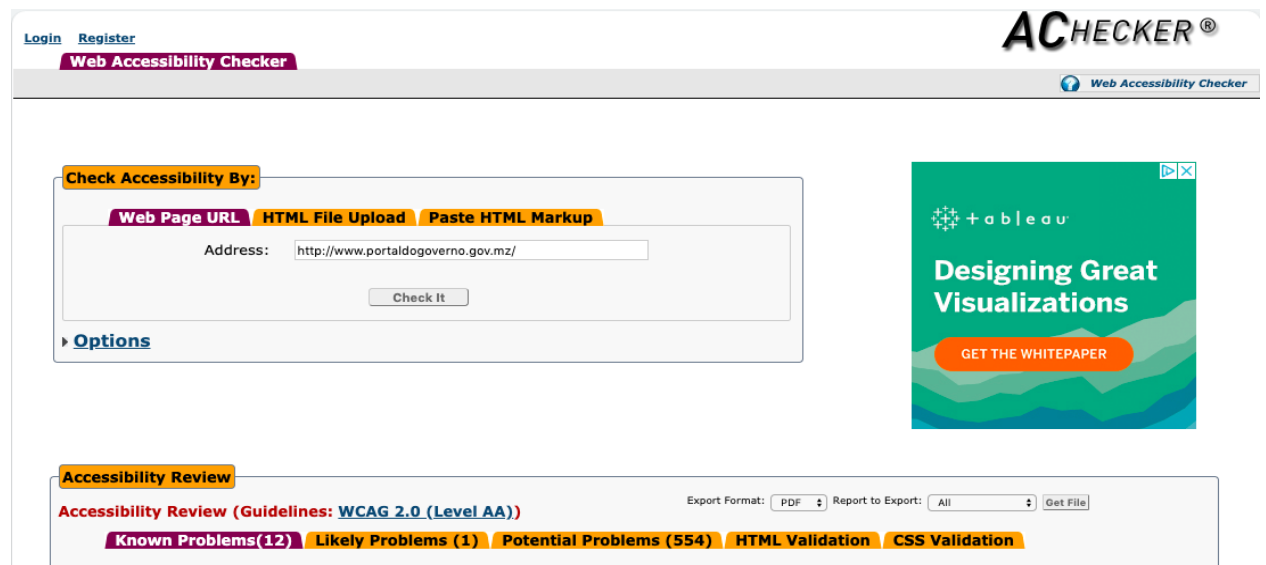
Figure 5-2: The screenshot of www.portaldogoverno.gov.mz being evaluated automatically using Web accessibility checker(achecker).

Table 5-1: A table showing test results of the websites using automating testing tool, Achecker.

WCAG 2.1 (AA conformance level)	Guidelines	www.portaldogoverno.gov.mz	www.olx.co.mz	www.bci.co.mz	www.movitel.co.mz	www.mmo.co.mz
1.1	Text Alternative	FAIL	PASS	FAIL	FAIL	FAIL
1.2	Time-Based Media	N/A	PASS	N/A	N/A	N/A
1.3	Adaptable	FAIL	FAIL	FAIL	FAIL	FAIL
1.4	Distinguishable	FAIL	PASS	FAIL	FAIL	FAIL
2.1	Keyboard Accessible	FAIL	PASS	FAIL	FAIL	FAIL
2.2	Enough Time	N/A	PASS	N/A	N/A	N/A
2.3	Seizures	FAIL	PASS	FAIL	FAIL	FAIL
2.4	Navigable	FAIL	FAIL	FAIL	FAIL	FAIL
3.1	Readable	FAIL	FAIL	PASS	PASS	PASS
3.2	Predictable	FAIL	FAIL	FAIL	FAIL	FAIL
3.3	Input Assistance	FAIL	PASS	FAIL	FAIL	FAIL
4.1	Compatible	PASS	PASS	FAIL	PASS	FAIL

As results from Achecker shows 4 out of 5 websites utterly failed to pass 1 or 2 accessibility tests for the web accessibility requirement. The only web accessibility guidelines to be achieved were just three websites at most, and these were readability and compatibility of the web content. During the test, the website that performed best was www.olx.co.mz with 8 web accessibility guidelines and worst were www.portaldogoverno.gov.mz and www.bci.co.mz with just 1.

5.1.2 Test results from automatic evaluation tool, SortSite.

Figure 5-3: The screenshot of www.bci.co.mz being evaluated automatically using SortSite tool.

Table 5-2: A table showing test results of websites using automating testing tool, SortSite.

WCAG 2.1 (AA conformance level)	Guidelines	www.portaldogoverno.gov.mz	www.olx.co.mz	www.bci.co.mz	www.movitel.co.mz	www.mmo.co.mz
1.1	Text Alternative	FAIL	FAIL	FAIL	FAIL	FAIL
1.2	Time-Based Media	FAIL	PASS	N/A	FAIL	N/A
1.3	Adaptable	FAIL	FAIL	FAIL	FAIL	FAIL
1.4	Distinguishable	FAIL	FAIL	FAIL	FAIL	FAIL
2.1	Keyboard Accessible	N/A	PASS	PASS	N/A	PASS
2.2	Enough Time	FAIL	PASS	PASS	FAIL	PASS
2.3	Seizures	FAIL	PASS	FAIL	FAIL	PASS
2.4	Navigable	FAIL	FAIL	FAIL	FAIL	PASS
3.1	Readable	FAIL	FAIL	PASS	PASS	PASS
3.2	Predictable	FAIL	PASS	FAIL	FAIL	PASS
3.3	Input Assistance	FAIL	PASS	FAIL	FAIL	FAIL
4.1	Compatible	FAIL	PASS	FAIL	PASS	PASS

As compared to Achecker tool, the results from the automatic evaluation tool, SortSite showed many other passes. Except, www.portaldogoverno.gov.mz governmental website all other 4 websites ticked additional web accessibility guidelines requirement. However, the changes for websites, except www.olx.co.mz were still not convincing as more web accessibility guidelines met failed remarks that those met for pass remarks. None of the websites meet the web accessibility guidelines for text alternative, distinguishable and adaptability. During the test, the website that performed best was www.olx.co.mz with 7 web accessibility guidelines and worst was www.portaldogoverno.gov.mz with none.

