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**Accessibility and Usability of Selected Information Systems in
Ghana with focus on Foreigners**

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ANNOTATION

The aim of this paper is to propose a suitable procedure of accessibility and usability evaluation of selected information systems in Ghana for foreigners. Selected everyday designated life situations will be used as a base for evaluation. List of recommendations on how to improve evaluated information systems will represent another output of the thesis. SortSite evaluation tool was used in the evaluation process. It is an automated software which can be used to evaluate both usability and accessibility of a website. The findings of the thesis show that the government of Ghana needs to implement laws which will enforce the designers to comply with rules and regulation governing web creation.

KEY WORDS

Information System, Accessibility, Usability, Ghana, Foreigners

NÁZEV

Přístupnost a použitelnost vybraných informačních systémů zaměřených na cizince v Ghaně

ANOTACE

Cílem příspěvku je navrhnout vhodný postup pro zhodnocení přístupnosti a použitelnosti vybraných informačních systémů v Ghaně pro cizince. Zvolené každodenní životní situace budou použity jako základ pro hodnocení. Dalším výstupem práce bude seznam doporučení, jak hodnocené informační systémy zlepšit. V rámci hodnocení byl v práci použit vyhodnocovací nástroj SortSite. Jedná se o automatizovaný software, který lze použít k vyhodnocení použitelnosti a přístupnosti webových stránek. Výsledky práce ukazují, že vláda Ghany musí implementovat zákony, které přimějí návrháře, aby dodržovali pravidla a zásady pro tvorbu přístupných a použitelných webových stránek.

KLÍČOVÉ SLOVÁ

Informační systém, přístupnost, použitelnost, Ghana, cizinci

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LIST OF THE ABBREVIATIONS

GIS	Ghana Immigration service
GTA	Ghana Tourism Authority
JUSG	Judicial Service Ghana
MOH	Ministry of Health Ghana
MOE	Ministry of Education Ghana
GSS	Ghana Statistical Service
E-GH	E-Ghana
EG	Elective Ghana
UOG	University of Ghana
UST	Kwame Nkrumah University of Science and Technology
WWW	World Wide Web
ISO	International Organization for Standardization
WCAG	Web Content Accessibility Guidelines
W3C	World Wide Web Consortium
GH	Ghana
WAI	Web Accessibility Initiative

INTRODUCTIONS

In this 21st- century information systems or technology has become our source of life. It is everywhere around us. At workplaces, in homes and even when travelling. Therefore, we expect information systems to meet our daily needs. We express our frustrations when they do not meet these obligations or expectation. The degree to which merchandise can be used by itemized handlers to realize a specified goal with success, proficiency, and satisfaction in a specified context of use is the meaning of usability according to International Organization for Standardization (ISO). And, according to ISO/IEC Guide 71: 2014, defines user accessibility as a user need to be related to features or attributes that are necessary for a system to be accessible. Thus, user accessibility can vary over time and across contexts of use.

According to Stats, I. W. (2013), there are about four billion (4000000000) users of the internet. These users represent about 60% of the world's population. In Africa, it is estimated that approximately four hundred million (474,000,000) which amounts to 35.9% of the population use the internet. In Ghana, it is estimated that about thirty million (33.6%) of the population use the internet for several reasons, research reasons, business reasons, educational purposes, commerce, entertainment, etc.

Despite the benefits, the internet provides to its users, usability and accessibility are not equal for all people. This can be particularly true for foreigners in a country. Foreigners might not use the internet due to challenges such as language, the prohibitive cost of the internet, and the internet devices. In this regard, they may not be able to have access to key information on e-commerce, health, immigration issues, and other vital information needed to make their stay in a country comfortable.

The aim of this thesis is to assess the usability and accessibility of information systems in relation to foreigners in Ghana. This thesis will be structured as follows: chapter one will focus on the theoretical aspect, the methods and sources of data, will be on chapter two, chapter three will focus on the results and discussion, chapter four will conclude the dissertation with a policy recommendation.

1 ACCESSIBILITY AND USABILITY BASIC PRINCIPLES

Internet usage penetration in Ghana has reached about 33.6%. According to internet usage statistics survey by Stats, (2013), little over ten million (10,110,000) people are already using the internet in Ghana. Due to the huge number of internet users and swift globalization has compelled the government of Ghana to provide information to its citizens through the web-governance. The usage of the web for information has made it much easier for people to use less time and has also reduced travelling a long distance before accessing information in the developed countries.

1.1 The World Wide Web

In recent years, the World Wide Web (WWW) has been an essential tool or platform which has contributed positively to the lives of many people all over the world. It has changed the way we connect to people, the way we access information and to connect to services. It has been one of the most vibrant tools of an information system. It has brought a great change in balancing the power of centralization to decentralization (Bratt, 2010). It is the ultimate library, the metacentre of information technology and information system. Currently there are a little over four billion (4,156,932,140) users of the internet and these users represent about 60% of the world's population according to Stats, I. W. (2013), they use the internet/web for different reasons, the politicians use it to express their intention for helping their communities, students use it as a platform for sharing and acquiring new ideas. Businesses also use it as a medium for showcasing their products and services as well as interacting with potential customers and partners. The inventor of the World Wide Web Sir Tim Berners-Lee created it as a medium which will *enable easier human communication, commerce, and opportunities to share knowledge and to make these benefits available to all people, whatever their hardware, software, network infrastructure, native language, culture, geographical location, or physical and mental ability* (Bratt, 2010). However, accessing the web is not available for everybody like it is supposed to be, and most of these peoples who are affected are those with a disability, old age and inevitably those in abject poverty who cannot afford the cost of using the internet. Tim Berners-Lee, director of the W3C and inventor of the World Wide Web, at the launch of the Web Accessibility Initiative (WAI) stated that; there are more than 750 million people with disabilities and today the number of people with disability has increased. So far as the world is embarking on all-inclusive connected

world, it is important that the Web is made usable by anyone, regardless of individual capabilities and disabilities. If the obstacles that separate people with disability from accessing the physical world is removed, then the web will be meaningful for communication (Aizpurua, Harper, & Vigo, 2016). If this can be achieved then, something must be done about Web accessibility which will help promote web usability.

1.2 The Relationship between Usability and Accessibility of the Web.

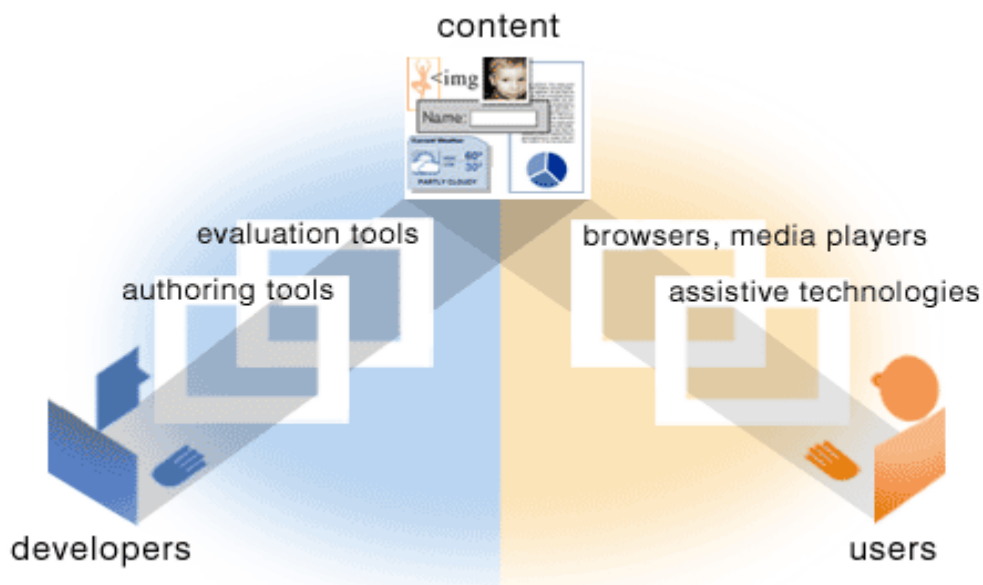
Usability and Accessibility over the years have both been well researched on the idea used in the linkage between user interfaces and more precisely on websites (Petrie, & Kheir, 2007). Usability and accessibility are important factors which have had a great impact on a given technology and how it is accessed by users. There is a strong belief that both usability and accessibility have common qualities and are mutually dependent on each other thus, without accessibility, usability is non-existent. However, defining the extent to which they go together has been difficult. Websites can be usable or accessible if both usability and accessibility are well structured according to (Aizpurua, Harper, & Vigo, 2016).