5.1.3 Test results from Web Accessibility Evaluation Tool, WAVE.

This tool checks for many important aspects in terms of accessibility barriers and displays the results of inaccessibility that are found on the website on the left side of each webpage in the form of a table. What's interesting using this method is that it also explains the inaccessibility mitigation tips and procedures by suggesting HTML formula and code. It mainly checks for things like colors, fonts sizes, navigation around the website, use of imagery, alt tags to make sure that the website is not discriminatory against people with disabilities. Below is the table 5-3 for the websites from the Wave evaluation tool. This tool is used to test the A and AA conformance level test.
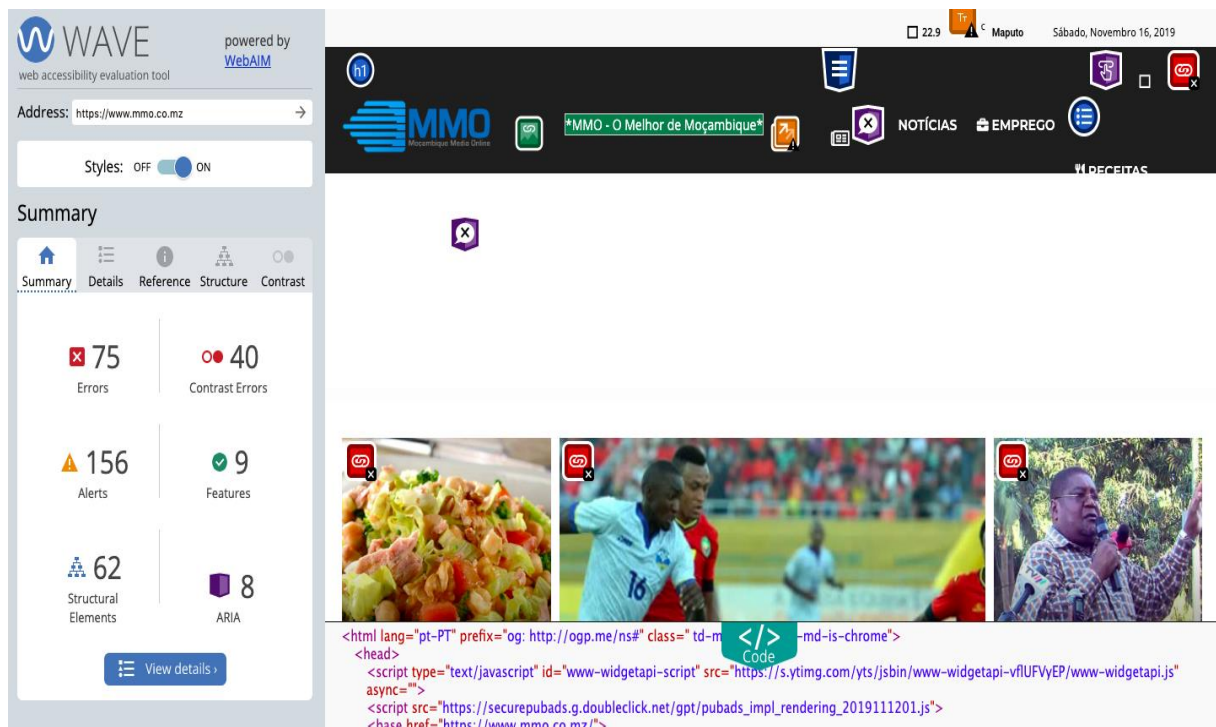
Figure 5-4: A screenshot of www.mno.co.mz being evaluated automatically using WAVE evaluation tool.

Table 5-3: A table showing test results of websites using automating testing tool, WAVE.

WCAG 2.1 (AA conformance level)	Guidelines	www.portal dogoverno. gov.mz	www.olx. co.mz	www.bci.co .mz	www.movit el.co.mz	www.mmo.c o.mz
1.1	Text Alternative	FAIL	PASS	FAIL	FAIL	FAIL
1.2	Time-Based Media	FAIL	PASS	N/A	FAIL	N/A
1.3	Adaptable	FAIL	FAIL	FAIL	FAIL	FAIL
1.4	Distinguishable	FAIL	PASS	FAIL	FAIL	FAIL
2.1	Keyboard Accessible	N/A	PASS	PASS	N/A	PASS
2.2	Enough Time	N/A	PASS	PASS	FAIL	PASS
2.3	Seizures	PASS	PASS	PASS	PASS	PASS
2.4	Navigable	FAIL	FAIL	FAIL	FAIL	FAIL
3.1	Readable	FAIL	PASS	PASS	PASS	PASS
3.2	Predictable	PASS	PASS	PASS	FAIL	PASS
3.3	Input Assistance	FAIL	PASS	FAIL	FAIL	FAIL
4.1	Compatible	PASS	PASS	FAIL	PASS	PASS

The results from WAVE evaluation tools showed all the website's increase in meeting more web accessibility guidelines than those from the tools used for evaluation before. The web accessibility guidelines for readable web content were meet by all the websites whereas the web accessibility guidelines for adaptability of the web content to simpler layout or ways appropriate for the device being used to access web content and navigating or finding the web content were found to fail for all the websites. During the test, the website that performed best was www.olx.co.mz meeting with 10 web accessibility guidelines and worst was www.movitel.co.mz and www.portaldogoverno.gov.mz with just 3.

5.1.4   Summarization of results from all three Automatic Testing Tools.

Table 5-4: Summarized Results of Automated Testing

WCAG 2.1 (AA conformance level)	Guidelines	HIGH	MEDIUM	LOW	Pass percentage
1.1	Text Alternative	A	C, D&E	B	13.33
1.2	Time-Based Media	N/A	N/A	N/A	N/A
1.3	Adaptable	A, B, C, D & E	-	-	0
1.4	Distinguishable	A, C, D & E	-	B	13.33
2.1	Keyboard Accessible	D & E	N/A	B	N/A
2.2	Enough Time	N/A	N/A	B	N/A
2.3	Seizures and physical reactions	A, C & D	E	B	53.33
2.4	Navigable	A, B, C & D	-	E	6.66
3.1	Readable	A & B	-	C, D & E	66.66
3.2	Predictable	D	C	A, B & E	40
3.3	Input Assistance	A, C, D & E	-	B	20
4.1	Compatible	C	A & E	B & D	66.66

For any given website evaluated through different web evaluation tools showed the different results in web accessibility guidelines. This is because each web evaluation tool exhibits a unique benchmark level to evaluate web accessibility guidelines. Some are built with more serious and strictness evaluation benchmark levels and some with loose ones, meaning the website tested through the former can filter for more fails in the web accessibility guidelines than the latter. The pass remarks for any website for a given web accessibility guidelines can be reclaimed with a fail remark with a stronger and strictly built benchmark evaluation tool (Vigo, Brown, & Conway, 2013).

The research reports the collective performance of all the websites from the data calculated as shown in the above figure 7.4. In the tables, the columns, 'HIGH', 'MEDIUM' and 'LOW', represents the websites which have high to low level of comparative web inaccessibility. The websites are represented with the alphabets (A, B, C, D, and E) and are equivalent to the alphabet in the order as,

A for http://www.portaldogoverno.gov.mz/

B for https://www.olx.co.mz/

C for https://www.bci.co.mz/

D for https://www.movitel.co.mz/

E for https://www.mmo.co.mz

The column HIGH, MEDIUM, and LOW for a website describes the comparative degree of website's suffering or ineptness for a given specific conformance level with respect to other websites. For example, the web accessibility guidelines for A (alphabetical representation for the website 'http://www.portaldogoverno.gov.mz/') are recorded under the column 'HIGH'. This means the website performed worst for the web accessibility guidelines 'Text Alternative' as compared with other websites being used for the evaluation in our research. Similarly, for the same web accessibility guidelines of 'Text Alternative' the website B https://www.olx.co.mz/ in the same row did well as it passed more web evaluation tool's test and thus is placed under the column 'HIGH'. And the websites (C, D, and E) are placed under the 'MEDIUM' column as these websites performed with the results better than 'HIGH' and worse than 'LOW'. Classifying the websites in these three columns gives the comparative results among the websites. This shows which website is better or worst compared to the other website for a specific success criterion.