1.3 Web Accessibility

It is very important to understand the concept of accessibility which will help build better insight into web accessibility. The Transport Department of Lincolnshire County Council defines accessibility as a process that aims to promote social inclusion by helping people from disadvantaged groups or areas to access jobs and essential services (Lincolnshire County Council, 2013).

Web accessibility is defined as the means that people with disabilities can use the Web. Furthermore, Web accessibility describes how people with disabilities and in a deplorable state can make changes, understand, navigate through and interact with the Web, and how they can make contributions to the Web. The web accessibility depends on various components such as; content, Web browsers, media players, assistive technology, users, developers, authoring tools and evaluation tools to work better (Petrie & Bevan, 2009).

Figure 1. Components of accessibility



Source: Web Accessibility Initiative (WAI). (<https://www.w3.org/WAI/intro/components-desc.html>)

The Indonesian government has provided a law that supports people with disabilities to access information both online and offline in their constitution. There are also several developed countries with similar laws to include all persons in accessing information from the web. The United Nations Convention on the Rights of Persons with Disabilities (UN CRPD) describes getting access to information and communication technologies which includes the web as a basic human right.

When the designed websites meet these goals, then it is accessible to people with hearing, movement, vision, and cerebral disabilities.

Therefore, developers and organizations that want to create high - quality websites and websites must make sure every person is included when collecting data of making a website, so that it may not exclude some people from using their products and services. We can say content has no exclusions, only if it can be seen and accessible to people with disadvantages, whether medical, technical or language and social status. Accessing web content must come with technology which will aid the disabled persons to access an interface of the website, for example, a screen reader Rutter et al (2007).

Most often accessibility studies done has been focusing only on people with disability and sometimes the aged, but the aim of the founder of WWW was to give equal access to everybody.

As stated in Yesilada et al (2012), if the focus of accessibility can shift from only disabled persons to a more general issue to include every person then it will help get the aim of WWW inventor. Sometimes the problem an abled person faces when accessing a web content is like a disabled person.

1.4 Web Usability

To understand what usability is, there must first be understanding of who a user is. Usability, as stated in Kinuthia (2013) is a quality attribute relating to how easy something is to use. And a user in simple term means someone who operates or uses something. In technological terms, a user is a person who interacts with a system, or basically the people who use the internet to retrieve information to their benefit. Web usability puts so many factors into consideration such as, the ease of understanding the website, structure, interface, and content observed by the user, and the speed with which the users can find items they are looking for.

Usability defines as the degree to which an item can be utilized by determined clients to accomplish indicated objectives with adequacy, proficiency, and fulfilment in a predetermined setting of utilization (Elberkawi et al, 2016).

Usability is defined in five basic mechanisms as proposed by ISO quoted in Nielson (2012) as follows;

Learnability: How easy is it for users to accomplish basic tasks the first time they encounter the design?

Efficiency: Once users have learned the design, how quickly can they perform tasks?

Memorability: When users return to the design after a period of not using it, how easily can they re-establish proficiency?

Errors: How many errors do users make, how severe are these errors, and how easily can they recover from the errors?

Satisfaction: How pleasant is it to use the design?

Therefore, usability is one of the most important core mandates when it comes to the usage of world wide web/internet. Web users are sometimes difficult to predict due to human nature, in terms of behaviour and preferences. Whiles the technological way of creating a website is growing, so does the expectations of the users. Many a time, the user of the web does not want to spend much time searching for information online but wants a positive result.

1.5 Evaluation tools for web usability and accessibility

Evaluation and testing tools for Web accessibility and usability are software programs or online services that help determine if web content meets the rules and regulations governing the usability and accessibility.

1.5.2 Usability evaluation and testing methods

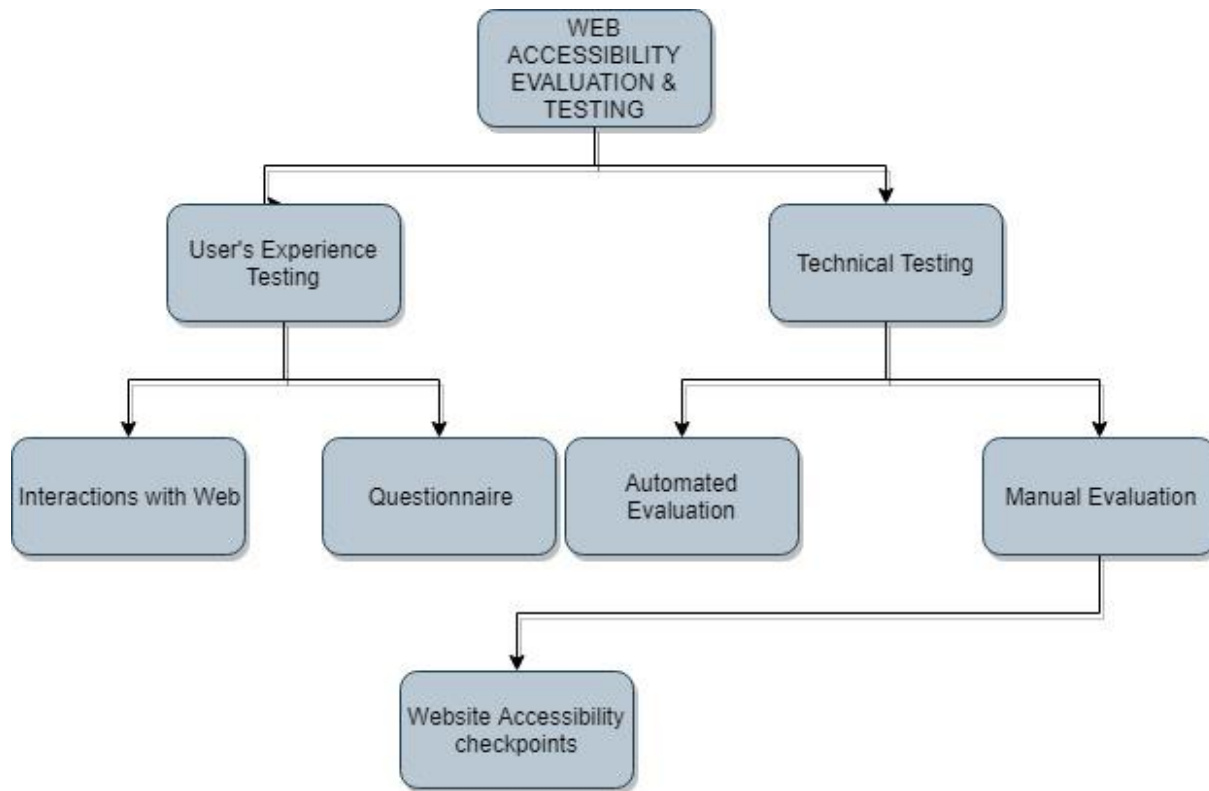
The most important element of usability is to make a product usable. Over the year's scholars have proposed several ways in which usability of websites can be evaluated. The online usability test method is one of the ways to evaluate usability. This method has direct involvement of the people/users who interact with the Website. This method has a vast focus on online testing as its name implies. This evaluation and testing method have the strength of collecting both data from a qualitative and quantitative source. It is very easy to gather many quantitative data in a short period of time since its interaction with users continues. It also has the tendency of collecting qualitative data about the experience of the user. The inspection method is another way of evaluating the usability of the website. A typical example is an online bus or flight booking website which provides services to customers, and the services they offer must be enough for customers to use (Elberkawi et al,2016). Booking agency does not care about how its product is being delivered to its customers but when the market is competitive, then it is important for the company to make things very easy for its customers or the website must be user-friendly.

The main concern of evaluation is to gather data which is in line with usability of a product, and this kind of task is mostly carried out using a group of people who uses the services of that product. As stated earlier in this page, there are two types or ways of gathering this kind of data, qualitative and quantitative method of a product. A quantitative analysis of a website evaluation has the focus of the quality of the website, while the qualitative analysis of a website can be done without the useful materials.

1.5.3 Accessibility evaluation and tools

There have been a few apparatuses created to upgrade the assessment of the dimensions of site availability. The figure below demonstrates the arrangement of site availability assessment. Hassanzadeh & Navidi's (2010) states that assessing web availability has been separated into two gatherings; testing by the client's involvement and specialized testing.

Figure 2. The two ways of evaluating website accessibility



Source: modified from Hassanzadeh & Navidi's (2010)

WAI developed Web Content Accessibility Guidelines which helps developers to build a website that has all-inclusive content no matter the status of the user or individual. Their maiden edition of guidelines which was WCAG 1.0 consisted of fourteen principles with sixty-five checklist, this checklist was divided into three main levels of urgency and completeness. In December 2008 it was upgraded to WCAG 2.0 with four main principles for making Web content accessible for all:

- a. Content must be made available to users in a way they can distinguish whether a user is able or disable.
- b. Content must come in such a way that user can interact with it with either standard or complicated devices.
- c. Content must be presented in manna that user can easily understand and work with it.
- d. Content must be presented using technologies and interfaces robust enough to allow for disability access, whether natively or in alternative technologies and interfaces.

The WCAG 2.0 has several checklists which help to achieve its goal as independent compliance unlike their maiden edition "WCAG 1.0" which had technological dependent difficulties. For the WCAG 2.0 to be considered as accessible, it must meet 5 conformance requirements and these requirements are:

Conformance Level – A website must fully meet one of the below levels of conformance:

- Level A - the minimum conformance level – the Web page must fulfil all success criteria of level A or ensure an alternate version with the same conformance.
- Level AA – this level can be fulfilled when all success criteria of levels A and AA has been met.
- Level AAA - must be fulfilled all success criteria of levels A and AA or ensured an alternate version with the same conformance.

Figure 3. Conformance level principles and guidelines

Principles	Guidelines	Level A	Level AA	Level AAA
1. Perceivable	1.1 Text Alternatives	1.1.1		
	1.2 Time-based Media	1.2.1 – 1.2.3	1.2.4 – 1.2.5	1.2.6 – 1.2.9
	1.3 Adaptable	1.3.1 – 1.3.3		
	1.4 Distinguishable	1.4.1 – 1.4.2	1.4.3 – 1.4.5	1.4.6 – 1.4.9
2. Operable	2.1 Keyboard Accessible	2.1.1 – 2.1.2		2.1.3
	2.2 Enough Time	2.2.1 – 2.2.2		2.2.3 – 2.2.5
	2.3 Seizures	2.3.1		2.3.2
	2.4 Navigable	2.4.1 – 2.4.4	2.4.5 – 2.4.7	2.4.8 – 2.4.10
3. Understandable	3.1 Readable	3.1.1	3.1.2	3.1.3 – 3.1.6
	3.2 Predictable	3.2.1 – 3.2.2	3.2.3 – 3.2.4	3.2.5
	3.3 Input Assistance	3.3.1 – 3.3.2	3.3.3 – 3.3.4	3.3.5 – 3.3.6
4. Robust	4.1 Compatible	4.1.1 – 4.1.2		

Source: own

1.6 Theoretical review

Taking accessibility and usability into consideration, several works have been done to prove that most public websites violate the rules and regulations of web usability and accessibility. Most of these findings were related to government websites. A study done by (Isa et al, 2011) to evaluate usability and accessibility in a Malaysian government website, showed that most of the e-government sites were issues of accessibility and usability rules. The authors used Nielsen heuristics and Web Content Accessibility Guidelines (WCAG) to evaluate about 155 websites and concluded that half of the webpages they scanned had issues of violating the rules of usability and accessibility of the web.

Another study which was conducted by Mtebe & Kondoro (2017) shows that most government websites in Tanzania have violation issues of usability and accessibility rules. Out of the 22 websites the study was conducted, 10 websites had issues of accessibility violations, which means almost 50% of the websites had more than 50 pages with accessibility issues and it was a similar case when it comes to issues with usability violations.

A research was carried out to evaluate usability and user experiences of Kenyan government websites by Kinuthia (2013) through lab-based usability testing which was done by a simple post-test survey. It was made known to the public that usability had several problems that prevented users from accessing those websites. Some of the usability problems included outdated information and personal details were not properly handled by those government websites and had violated individual privacy policy.

Due to the growing number of internet usage in every part of our daily activities, there has been a series of study to evaluate usability and accessibility in some public website in various countries around the world, both developed and developing countries. E-governance, E-learning, and E-shop are some of the fields that a study has been conducted to evaluate usability and accessibility, but such studies or research has not been conducted focusing on foreigners to know the kind of difficulty they go through when they travel outside their native countries. According to the world bank collection of development indicators as stated in (Trading, Economics 2019) Ghana received 897,000 tourists in the year 2015 alone.

Therefore, the need for urgent to study on usability and accessibility evaluation of public websites to improve the creation of website services to make it easier for users to interact with web services.

2 METHODOLOGY

2.1 Research aim

The aim of this thesis is to assess the usability and accessibility of information systems of Ghana in relation to foreigners. This thesis will also focus on how foreigners will not be neglected when they travel to other parts of the world.

2.2 Research objectives

- To assess or examine the barriers /challenges of information accessibility and usability for foreigners in Ghana.
- To find out the nature of the website built in Ghana by web designers.

2.3 Research question

This research seeks to answer these two major questions and try to find some solutions for these problems at the end.

- RQ1: What are the barriers to information accessibility and usability in Ghana?
- RQ2: What are the causes of these barriers to information accessibility and usability in Ghana?

2.4 Selection of the Public Website

This part contains the list of websites used in the survey, that was carried out by the research. In total ten different institutional websites were chosen for the survey. Nine out of the ten the selected websites were government websites, and the other was private websites, that's Elective Ghana.

Table 1. Sample of websites used

NO	NAME OF WEBSITE		URL
1	Ghana Immigration Service	GIS	http://ghanaimmigration.org
2	Ghana Tourism Authority	GTA	http://www.ghana.travel
3	Judicially Service Ghana	JUSG	https://judicial.gov.gh
4	Ministry of Health Ghana	MOH	http://www.moh.gov.gh
5	Ministry of Education Ghana	MOE	http://moe.gov.gh
6	Ghana Statistical Service	GSS	http://www.statsghana.gov.gh
7	E-services Ghana	E-GH	http://www.eservices.gov.gh
8	Elective Ghana	EG	http://electiveghana.org
9	University of Ghana (LAGON)	UOG	http://www.ug.edu.gh
10	Kwame Nkrumah University of Science and Technology	UST	http://www.knust.edu.gh

2.4.1 Selected Web Browsers

These web browsers were selected because the aim of web accessibility demands that, there are no barriers to accessing the world wide web no matter your status or the smaller your machine is;

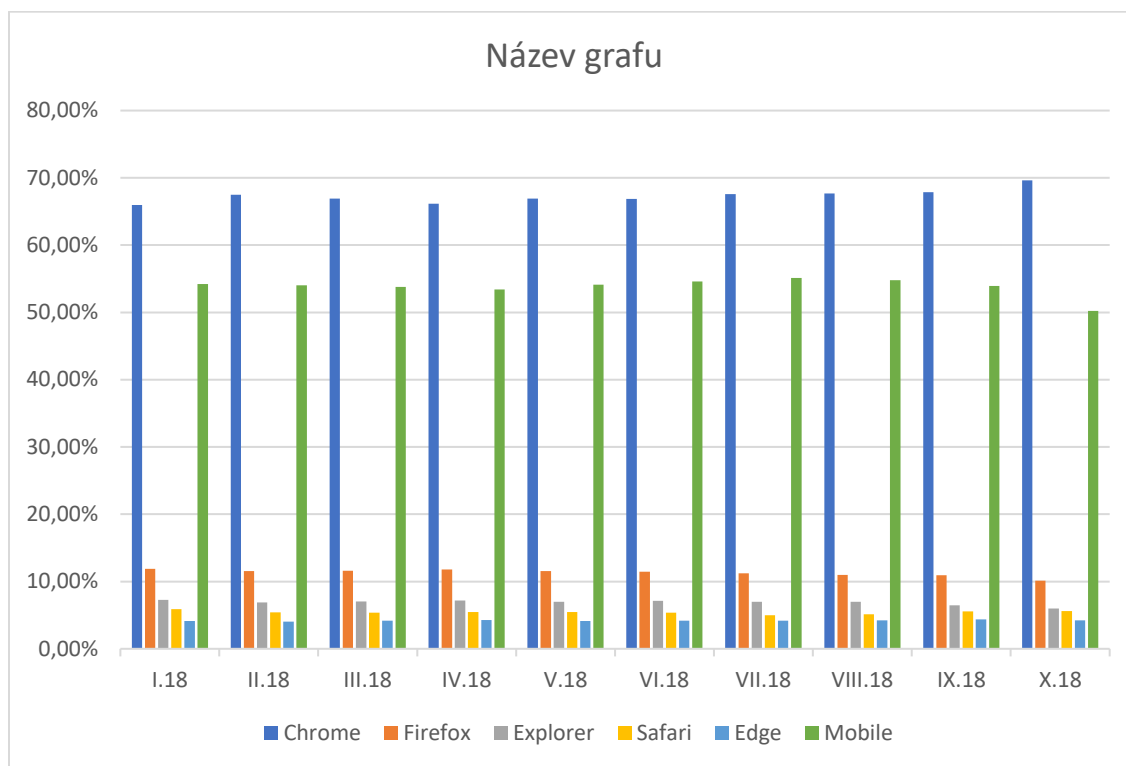
therefore, it was necessary to search for the most used or popular web browsers to support this project. Some of these web browsers could be used on any device but Some of these web browsers could be used on any device or operating system but others supported only special operating system (OS), an example was a safari web browser which can be operated on Mac OS and apple devices.