The website A faces the most accessibility issues whereas the website B faces the least. Given that website, A is a governmental website and its importance for the citizens is paramount, the Mozambican governmental website utterly fails to make it accessible to its citizens, and potentially many people with disabilities causing many problems in accessing and using the website.

The pass percentage of any conformance level is the average figure of results from all tools combined over all the websites being evaluated. We define pass percentage to know how well the website has performed overall for a specific conformance level. Mathematically, we calculate it as;

Pass percentage = (number of passes for specific conformance level / total number of fields) * 100.

For Instance, pass percentage for text alternative = (2/15) *100 equals 13.33 percent. This means data for pass percentage depicts all the websites collectively for a given web accessibility guidelines. A total number of fields remains i.e. the denominator or divisor as the total number of fields are 15 as 3 tools times 5 websites. N/A in the table represents the results for that field cannot be obtained because the result was not specified in tools results. Calculating N/A with a known entity would return an infinite or known result.

As can be seen from the table 5-4, the combined effort of all the websites, apart from 3 web accessibility conformance levels, Seizures and physical reactions, compatible and readable, the other 9 conformance levels show low to very low pass percentage. Such results are inevitable to cause web accessibility barriers for people with disabilities using it. The results from this prove that the websites do not satisfy the user's needs to access the website if the users are having varied sorts of impairments or disabilities. The overall performance of these websites able to impact to be used by people with disabilities is certainly bleak. This shows that these websites fail to make any prevalence among these group users.

5.2   People with Disabilities: User Testing and Interview/Interaction Results

Table 5-5 below reports the performance of the users on the task that was given to them. As discussed earlier as well, the allocation and number of tasks to any user are random. As can be seen from the table, thirty users were asked to perform a total of sixty tasks between them. The pass percentage is the successful completion of any task allocated to the number of users.

Table 5-5 User Testing Results.

Tasks	Users using Assistive Technology		Pass percentage	Users not using Assistive Technology		Pass percentage	Total users involved in the given task	Pass percentage
	Users involved	Users completing the task		Users involved	Users completing task			
User profile registrations	2	2	100%	13	2	15%	15	27 %
Login and log out of their profile	3	2	67%	12	2	17%	15	27%
Reserve or purchase of an item	1	1	100%	9	1	11%	10	20%
Navigation to some specifics in the webpage.	3	2	67%	17	3	18%	20	25%
Total	9	7	78%	51	8	16%	60	25%

Overall, out of 60 tasks performed among the 30 users, only 15 tasks were completed. Mathematically, this essentially means only 1 out of 4 users can perform the basic task on the web. Out of 60 tasks, 25 tasks saw the users dropping themselves from the task at an early stage, without even attempting to proceed. And 20 users dropping themselves later, with few of them showing signs of struggle and frustration during the task. This approach from users of 45 incomplete tasks demonstrates, they were inexperienced and inept in performing on the

web anytime and thus had to quit at some stage during the task. Out of a total of 30 users, 21 of them represented the tasks that remain incomplete. And thus 9 users represented the 15 tasks being completed, irrespective of the assistive technology being used. Also, the pass percentage for all the tasks ranges from 20 to 27 percent. This number is very low and without any doubt, reflects the inabilities of the people with disabilities to perform on the web.

The table sees the major distinction in the users who use assistive technology and those who don't. Out of 60 tasks performed among the users, only 9 of the tasks involved the usage of assistive technology. The lack of use in assistive technology accounted for 51 tasks with the pass percentage of only 16 percent. Whereas the pass percentage for the tasks which involved the use of assistive technology accounted for 78 percent. Thus, the pass percentage results for the same task, but one using assistive technology and the other without using assistive technology producing such a drastic difference clearly implies the majority of the users failing to accomplish the task given to them. From the results, it can also be argued that the users using assistive technology are more of an expert user and more likely to perform and complete a task on the web. Most of the users using assistive technology showed little to no signs of insecurities while performing the task on the web and subsequently were able to complete the task the users.

The inability of 21 users to perform the 45 tasks, therefore did not provide any results through observation. Even little and minimum actions few users performed were insignificant and negligible to be considered as results. And thus, to find the reason for such a poor action in failing to perform the task, we performed a separate interaction-sessions, where they could come up with their underlying barriers that contributed badly in their performance.

Thus, the results we got were two different kinds of results. One result; produced through the observation of the tasks completed by 9 users and the other produced from the interaction session with 21 users who fail to perform the task. We call this, technical results (functional results related to web accessibility) for former and non-technical results (non-functional results related to web accessibility) for latter respectively. The technical results relate to the web

accessibility issues that lie within the website and that contribute some web content to remain inaccessible. And, non-technical results relate to any other factors that users find responsible that make them difficult to approach web services or applications. We report these technical results and non-technical responses in a separate table.

Table 5-6 below reports the technical results as the major web accessibility flaws observed from 15 completed tasks performed by 9 users. The table lists the user with their disability kind who completed the task given to them.

5.2.1 Summary of main points from observation of user testing.

Table 5-6: User testing technical issues.

Types of disability		Number of users	Observations	Presumptive technical causes
Visual Impairment	Partially Sighted	1	• Difficulties in navigation, searching web content, accessing multimedia content, and finding specific web content.	• Absence of bypass block link. • Missing label. • Absence of descriptive tags for multimedia (alt tags). • Low contrast and font size.
	Blind	-	-	-
Hearing Impairment	Hard of Hearing	2	• Difficulties accessing multimedia	• Missing captioning or relevant text translation.
	Deaf	1	• Difficulties accessing multimedia	• Missing captioning or relevant text translation
Speech Impairment		2	• Difficulties in input through speech.	• Missing inbuilt input speech tool.
Manual Dexterity Impairment		-	-	-
Lower levels of literacy		-	-	-
Learning Difficulties		1	• Difficulties in word and text predicting. • Difficulties in locating complex and dynamically animated interface.	• Missing predictive word feature. • Undefined Link Purpose.
Mental Health Conditions and cognitive limitations.		1	• Acquired dizziness and blurriness in vision. • Required more mental effort. • Difficulties in focusing web content. • Mistaken screen touch	• Missing label. • Non perceivable icons • Small defaults fonts • No error prevention. • Moving/dynamic pictures.
Multiple Impairments		1	• Difficulties in navigation and accessing multimedia. • Involuntary invalid typing and seizures.	• Missing label. • Absence of descriptive tags for multimedia (alt tags). • Low contrast and font size.

		• Required more visual effort.	• Missing captioning or relevant text translation. • Undefined Link Purpose
Total	9		

Table 5-7 below accounts for the remaining 21 users who failed to complete the task given to them. The responses from each individual user are grouped under relevant sections. We group it to better understand the responses collected and how it is driven. The table groups the responses (Non-technical responses) that users believed are responsible for their fails to perform the task.

5.2.2 Summary of main points from interaction with users on what affect their web applications/services usages.

Table 5-7: Non-technical responses of people with disabilities.