Figure 4 The table below shows popularly used web browsers

Date	Chrome	Firefox	Explorer	Safari	Edge	Mobile
Oct-18	69.64%	10.14%	6.01%	5.61%	4.21%	50.22%
Sep-18	67.88%	10.94%	6.45%	5.58%	4.36%	53.95%
Aug-18	67.66%	10.96%	6.97%	5.13%	4.24%	54.80%
Jul-18	67.60%	11.23%	6.97%	5.01%	4.19%	55.12%
Jun-18	66.87%	11.44%	7.13%	5.38%	4.16%	54.62%
May-18	66.93%	11.55%	6.97%	5.48%	4.15%	54.11%
Apr-18	66.17%	11.78%	7.17%	5.48%	4.26%	53.42%
Mar-18	66.93%	11.60%	7.02%	5.37%	4.18%	53.80%
Feb-18	67.49%	11.54%	6.91%	5.42%	4.04%	54.02%
Jan-18	65.98%	11.87%	7.28%	5.87%	4.11%	54.20%

Source: StatCounter (2018)

Figure 5. The most used web browsers



Source: own

3 THE STUDY EVALUATION PROCESS

3.1 Accessibility

There are several automated website testing and evaluation tools used for evaluating accessibility and usability. Examples are, SortSite, A-Checker, EvalAccess, InFocus, Wave TAW, etc. These evaluating tools were developed through the aspiration of Web Content Accessibility Guidelines Priority levels powered by World Wide Web Consortium. This guideline explains that *agencies must give disabled employees and members of the public access to information comparable to the access available to others* (GSA Government-wide 2018).

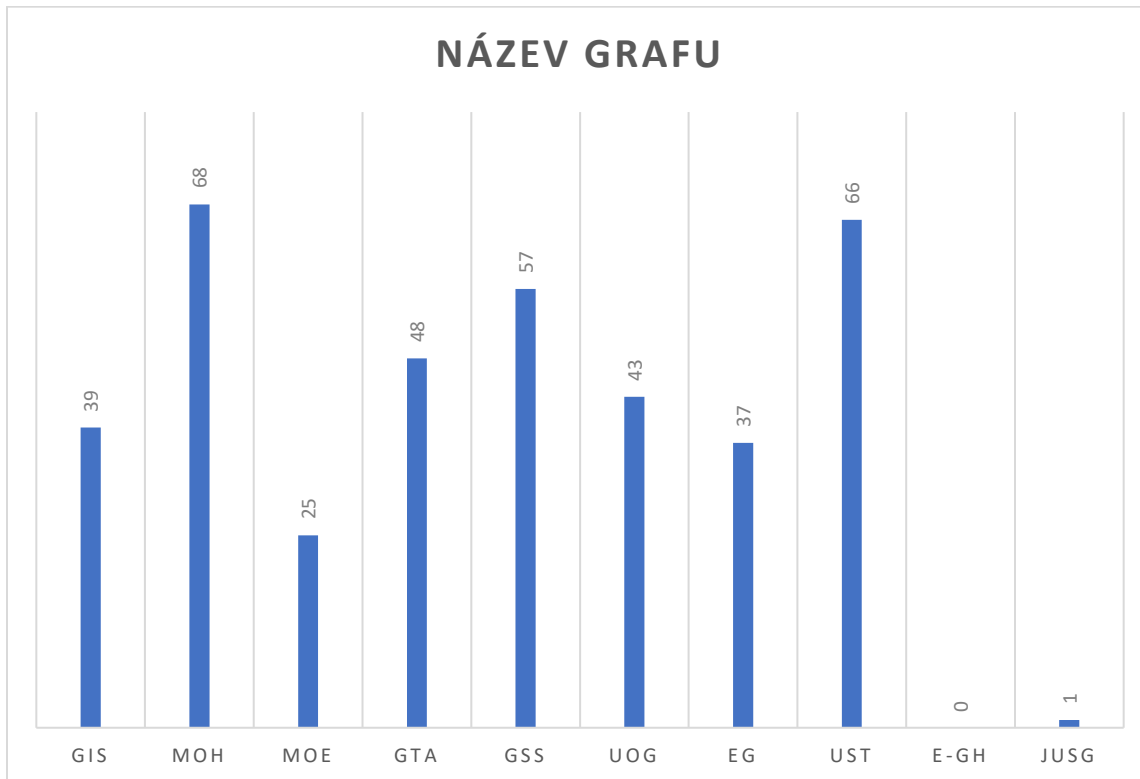
All the above-mentioned automated tools can be used to analyse issues pertaining accessibility and usability of a website. The tool selected for evaluation of this was SortSite evaluation tool. There hasn't been a concrete agreement on which tools are better for conducting website accessibility evaluation (Isa et al, 2011).

SortSite was selected due to these reasons: it supports WCAG 1.0 2.0, it supports the evaluation of HTML and it can also give detail of issues in every aspect of the website that has been evaluated.

The study was conducted by using qualitative and quantitative method to evaluate the accessibility of the selected public website. This approach was considered because the focus of getting better website accessibility depends on the quality of the website, Makoza & Chigona (2013). A total number of 100 pages were scanned in every website mentioned in fig.1 and all the website had issues of violating accessibility and usability rules.

This sector shows the results from the analysis of the accessibility reports. There were several accessibility issues recorded in every 100 pages that were scanned through, which amounts to 44%. Out of the 10 websites that were chosen one of them could not be assessed by the evaluation software, E-Service Ghana. Moreover, the outcome of the test shows that MOH had the highest number of pages with accessibility issues (68 pages) and seconded by UST with 66 pages accessibility issues and JUSG had the least number of pages with only 3. The figure below shows the number of pages with accessibility issues.

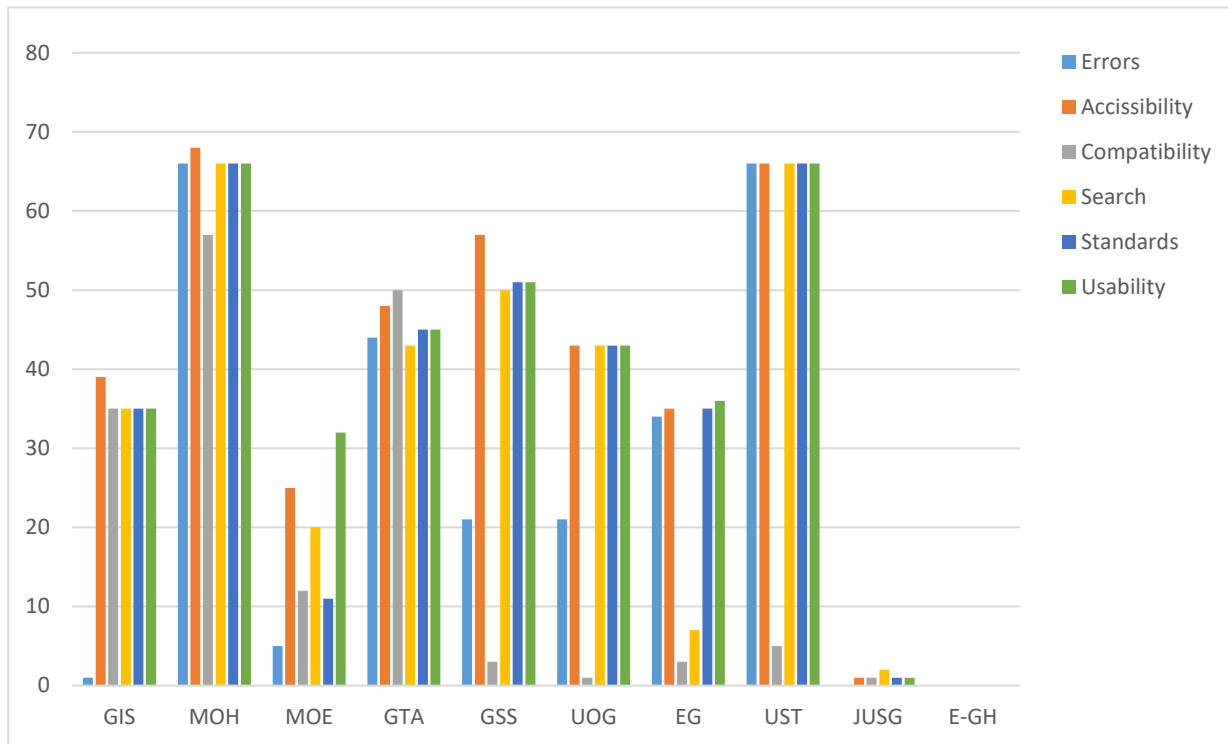
Figure 6. the pages with accessibility issues in each website