Group of Factors	User responses	Number of users responded.
Financial Factors	Expensive internet.	2
	Assistive Technology unaffordable.	2
	ICT course costly to learn.	2
	Unemployment.	2
Educational factor	No schooling or proper schooling.	3
	No ICT course in school.	3
	Bad command of English.	2
	Prior web experience embarrassing	1
ICT Infrastructure	Internet inaccessible.	1
	No device to access web.	3
Societal factors	Lack of family support.	4
	Uncooperative friends.	4
	Community treating unfairly.	3
	Believing own disability is responsible.	2
	Difficult household work	3
	Public and governmental places providing no means of accessibility	4

The different and many (intersection) responses from the 21 users are categorized among 4 different factors. The numbers corresponding to the user responses describe the number of users mentioning the response. Out of 40 responses, the societal factors accounted for 20

times, the most for any factors while the factors related to ICT infrastructure for only 4 times. The other 18 user responses believed their weak financial and educational background, on around equal measures affecting their web usage. We discuss in brief on all these factors collectively.

Most of the woman's responses indicated the clear lack of grasp of web technology. They believed women lack the understanding and learning web technologies as compared to men. This is because women are generally engaged in their household work which deprives them of being social and communal most of the time, contributing to a lack of opportunity for them to use and learn web technologies. And for some woman who can manage to have extra time after household work, tend to earn for their surviving leaving no time to interact with web technologies. This findings from our study corresponds with the study (Eide & Kamaleri, 2009, p. 84) where it indicated that women in the households performs the additional duties.

Given the weak financial status of people with disability, many of the web technology products, and assistive technology remains expensive to them. On further queries with the same 21 users, 16 of them mentioned they did not know about Assistive Technology and 5 users who know about it mentioned it was expensive and difficult to buy in their country and thus had a limited experience using it. Thus, despite some of them being aware of how these products can be helpful for them, they cannot buy it. The usage of the internet for some users remains expensive and difficult to purchase by. The easiest provision of the internet, which can be acquired from ISP (Internet Service Provider) with the same mobile network SIM (subscriber identification module) the user owns, the internet tends to finish very fast. In addition to it, failure to provide convincing and proper transparency by ISP for internet usage and traffic consumed by users remains a major concern among the users.

Some of the web applications and services are in English and many of the users thus cannot understand as English is not their native or first language spoken in the country.

The respondent mentioned they do not get enough web-related support and help from friends and their senior family members tend to overprotect and restrict them from engaging in any outside activity. Doing so the users believe, the family does not provide any opportunity for them to participate and learn that might exist out their door. Lack of family and friend support towards the people with disability is found to be the biggest reason affecting their web usage.

5.3   Results From Interviewing Web Employees.

First, we talk through the web employee´s responses to the questions they have been interviewed.

We maintain the table for each interrogative question and report the responses with numeric data or yes/no, as appropriate. And we represent the responses for the questions that generate ideas or expressions, in any appropriate graph, by grouping and differentiating ideas or expressions under specific categories. Some of the key responses of the web employees are quoted to better understand their perspectives on the questions asked. However, it is worth noting that, few web employees might have falsely responded to some questions favoring accessibility knowledge and practice owning to their dignity, identity, and fear of losing the job. In this regard, the hesitancy and reluctancy of some web employees were sensed during the interview process.

1. **Since how long are you working in the profession of web technology, after finishing your degree or training education?**

The responses from web employees on their experience in the field of web technology are shown in the Table 5-8 below. The work experience for the web employees ranges from 1 to 12 years. The average work experience of web employee is 5.5 years. Most web employees have work experience of 3 to 6 years.

Key web employees responses:

B1: *"I have been working for 6 years now. I am also a part-time lecturer in Polytechnic University."*

D2: *"It's been more than decade of working in IT jobs, in 6 companies"*

Table 5-8: Work experience of web employees in the field of web technology.

A1	B1	C1	C2	D1	D2	D3	E1	E2	E3	E4	F1	F2	F3	F4
2 yea rs	6 yea rs	4 years	4 years	3 years	12 years	8 years	3 years	6 year s	9 year s	4 year s	7 yea rs	4 yea rs	1 yea r	6 yea rs

2. What are your academic qualifications in the field of web Technology?

The responses from web employees on their academic qualification are shown in the Table 5-9 below. Five web employees hold master's degree in computer science, 4 have bachelor's degree in Computer Science, 4 have web development related training and remaining 2 hold other computer related training. The maximum academic qualification attained by any web employee is found to be up to master's degree.

Key web employees responses:

D2: *"I worked immediately after completing 6 months of diploma course in web and graphic design in 2007. It was considered demanding and technical job then (which still is) as workforce in IT sector was scarce. Now I have colleagues working with me who have advanced technical and updated knowledge than me."*

F2: *"I hold a bachelor's degree in Computer Science and Engineering from UEM(Universidade Eduardo Mondlane). I started working from 2015. I am responsible for mobile application development in the company "*

Table 5-9: Qualification of web employees.

Qualification level	Number of web employees respond
Master's degree	5
Bachelor's degree	4

Web development training	4
Other training courses	2

3. Are you aware of any state obligations, regulations and policies put in place for web accessibility?

The responses were, 1 of the web employees responding he knows at least one of the state obligations, regulations or policies for web accessibility, 8 web employees responding 'No' and 6 were not sure if they know any. In addition, the only web employee knowing any regulations or policies for web accessibility knew only the section 508 compliance of the American Disability Act and is unsure if any such act exists in the context of Mozambique. The table 5-10 below conveys the same information.

Key web employees responses:

A2: *"I am not sure about it. I can't precisely say about this, even it exists. I am unaware, sorry"*

C2: *"What I know is only about section 508 compliance of the American Disability Act. I knew it sometime ago in one of the seminars. I am not aware of any others. "*

Table 5-10: Number of web employees response to state obligations, regulations and policies

Nature of Responses	Number of web employees respond
Yes	1
No	8
Not Sure	6

4. Are you familiar with web accessibility and the tools and guidelines for it? Can you name them?

The responses were, 6 of the web employees responding Yes, 4 responding No and 5 Not Sure. The table below conveys the same information. However, as compared to the responses to the

question, where 6 web employees said they are familiar with the web accessibility, only 3 of them could explain more about accessibility guidelines and tools. Given this nature of responses, it was sensed that three of the web employees might have falsely responded that they do know about accessibility just because of fear of losing their identity or to secure their job place. The table 5-11 below conveys the same information.

Key web employees responses:

D2: *"I am aware of web policies put in place by WWW's WAI. But we (including other web employees in the company) are not mandated to practice that. And if you are asking about any state regulations for web accessibility, we are not aware of that, at least not me."*

B1: *"I don't know what that means. But I think it's about making web services more practical, isn't it? "*

F1: *"I have heard about it, but I cannot explain it to you. As, I don't know a lot about it"*

Table 5-11: Web employees responses to web accessibility and the tools and guidelines.

Nature of Responses	Number of web employees respond	
Yes	3, further explains web accessibility	3, does not explain anything on web accessibility
No	4	
Not Sure	5	

5. **Do you practice any approach to make your web products accessible? And how many projects you have worked with had web accessibility implementation in it?**

The responses in this study, paradoxically, only 2 web employees out of 3 having prior understanding and knowledge on web accessibility said they incorporate it in their web products. Four of the web employees said they do not approach any form of web accessibility in their product while 9 of the remaining were not sure if they incorporate any. The other set of question recorded none of the web employees had worked on web accessibility specific projects. Thirteen of the total web employees acknowledge they did not work in such projects

at any time, while the remaining 2 would not turn otherwise saying they worked on it but cannot realize the exact number of projects. The table 5-12 below shows the same information.

Key web employees responses:

A1: *"I am new to the work here. Despite that, I have not gotten any advice on how to start proceedings related to web accessibility. I think the higher authority in this company are responsible for ensuring practicality of the web solutions. I have never seriously worked with the projects that required web accessibility."*

D2*: "Never seriously exercised web accessibility in the products. But I try to work on the basics like alternative text, improving contrast, and few WCAG compliance level A. But I haven't exercised enough time dedicated to just web accessibility. I have worked in few companies here, trust me, web accessibility is least of their importance."*

Table 5-12: Web employees responses practicing web accessibility currently.

Nature of Responses	Number of web employees respond	Worked on specific web accessibility projects
Yes	2	0
No	4	13
Not Sure	9	2

6. Are you or any other employee in this company is responsible to ensure the products are designed accessible or review the product for accessibility before releasing?

Out of 15 employees, none of the employees in any of the company is found to be responsible to ensure the web products released by them meets accessibility standard. Ten of which are certain to admit this while 5 of them were not sure if there exists anyone for the same. However, 2 web employees responded on an individual basis they try to meet the accessibility standards to the best of their ability in the project they are involved in. But this response was

not enough to meet the criteria that aim to find if there was any web employee who was responsible for ensuring web accessibility. The table 5-13 below shows this information.

Key web employees responses:
D1: *"I have never been asked to maintain or verify web accessibility in 3 years of work experience. The manager holds a responsibility in our company to verify the product before release. I think he does that sometimes."*

A1: *"I am not responsible, at least. I cannot say about others. I am relatively new to work here, so don't know much of other responsibility in death."*

Table 5-13: Web employees responses on, if they or any other employee responsible for web accessibility.

Nature of Responses	Number of web employees respond
Yes	0
No	10
Not Sure	5

7. Do you think implementing web accessibility is important?

The responses considering whether web accessibility is important, 2 web employees feel it is while 10 web employees feel it might be important. The remaining 3 cited as it is not very important.

Key web employees responses:
F1: *"The societal gap is very high in our community. The best way possible to minimize that is by educating everyone on how to use the web and internet. But it is in the hands of government and the finance needed is too high to afford for country like Mozambique "*

C1: "*Accessibility is the least of the concern because the audiences of the products are not people with disabilities. Even if it is, the numbers are negligible.*"

Table 5-14: Web employees responses to, if web accessibility is important.

Nature of Responses	Number of web employees respond
Yes	2
No	2
Not Sure	10

8. How important do you think is a topic web accessibility is about the people with disability in Mozambique? And why?

The responses to this question which were foreseen as an important factor in our research study prove out to be depressing from the responses gathered. Most of the responses were indifferent showing little or no concern towards people with disabilities and thus not accounting for their needs that can be addressed through web accessibility. Only 3 out of 15 web employees feel web accessibility regarding people with disabilities is important.

Out of 12, 10 are not sure if it can positively impact people with disabilities and 2 others assuming web accessibility can't help people with disabilities at any cost. On subsequent sub-questions with these 12 web employees, most of them were found to consider people with disabilities with the medical model rather than the social model or environmental model. Thus, 12 web employees responding to being apathetic should not be surprising given that they conceptualize people with disabilities with the medical model.

Key web employees responses:

D3: *"It is certainly important. And especially, in the countries like Mozambique, it's very important to include all users digitally. Given the fact of the easily acquired benefits of the web, everyone should be facilitated by it."*

Table 5-15: Web employees responses on if web accessibility is important to people with disability in Mozambique.

Nature of Responses	Number of web employees respond
Yes	3
No	2
Not Sure	10

9. Do you think implementing Web accessibility is a difficult and challenging task? Why?

The responses to this query were quite concerning as only one employee feel web accessibility is not difficult and challenging to implement. While 4 others felt it is difficult to balance the requirements and services for both the user groups and the rest of the 10 employees responded that they are not sure what experience it can be when working with accessibility pragmatically.

Key web employees responses:

F3: *"I am certainly not the right person you would be asking it. I am new to this field of work. I think if I learn that it could be easy for me to explain."*

E4: *"Yes, it is quite difficult. There are many considerations to be taken on board. If all points of accessibility should be met, its challenging and often can need an expert hand on it. It is difficult (web accessibility) for any company in Mozambique for two reasons. First, it can be expensive to hire an additional expert in web accessibility and secondly, lack of such professionals"*

Table 5-16: Web employees response to if web accessibility is difficult and challenging.

Nature of Responses	Number of web employees respond
Yes	4
No	1
Not Sure	10

10. **Do you think the user base for the web products or services would increase when web accessibility is practiced more frequently?**

Six web employees responded that practicing web accessibility frequently, the numbers of customers or users can be increased for any web products or services. On a further note, 3 out of these 6 web employees were quite vocal towards people with disabilities on how web accessibility can avail more opportunities to them and help themselves involve in a digital platform that otherwise is difficult to attain given their physical condition.

On a contrary though, other remaining 9 web employees did not put on any views that would relate people with disabilities. Two out of these 9 web employees feel practicing web accessibility might not influence or change the number of user or customer at all and 7 others were not sure if it can or cannot have an impact.

<u>Key web employees responses:</u>
D1: "*I don't think so. I think most of the people with disabilities do not use web services in Mozambique. Even if they need to, they are helped by their family and friends if anything important is to be performed through the web. However, some of them (people with disabilities) uses the basic and most common applications like Facebook, WhatsApp , etc.*"

D3: "*It has certainly potential to do so. If we regularly incorporate accessibility features in web products, we can appeal users having disabilities use them. But it's a far-reach goal, nevertheless certainly doable. Patience is the key.*"

Table 5-17: Web employees responses to if the user base for the web products or services would increase when web accessibility is practiced.

Nature of Responses	Number of web employees respond
Yes	6
No	2
Not Sure	7

The remaining final question is by far the most explanatory questions designed to open web employees in their responses during the interaction process.

11. What do you think are the reasons behind web inaccessibility in Mozambique?

Since the responses from this question produced many subjective personal opinions, we, therefore, select common opinions and group them under the different appropriate factors to illustrate more clear and concise observations. Grouping responses thus helps the report to decisively analyze the responses collectively rather than separately discussing them. We discuss briefly the grouping of these factors. We grouped all the responses in the individual factor which indicated the inaccessibility in web areas results from individual actions and responsibilities. Organizational factors consist of responses that describe the reasons for web inaccessibility that potentially arises within or from the company or organization the web employee is involved with. And the responses that do not arise from individual or organizational results and that most probably comes from the other sources are grouped under external factors. The table below categorizes the web employees' responses under three mentioned factors.

Key web employees responses:

E1: "*I am not sure what are exact reasons. But If I were a manager of this place(company), I would require web designers to interact with the customers so proper user requirement falls in the ears of designers.*"

F4: "*More meetings between the manager, stake holders and web employees(working for that project) should take place after completion of major iterations in the development lifecycle of the project. This will help better analyze the segmented task for each responsible web employees before compiling with any possible incompatibility.*"

Table 5-18: Grouping of web employees' responses into Individual, Organizational and External factors.