Source: own

With the SortSite software, it was possible to identify the total number of issues in each of the websites. Out of the 9 websites that were able to be scanned through SortSite software, there were several issues which amount to an average of 34.6 and the website for ministry of health Ghana had the highest overall number of issues with 389 in total. The figure below shows the total number of issues each website recorded.

Figure 7. the total number of issues per each website



Source: own

After a series of checks, it came to light that, most of the websites had violated the rules of WCAG Checkpoints. The study found out that, the most commonly violated checkpoint by various websites was HTML5 WCAG 2.0 A 4.1.1 and this type of violation explains how a content should carry out the usage of markup languages, elements should have whole start and end tags, factors are nested according to their specifications and should not contain replica attributes, and every identity is unique, without the place the specifications permit these features. Ensuring that Web pages have whole start and end tags and are nested in accordance with specification helps make sure that assistive technologies can parse the content material precisely and without crashing.

The second most violated checkpoint was WCAG 2.0 A F68, and this violation happens when there are no exposed names provided by form control to assistive technologies, this means that users will not be able to know the purpose of the form control.

Some users could not access a content material due to the failure or the absence of WCAG 2.0 A F70, while others had to deal with the contrast between text and background. For instance, some users find it hard to read small grey text on a white background, dark gray written content on a

black background or purple background with white text, the table below shows some of the chosen type of problems and their description.

Table 2. Types of checkpoint issues and description

Priority level	Type of Checkpoint issue	Description
A	WCAG 2.0 A F30 Section 508	This describes the failure of text alternatives, which is when a text alternative cannot be replaced with a non-text alternative without losing information.
	WCAG 2.0 A F89 Section 508	This disappointment condition happens when an interface contains only non-text substance, such as a picture, which interface cannot be recognized by an available title.
	WCAG 2.0 A F91 Section 508	This happens when data tables do not support header elements.
	WCAG 2.0 A F65 Section 508	Assistive technologies are meaningless to users when there is no source of text to instruct image alternative.
	WCAG 2.0 A F68 Section 508	This happens when there are no exposed names provided by form control to assistive technologies, this means that users will not be able to know the purpose of the form control.
	WCAG 2.0 A F70 Section 508	This sort of problem cause screen readers to miss some content due to tables not having header element.
	WCAG 2.0 A F49 Section 508	This page employments settled tables, which don't make sense when studied in a screen per-user.
	WCAG 2.0 A 2.4.1 Section 508	This error happens when there are no TITLE properties found for the outlines on these pages.
	HTML5 WCAG 2.0 A 4.1.1 Section 508	In substance executed using markup dialects, components have total begin and end labels, elements are settled according to their details, elements don't contain copy qualities, and any IDs are one of a kind, but where the details permit these highlights.
	WCAG 2.0 A 3.1.1 Section 508	This is the failure condition when a link contains only non-text content such as image and that link cannot be recognized

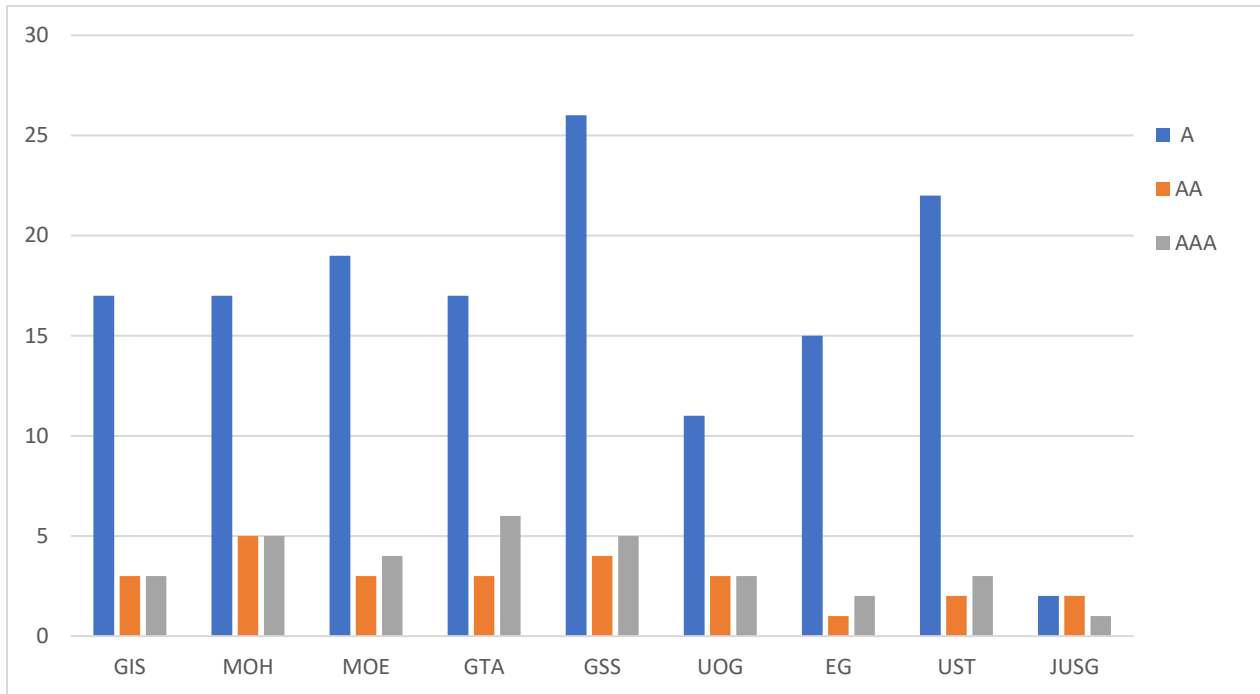
		by the accessible name.
	WCAG 2.0 A F63 Section 508	This is the condition when the link provided does not give a clear indication for the user to understand and use with easiness’.
	WCAG 2.0 A H2 Section 508	Using ALT text which duplicates link text in the same link or the following link results in screen readers stuttering as the same text is read out twice.
AA	WCAG 2.0 AA 2.4.6 Section 508	This error happens when there is no proper description of headings and labels. This makes it difficult for users to find information easily.
	WCAG 2.0 AA F24 Section 508	This error makes it difficult for users with vision loss or cognitive to read content due to the combination of the background colour or contrast.
	WCAG 2.0 AA G130 Section 508	The goal of this strategy is to make segment headings inside Web content distinct. Engaging headings and titles (see Providing expressive titles for Web pages) cooperate to give users a review of the element and its association.
	WCAG 2.0 AA F78 Section 508	This portrays a disappointment condition that happens when the client specialist's default visual sign of console centre is killed or rendered non-noticeable by another styling on the page without giving a creator provided a visual centre marker
AAA	WCAG 2.0 AAA F22	This makes it quite an ease for user to focus on what they are doing on the due to new windows and this happens when pop-ups appear expectedly.
	WCAG 2.0 AAA 2.4.10	The expectation of this Success Criterion is to give headings to segments of a Webpage when the page is composed of segments.
	WCAG 2.0 AAA F84	This disappointment depicts a common condition where joins such as "press here" is not specified in a content.
	WCAG 2.0 AAA 2.4.9	This has link purpose and it specifies only one link, this mechanism help users to search for only one link at a time.