Group of factors	Nature of web employee responses
Individual factor	Perceiving disability with medical model
	Poor knowledge on the topic of web accessibility.
	English Incompetency
Organizational factors	Low wages of web employees
	Lack of Internship training
	Organizational/stakeholder requirement
External factors	Customer/client requirement
	State policies and regulations
	Untrendy topic in Mozambique

The Venn-diagram figure 5-5 below shows the number of web employee's responses who thinks inaccessibility on the web is due to an individual ineptness or understanding of the topic. The report describes the three nature of responses under individual factor which are responsible for inaccessibility in the web. Several interviewee's responses mentioned under the Medical Model depict disability is an individual condition that limits their ability to use the web. The medical model defines disability located within the individual(Marks, 1997). Thus, we categories their approach towards people with disabilities under the Medical Model. The response under "poor web accessibility knowledge" means the responses from the interviewee who admitted inaccessibility is due to their poor knowledge on the topic. However, some responses blamed the inadequacy of their level of English. Further, they reported, as most of the mainstream web development environment and applications are in English, sometimes their limited comprehension skills in English do not allow them to advance their work. And thus, they work with a fixed package of workload in their everyday job.
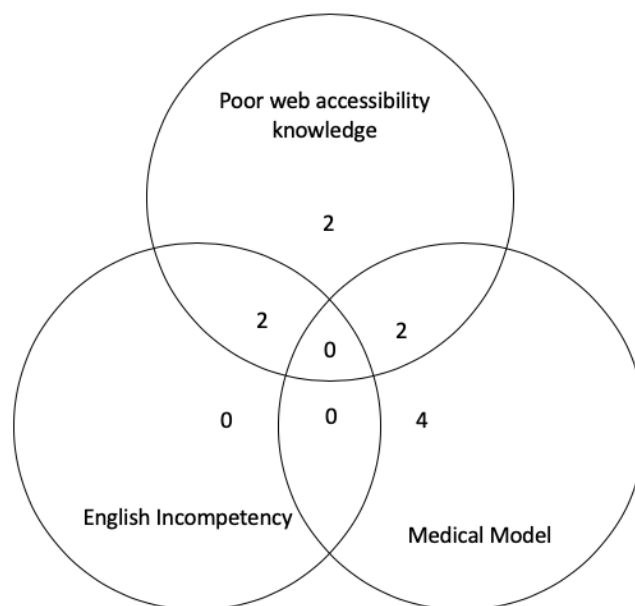

Figure 5-5: Venn-diagram of web employees' responses under Individual factors.

The Venn-diagram figure 5-6 below shows the number of web employee's responses who thinks inaccessibility on the web is due to their organizations or company in which they work in. Some of the responses criticized the pay scale for web employees in IT companies being low. According to a few of them, given the nature and level of work in the IT industry, and is called a software developer or web developer, the tag does not justify the payment. While some also feel that, being hired as a fresher in the company, it is the company's responsibility to train them on new or unknown topics. This would make them cognizant of the company's work culture, practice, and trend. Some of the web employees were also noted citing it is not because of them the web products are inaccessible rather it´s project manager or stakeholder's requirements that rarely mandates building accessible products. Also, the web employees are hardly been asked to incorporate web accessibility in the projects. There can be many probable inferences to this, stakeholders or project master´s lack of knowledge on web accessibility. The presumption that the accessible web products can cost more and require more time or being complacent assuming ad hoc population satisfies the major customer base.
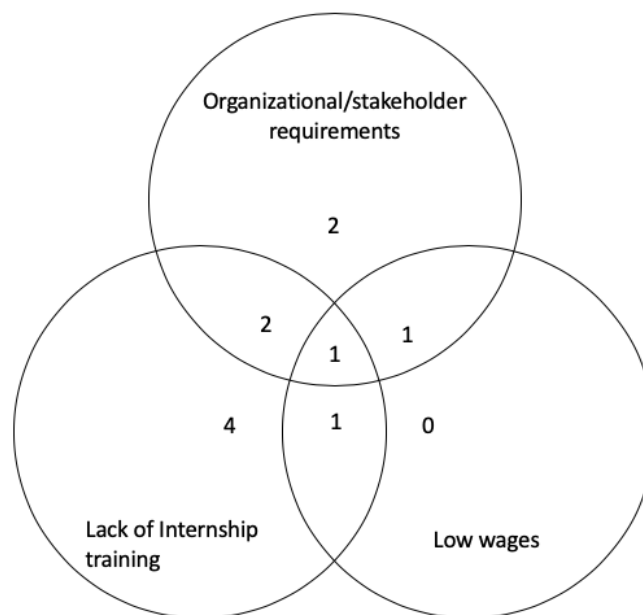
Figure 5-6: Venn-diagram of web employees' responses under Organizational factors.

The Venn-diagram figure 5-7 below shows the number of web employee's responses who thinks inaccessibility on the web is due to other factors that are external than those factors mentioned above. Many web employees feel it is due to the State´s poor law-making strategy and policy responsible for web inaccessibility to a great extent. They feel the topic is unique and are thus not aware of web accessibility practices because they are not obliged to follow such practices as regulations. They blame the absence of any ICT policies not relating to web accessibility. Also, some responses cited the client, or the customer does not come up with accessibility requirement and as a result, the product must be built based on what they demanded. However, the research also finds some interviewees feel the topic of web accessibility is not ubiquitous in Mozambique and thus untrendy which in effect fails to motivate the web accessibility practice further.

Figure 5-7: Venn-diagram of web employees' responses under External factor.

6 DISCUSSION

6.1 Discussion from Findings and Results.

To our understanding, this report work is first of its kind that has explored the factors contributing to web inaccessibility in Mozambique. The ubiquity of the websites supposedly serving as the basic exponent of the web througho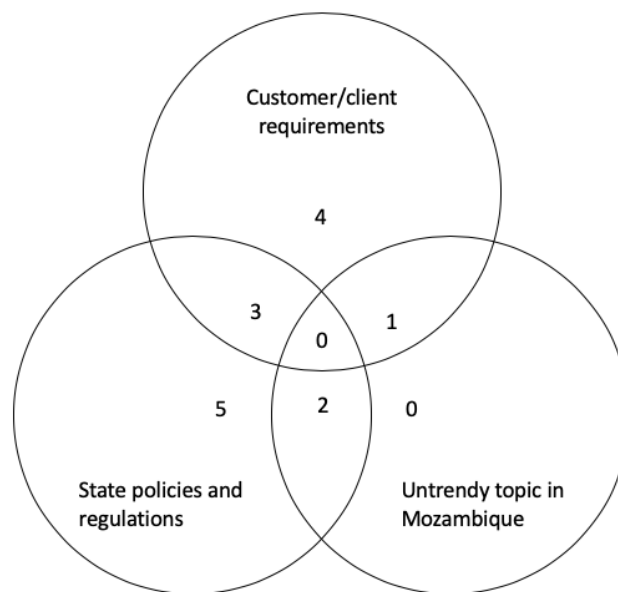ut the globe, nonetheless, remains utterly inaccessible in Mozambique. The web experience among the people with disabilities and web accessibility practice among web employees in Mozambique remains poor, the study revealed. The factors contributing to it are studied, which remains more of an extrinsic like poverty, poor education, governmental policies, and ICT infrastructures. However, there is a need of further or similar studies to better understand the case.

Analyzing the results from 3 perspectives: evaluation of websites, user testing and interacting with people with disabilities and interviewing and interacting with web employees in Mozambique presented us with a broader understanding of the causes for web inaccessibility in Mozambique.

The 5 websites evaluated showed basic to major accessibility flaws and none of the websites comply with WCAG 2.1 guidelines to the adequacy to meet web accessibility. The governmental website, http://www.portaldogoverno.gov.mz/ is found to have the worst accessibility among the 5 websites. This result is in line with the study from Costa et al., (2013) where the authors finds the Mozambican governmental websites to be inaccessible. This paper intended to study which conformance level of web accessibility the overall websites suffers the most. On a disappointing note, none of the conformance level showed satisfactory accessibility level. Only 3 web accessibility conformance levels, Seizures and physical reactions, compatible and readable, ranged from 50 to 66.66 pass percentage and the other 9 conformance levels failed to make impressive marks. Such results of the websites are inevitable to cause web accessibility barriers for people with disabilities using it. Also, our study learnt

the usage of the website among people with disabilities is seldom. This proves that websites in Mozambique have failed to outreach people with disabilities due to their inaccessibility.

The usage assistive technology among people with disabilities in Mozambique is uncommon and scare. The results are in agreement with (Eide & Kamaleri, 2009). However, some people with disabilities who have been using assistive technology are better performers of web-related tasks than their counterparts. Thus, the users having using assistive technology decisively creates a line among the users with those who cannot perform on the web. This is found to be a potential contributor for inaccessibility on the web among the group of people who don't use assistive technology. In addition, some other non-technical factors like poverty and lower levels of literacy in tandem with digital literacy are tangentially linked to affect many people with disabilities use the web. The underlying requirement for users using digital services, for instance, website, should have a qualified level of alphabetical literacy followed by equally adequate digital literacy (van der Geest & Velleman, 2014). More than half of the users in the basic web-task fails in this regard, let alone the adequate digital competencies needed to undertake any further complex task. In uniformity with the previous research carried by Sida[9], (2014) our study agrees that people with disabilities in Mozambique face a high rate of exclusion and discrimination in society. In addition to it, the other extrinsic factors like poor ICT infrastructure, user's poor educational background, weak financial status, unsupportive and unaccommodating family and friends including, user's innate belief on own inability, are responsible for affecting the practice of web services among users with disabilities in Mozambique.

The study on web employees established that the approach towards the accessibility in web and inclusive design does not seem a serious practice amongst the web employees in Mozambique. Almost all web employees build a web product for the mainstream general population and do not consider people with disabilities in Mozambique. None of the web

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[9] In Mozambique, discrimination over people with disabilities is a common issue in employment, education, health care, and the provision of other state services (Sida, 2014).

employees incorporates accessibility measures in all their products and only very few of them practice web accessibility measures at some time. This is to say, there exist, little if any web employees practice web accessibility on their own. The web employees are found to be deeply unaware of web accessibility guidelines and tools despite being available in the public domain. The level of understanding and awareness of the web employees in the subject is undoubtedly found to be dearth. However, the other factors buttressing this obvious fact are worth reflecting upfront. Absence of state policies and regulations specific to web accessibility, rudimentary web requirements and apathetic considerations from stakeholders/clients for their products and lack of web accessibility training for web employees are the factors, in the first place, restraining web employees practice web accessibility, in addition to other several factors mentioned in the previous section. The attitudes of most of the web employees towards web accessibility should not come as much of a surprise considering the impact of these factors that do not motivate and make them cognizant of the topic. Surprisingly, despite the average period of experience of web employees working in the IT industry accounted for 5.5 years and only 4 out of 15 web employees interviewed aged less than 4 years of working experience, the lack of practice for web inaccessibility is hard to fathom by. However, it can be ascertained that approach towards web accessibility has been an enduring ignorance concern. Consequently, it all comes down to a lack of awareness towards web accessibility and thus they lack the competencies and skills demanding in the field of web accessibility. As the problem seemed to be more of an awareness concern than that of malpractice, it is unfair to rule that web employees are the main account for web inaccessibility issues in Mozambique. Though it can be inferred that the inaccessibility of the web is greatly influenced by the actions from web employees and their understanding and awareness towards the subject, other influential factors mentioned above propels web employees in their action. Thus, addressing these driving factors should affect web employees in their approach and practice towards promoting web accessibility. However, this should not be an excuse to rule web employees completely off as a major exponent for inaccessibility on the web in Mozambique. Other various reasons account for web inaccessibility in Mozambique as mentioned earlier in the findings.

For many interviewees (both people with disabilities and web employees) showed little knowledge of web accessibility. The majority of the population with disabilities do not consider themselves typical web users and those who use the web call themselves occasional users. And web employees seldom perform any accessibility measures in their web solutions. For many (but not all) interviewees, 'accessibility' in the web is a novel and unfamiliar topic, and thus its scarce experiences among them should not be considered surprising. This is the prominent reason why most interviewees could not subjectively mention the technical or functional issues on web accessibility rather would easily go on to explain other tangential factors they suppose are responsible for it. The dearth of information related to web accessibility is because the population of disabilities using the web or making their daily life through the web is found considerably low in Mozambique. The dearth in findings of core results specific to web accessibility from interviewees led the research for evaluation of rationale for non-technical (extrinsic) results. The study finds the number of factors in the quest, characterized into different groups, discussed in the result section. These identified extrinsic factors are fairly consistent and can be related to the factors explained in past research (Oyedemi, 2004), where the author urges the simultaneous holistic extension of cultural, political, societal and economic factors for universal ICT access.

In an alternate angle, the findings of the study call for immediate attention towards improved web accessibility and it can largely be achieved by addressing the barriers, the extrinsic factors which are understood in the study. However, the situations for improved web accessibility in a low-income country like Mozambique largely remains in the hands of the government. Most of the findings are also in line with the need for government supports, like provisions of resources, awareness and assistive technology to people with disabilities and legislative framework on web accessibility standards for web employees. This study found the similar kind of results, with the study form Baguma et al., (2007), contributing to web inaccessibility in Mozambique, where web inaccessibility in the country is due to the absence of web accessibility specific regulations and policies.

The field of ICT in Mozambique is at its infancy stage, and certainly needs improvement in ICT policies and regulations relating to web accessibility, which in specific have not taken place before. With the government gradually initiating and developing ICT projects shows the realizations have derived into effect. This research has found evidence on how some nations in the past or recently are able to improve accessibility on the web by amending and enacting the laws. From, UN CRPD conventions regulations, web employees' responses, improved history of other nations enacting web accessibility laws, etc. provides enough rationale for Mozambique to act very soon to enact and regulate policies inaccessibility on the web.