According to the result of the test, every accessibility issue was categorized based on the three priorities of WCAG 2.0 guidelines focusing on how it will affect the accessibility of the website. The most common violated guideline was Level A with a total number of 133 issues on more than 100 pages. According to the survey outcome, Ghana Statistical Service had the highest number of violations issues, with total number 26 issues on more than 80 pages. The website with the lowest issues was the Judicial Service of Ghana with only 2 issues. Table and figure below show the conformance levels violations.

Table 3. Conformance level violations

	Level A Error	Level AA Error	Level AAA Error
Ghana Immigration Service	22	3	6
Ministry of Health	4	0	0
Ministry of Education	11	3	4
Ghana Tourism Authority	17	3	6
Ghana Statistical Service	26	4	5
University of Ghana	19	3	3
Elective Ghana	15	1	2
Kwame Nkrumah University of Science and Technology	17	2	3
Judicial Service of Ghana	2	0	1
E-services Ghana	0	0	0

Figure 8. number of conformance levels violations per website



3.2 Usability

Due to the nature of governance and the quantum of public services provided by nations to its citizens through digital means, there has been the need for public services in Ghana to deploy technological means to serve both the citizens Ghana as well as foreigners in a better way. If Ghana uses digital means to serve its citizens with information then, it is expected that, many people will use these electronic services nation-wide. Services provided electronically has already been accepted widely all over the world as a developmental tool. Therefore, it has brought the need to ascertain how Ghana uses these sorts of tool, in so doing I'm aiming to assess the usability of these websites provided by public services.

I sort to find out firstly, how often do people use the mentioned websites and how long it takes users to complete their search on that website. It was also important to find out how supportive these websites were in solving user's problem. After this had been highlighted, it was also necessary to find out, what were some of the problems encountered whiles these websites were being used, it was also important to know what users might think is important and must be

changed by designers when building websites. To upgrade a website, it necessary to know how users will grade it.

To ascertain how people, patronize Web in Ghana, I used SortSite evaluation tool to search for usability state of the mentioned public website and these were what I found, per the use evaluation software. For every website that was scanned, there were several pages that had usability issues.

With the help of Sortsite evaluation tool, it was possible to know which checkpoints had been mostly violated by the various websites. The result of the study shows that Usability.gov 13:5 and 14:3 were the guidelines that had recorded the highest level of violations.

The guideline Usability.gov 14:3 ensures that the loading speed of a page should not be slowed down beyond the standard mark of 5 seconds due to the downloading of an image. The result shows that most of the website had a large image which as a result slows down the speed of the site.

The study also revealed that the guideline Usability.gov 13:5 also ensures that, a descriptive label should use in other not to confuse readers or users in terms of differentiating

The table below shows some of the issues and found and their description.

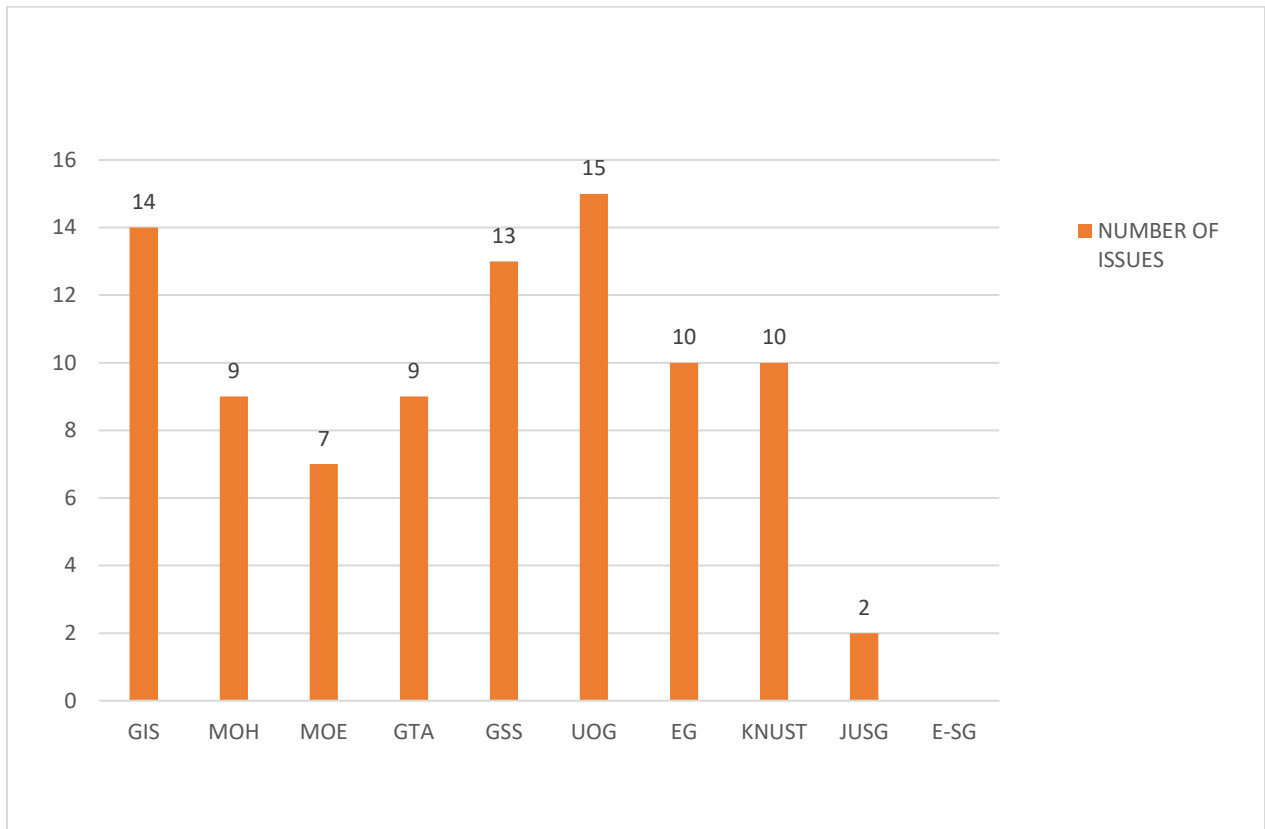
Table 4. Types of usability issues and description

Usability.gov 10:1	Using an expressive, simply and understandable of link labels makes it easy for users differentiate by users rather than designers.
Usability.gov 14:3	Take steps to ensure that images do not have a negative impact on download speeds.
Usability.gov 13:5	Display an associated label for each data entry field which has an associated display help user to understand the type of entries they chosen.

Usability.gov 11:10	Using of short phrase or change of font size characteristics the importance of a word.
Usability.gov 11:5	It is important to use bold text when describing a specific piece of information.
Usability.gov 12:9	
Usability.gov 17:4	Provide a search option in a standard place on each page of a content-rich website.
Usability.gov 11:7	Use a familiar font to achieve the best possible reading speed.
Usability.gov 10:6	Use text links rather than image links
Usability.gov 10:4	Ensure that items that are not clickable do not have characteristics that suggest that they are clickable.

Source: SortSite

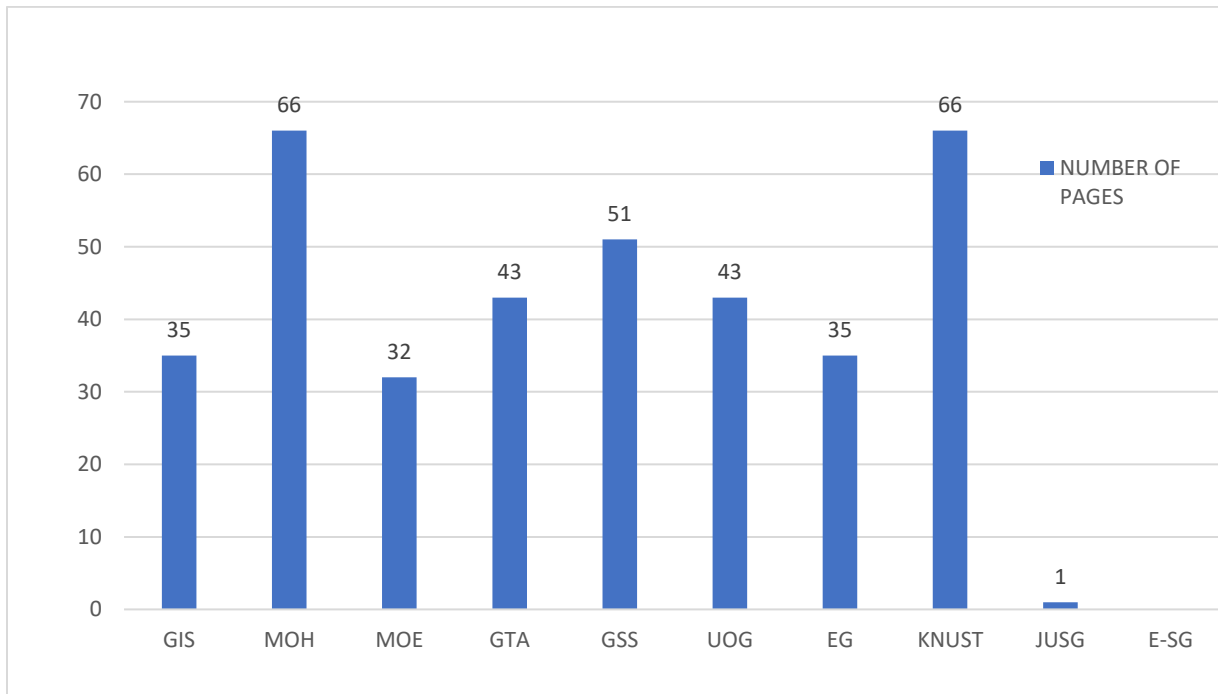
Figure 9. number of usability issue per each website



Source: own

Moreover, another part of the test shows that, MOH and UST websites had the highest number of pages with usability issues, it had a total number of 66 pages with issues of usability and was followed by GSS with 51 pages usability issues. JUSG had the least number of pages with only 1 page with usability issue. The figure below shows the number of pages with usability issues.

Figure 10 number of pages with usability issues



3.3 Discussion

For a decade now, Ghana receives an average of 850000 tourists each year (Trading Economics 2019) and therefore, the need to create websites which will enable people to use the internet efficiently is important. The World Wide Web as stated earlier in this work created to *enable easier human communication, commerce, and opportunities to share knowledge and make these assistances available to all people, whatsoever their hardware, software, network structure, native language, culture, topographical position, or physical and mental ability* (Bratt 2010). It will be impossible for users to access information on the internet, if the website created have problems from usability and accessibility.

The aim of this study is to assess the usability and accessibility of information systems in relation to foreigners in Ghana. Ten public websites were used as baseline samples for every day designated life situations, only of them could not be evaluated. SortSite was the tool used in the evaluation process of this thesis. The evaluation done in this work was based on the W3C WCAG accessibility standards and section 508 guidelines, and the benchmark criteria used for

the usability aspect was the USA federal Usability.gov guidelines. It was revealed during the accessibility evaluation process that, most of the public website had violated the rules both accessibility and usability guidelines.

3.3.1 Answers to research questions

3.3.2 RQ1: What are the barriers to information accessibility and usability in Ghana?

Basically, the outcome of the study shows that almost all the sample websites used had problems from usability and accessibility that made it difficult for users to access and use the website. Out of the 100 total pages that were scanned in every website, there were usability and accessibility issues. About 60% of the 9 out of 10 websites that were scanned had over a total 40 pages with accessibility issues in every 100 pages. Part of the analysis revealed that an average of 34.6 total issues was recorded in all areas such as accessibility, usability, search, errors, etc.

The findings enumerate that many of the websites suffered from HTML5, which states that, start and end tags must be placed in order not to miss a critical character in their formation, such as a closing angle bracket or a mismatched attribute value, quotation mark are not complete by (HH.gov, 2017). Some of the pages had PDF but there was no tool like Adobe reader that will enable users to open those PDF's. Furthermore, some pages had problems with text and background colours which as a result prevented some group of people from accessing the page. This was because it's difficult for some users to read on the dark grey text on a black background.

The owners of these websites shouldn't forget that, there shouldn't be any form of barrier that will prevent some group of people from benefiting from what is supposed to be a national cake, no matter how small or big their machine is and no matter what your status (Bratt, 2010) this means that all public websites must conform with the rules and regulations governing the creation of a website.

Moreover, other parts of the findings revealed that most website had problems with usability and would have a great negative impact on both foreigners and citizens in using the mentioned public websites. For every 100 total pages that were scanned, there were more than 40 pages with usability problems.

The study covered that, Usability.gov 14:3 and 13:5 were highest violated guidelines. The impact of Usability 14:3 on users is that, since most of the sample website has large images which slow down the downloading speed of the page according to (HH.gov, 2017), users will waste much time and money on using the website. This situation might deter from people from using public websites.

The website usability and accessibility bores down to mainly the creation of the website. Many a times barriers to information accessibility and usability is as a result of many causes that hinders the quality of a created website. Amongst the numerous causes of these barriers, this research seeks to provide two main causes to the barriers of information usability and accessibility in Ghana. They include first, ignorance and negligence on the part of the website engineers or the institutions that employed them to create the website. Secondary, another cause to information usability and accessibility in Ghana is because of the cost involve in creating a standardized website.

3.3.3 RQ2: What are the causes of these barriers to information accessibility and usability in Ghana?

3.3.4 Ignorance and negligence

Ignorance on the part of engineers could be that, they are inexperienced, or they lack the knowledge to create modernized or standardized websites that will have the features which will help users to access information on the website. On the other hand, negligence on the part of the institutions that employed the builders to create the website and their inability to inspect the website after it has been created causes barrier to website usability and accessibility.

Additionally, the features that a modern or standardized website may have, may cause for additional funds or cost which the various public institutions in Ghana do not have or do not want to incur in place to provide for the creation a standardized website, thereby creating barriers to information accessibility and usability in Ghana.

3.4 Suggestion

This work offers the following ideas for promoting better accessibility and usability of the Web Ghana, even though the study had some limitations. The process of evaluating a website needs to

use the approach of multi-method evaluation which combines both primary and secondary data for evaluation. Nevertheless, the out-come of the evaluation highlighted on some key issue that needs to be dealt with.

First and foremost, there should be the need for web designers to follow all the rules and regulations provided by W3C when creating website. There should be a government policy that will force designers to follow every rule and regulations set by the upper authorities. Several countries have policies which has helped them to improve upon the creation of public website.

Furthermore, there ought to be a provision of tools to sort out substance spread out of things on the page and structure of the page ought to be simple. New users, disabled and old age web users should benefit from some aspects of accessibility such as clear and consistent design, navigation and links because some people, have little opportunity to use the web continuously due to socio-economic reasons. Therefore, the website interface should be made simpler for these people.

CONCLUSION

In a nutshell, due to the growing number of internet users in Ghana, the demand for well and reliable information system from all aspect of life from both citizens and foreigners is expected. There is the need for every website created to serve the interest of the public includes every individual. This chapter is the recap of the entire work. The introductory part of the thesis explains what an information system is about, how it's being used in this 21st century and the benefits it has brought to users. It also describes how this paper is structured. It elaborates on how difficult it is for other foreign nationals faces to access the web when they travel to other countries.

The first chapter describes the basic principles of web usability and accessibility. It highlights how WWW has brought a great change to how people are connected. It explains both web accessibility and usability, their evaluation and testing tools. The relationship between usability and accessibility were not able to be emphasized due to the strong belief that both have a special impact on how technology can be used.

The second chapter focuses on the theoretical part of the project. It explains how similar works have been taken place and their suggestions and other tools used when the research being conducted. Most of the research conducted discovered that, some public website had violated the rules and regulations of web usability and accessibility.

The third chapter also emphasize on the methodology and structure of the thesis. When conducting such kind of work, the selection of data and tools for evaluation are vital. Therefore, all possible data must be factored out. The evaluation process for-saw the usage of an automated evaluation tool (SortSite) was used to evaluate both the usability and accessibility of the entire findings. The evaluation of the usability aspect was conducted base on some everyday life situations. The result from the study made it emphatically clear that most of the website has violated the rules of both usability and accessibility. Due to the nature of the website built to serve the citizens of Ghana and other foreign nationals, because of the nature of website built, users will find it difficult for a user to access the interface of the website with ease and satisfaction.

The discussion aspect also reflects on the answers to the two main research questions. It was revealed that, the causes and barriers to information accessibility and usability in Ghana was due to the high cost involved and unavailability of funds to create standardized website that will ensure information accessibility and usability. Ignorance and negligence were also another barrier to information accessibility and usability in Ghana. Builders and institutions neglect the right path of creating and inspecting websites after it has been created.

Therefore, it is the responsibility of the government Ghana to implement laws which will force various web creators to put in place all the necessary assistive tools that will help persons from the different status of different backgrounds.