The UNCRPD article 9: Accessibility, Paragraph 28 of Chapter 3 "Obligations of States parties" presents a suitable case for countries like Mozambique to implement accessibility in ICT by adopting suitable legal framework in the absence of relevant legislation(Committee on the Rights of Persons with Disabilities, 2014, p. 8).

6.2   Limitations of the Study.

The coverage of the focus groups used in the research is very narrow. As web employees from Maputo city and people with disabilities from Maputo, Xai-Xai and Matola districts were only considered in the whole of Mozambique. The reliability of the research conducted within such a smaller scope of place to a certain degree is debatable. Nevertheless, as the study was conducted majorly in the capital cities of the provinces (including capita of Mozambique) where it is believed modern technology for web accessibility is provided. Thus, it would not impact the results greatly. This is because the higher value of the range of data would remain the same even though the study had covered more places in the country.

We did not consider higher secondary school students which supposedly contributes to potential users engaging in the modern web technology in existence, the study in these regards can go missing.

The hired language interpreter and online google translator were used in the translation of the Portuguese language to English and vice versa, to and from focus groups and me(as a researcher). He was found to have a below par proficiency in English and mediocre understanding and knowledge towards the web and ICT. The gap in language and technological understanding might have created some flaws in communication between the interviewer/me (author) and interviewees (focus groups). Thus, resulting an impact in the quality of data collected. At times the online google translator was used in the thesis work. I, however, acknowledge that google translator is not a true substitute for language translation and thus doesn't always provide a high-quality translation as that one human translator could offer. On all these limitations, it could be improved in future work by better pre-evaluation of the interpreter and his/her skill possessions needed for the intended work. Any material needed to be translated, is better advised to be translated using human interpretation rather google translation to avoid any gaps.

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For one of the websites among 5 used for automatic evaluation, the URL for www.olx.co.mz is no longer available. This realization came during the final 2020 self-evaluation before the submission of the thesis. According to local source, the website has been taken down due to security concerns. However, the version of the website evaluated for automatic testing can be traced backdate at https://web.archive.org/web/20190128220421/https://www.olx.co.mz/ at archive.org.

Since, live physical observation was carried on how people with disabilities perform their task, it might have affected their confidence and hindered their performance. Some user selections through a random sampling technique might be unreliable as readily available users and user's voluntary response is processed in the research (Khan Academy, 2020). Failing in the authentic selection of users; called error sampling also poses a threat for ineffective selection procedure among users (Sharma, 2017).

6.3   Suggestions for Future Work.

Basically, future work on same type of study should consider correcting the limitations of this study discussed in the above section. The most important suggestions remain to study more and broader focus groups (people with disabilities and web employees) from other various parts of Mozambique to produce more consistent and accurate generalization of the country.

It should be noted that this paper does not aim to discuss what could promote web accessibility in Mozambique rather it focuses on what are the factors that cause inaccessibly on the web. However, the argument can be made, as if addressing these factors, it could be influential for prompting and achieving web accessibility in Mozambique. Similarly, the findings from this research work can be instrumental for future works which aim to study or promote web accessibility in Mozambique. Even so, this remains to be seen, this study could contribute to any future work, carried out for the same purpose.

Despite our study discovering dearth of accessibility in ICT and web, this provides a new opportunity for web builders, stakeholders, regulation and policy makers to encompass accessibility/universal design guidelines and principles from beginning. A good reference for such practice can be exercised from widely accepted source of Web Accessibility Initiative (WAI) of W3C which develops guidelines, widely regarded as the international standard for web accessibility. This can be found at https://www.w3.org/WAI/ (world wide web consortium (w3c), 2020). In addition, universal Design approach is flexible and can be adopted to meet local case, thus indicating its inclusive nature where the design process can be consultative and participatory with local environment. It is considered cost-effective because it requires additional costs of approximately one percent if incorporated from the outset of a project (Snider & Takeda, 2008, p. iii). Incorporation cost of implementing Universal design can be found on the report "Cost-benefit analysis of universal design". The authors presents the detailed literature on Universal design, measurements of outcomes and effects of universal design, and cost-benefit analyses (K. S. Fuglerud, Halbach, & Tjøstheim, 2015).

7 CONCLUSION.

Our study discovered there exists web accessibility and usability issues on the web for people with disabilities in Mozambique.

The most used 5 websites in Mozambique being evaluated are found to have major accessibility flaws. Added with, the user testing and interactions with the users: people with disabilities showed their inability in using web services and scarce usage of assistive technology while performing web-related tasks. Interview and interactions with web employees in Mozambique revealed their inept awareness and skills in web accessibility guidelines and knowledge to perform any web accessibility practices in their web solutions. Combining the results of these three different methodological approaches (website evaluation, interview and interaction with people with disabilities and web employees) for studying web accessibility in Mozambique helped to understand the underneath issues contributing to the web inaccessibility from their individual and independent levels. Our study found that the issues in web accessibility in Mozambique, are more of an extrinsic in nature which is the cause for a functional (technical) issues, inaccessibility flaws on the web. Thus, the extrinsic (non-functional) factors must be addressed to achieve accessible functional (technical) requirements relating to web accessibility. These extrinsic factors are majorly societal, financial, organizational, legislative, and environmental/external factors. These factors contribute to maintaining a gap in the adoption of web accessibility support and services for people with disabilities and practice and awareness among web practitioners. Being one of the members among the state parties to the UNCRPD Article 9 relating to 'accessibility' aiming to improve accessibility for people with disabilities, Mozambique is only slowly progressing, this study finds.

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9 APPENDICES

i APPENDICES

Interview questions for people with disabilities.

1. How was your experience of coming to the interview today? How the use of web applications helped you if any.
2. Do you own any mobile, computer or any digital devices that work using the web?
3. How often do you use the web, the internet?
4. Have you ever heard about web accessibility?
5. What are the web accessibility barriers you generally encounter? Maybe disability-specific or non-disability specific? How friendly are web services for you when using it?
6. How do you get benefitted using these applications in your daily life?
7. Do you face any kinds of barriers while using any web services or applications?
8. Do you use any assistive devices in combination with phone or laptop?
9. How often do you access a website and which websites do you use more often?
10. what kind of activities do you do through the web? How easy is it for you? Tell me about Your experiences in using them.
11. What kind of things are still difficult for you to perform on the web?
12. How do you meet your different needs, which otherwise couldn't have been possible through the web?
13. Do you think these problems are exclusively faced by you or there may be other users as well as facing the same problem?
14. Would you like to add anything before you go?

ii APPENDICES.

Interview questions for web designers:

1. How old are you in this profession of web technology?

2. What are your academic qualifications in the field of web Technology?

3. Are you aware of any state obligations, regulations and policies put in place for web accessibility?

4. Are you aware of web accessibility and the tools and guidelines for it?

5. Do you practice any approach to make your web products accessible? And how many projects you have worked with had web accessibility implementation in it?

6. Are you or any other employee in this company is responsible to ensure the products are designed accessible or review the product for accessibility before releasing?

7. Do you think implementing web accessibility is important?

8. How important do you think is a topic web accessibility is in regard to the people with disability in Mozambique?

9. Do you think implementing Web accessibility is a difficult and challenging task?

10. Do you think the user base for the web products or services would increase when web accessibility is practiced more frequently?

11. What do you think are the reasons behind web inaccessibility in Mozambique?