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List of appendices

Appendix 1

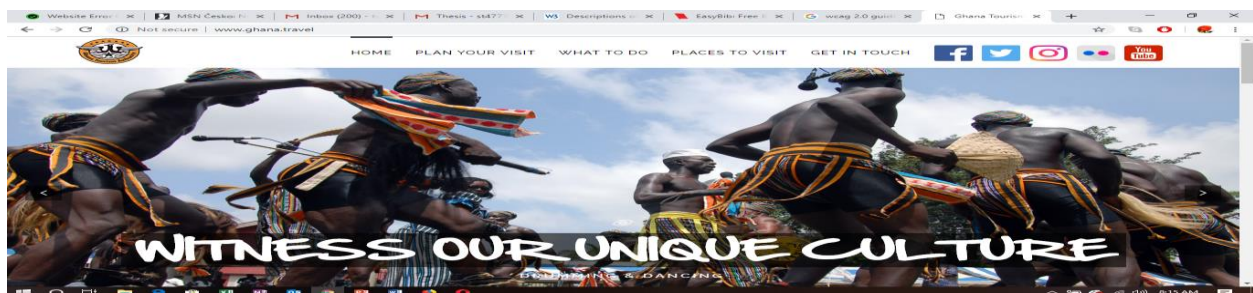
The front view of Ghana Immigration Service



Source: Ghana Immigration Service (<http://ghanaimmigration.org>)

Appendix 2

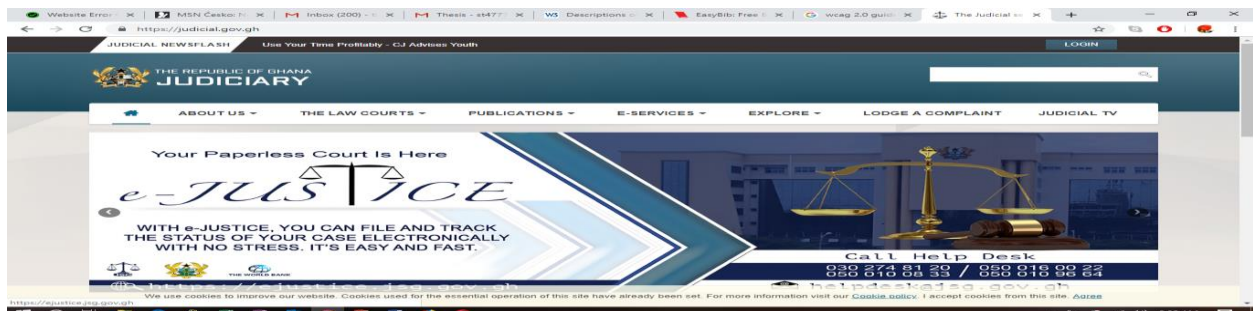
The caption of Ghana Tourism Authority



Source: Ghana Tourism Authority (<http://www.ghana.travel>)

Appendix 3

Picture of Ghana Judicially Service



Source: Judicially Service Ghana (<https://judicial.gov.gh>)

Appendix 4

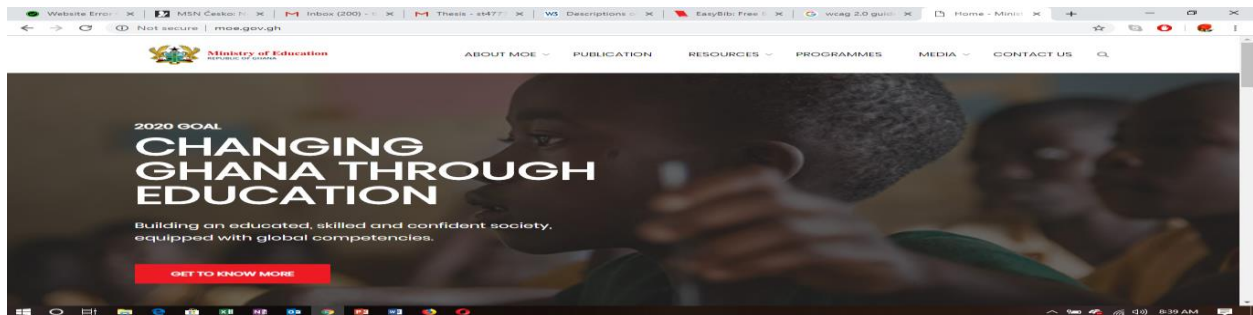
The front page of Ministry of Health Ghana



Source: Ministry of Health Ghana (<http://www.moh.gov.gh>)

Appendix 5

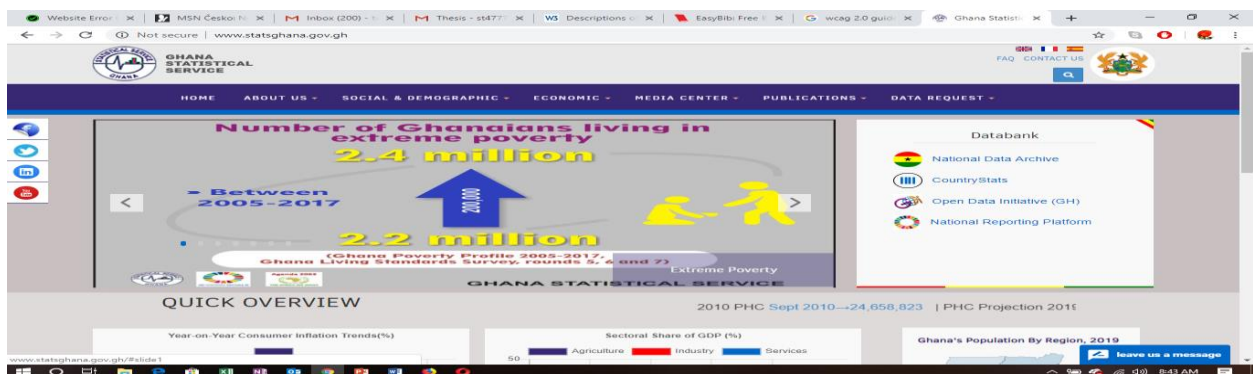
The print screen of Ministry of Education Ghana



Source: Ministry of Education Ghana (<http://moe.gov.gh>)

Appendix 6

The website of Ghana Statistical Service



Source: Ghana Statistical Service (<http://www.statsghana.gov.gh>)

Appendix 7

The picture of Elective Ghana



Source: Elective Ghana (<http://electiveghana.org>)

Appendix 8

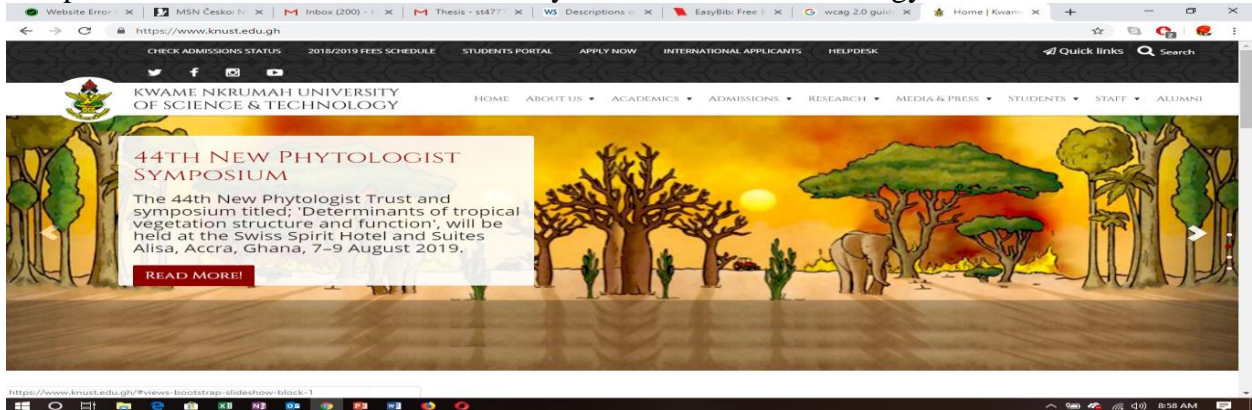
The front view page of University of Ghana (LAGON)



Source: University of Ghana (<http://www.ug.edu.gh>)

Appendix 9

The picture of Kwame Nkrumah University of Science and Technology



Source: Kwame Nkrumah University of Science and Technology (<http://www.knust.edu.gh>)