CHAPTER 2

RELATING DISABILITIES AND WEBSITE ACCESSIBILITY

2.1 Introduction

The contribution of this chapter is to analyze about the disabilities and how the disabilities are negatively affecting the disabled people from accessing the E-Governance websites, and also to review about the new issues that are not addressed in the nationally and internationally accepted web accessibility guidelines.

This chapter starts with a discussion of the current situations of disabled users in India, disabilities that affect web accessibility, characteristics of each disability and the common assistive tools and techniques used to access the website. Next, this chapter explains in detail about the properties of websites and how the properties affecting the disabled people to access the websites. Further, this chapter extends to address the practical difficulties faced by the disabled people when interacting with E-Governance websites. Finally, it reviews the literature about the new features causes the accessibility problems.

2.2 Current Situation of Disabled Users in India

India has one of the largest disabled populations in the world. It was estimated to be approximately 2.13 percent of India's total population or 2.19 crore as per census of India (2001). According to the report of Khan (2005) 12 million people in India are blind and 28.5 million have a low vision that affects the use of computer displays, while nearly 6 million people have mobility impairments. However, the 2011 census, by applying new data collection methodologies, is likely to bring this number to a much higher level. It is believed that there are at least 70 million persons with disabilities in India (census of India 2011).
According to Nanda & Ramesh (2012) among 335 disabled people 291 disabled people are computer literate. Figure 2.1 shows the computer literacy of disabled people. This shows most of the disabled people are well known to use the E-Governance websites and willing to participate in government activities if the websites are accessible to them.

Figure 2.1 Computer Literacy of Disabled People (Nanda & Ramesh 2012)

### 2.3 Disabilities that Affect Accessibility

According to Freire (2012) the percentage of people with disabilities in many countries are in between 10% to 20%. The Indian population estimates that approximately 70 million of the persons are with disabilities in India alone (India 2012). The problem of computer and web accessibility is becoming increasingly significant because the number of people with visual loss is rising. People aged 65 years and older have a greater problem of low vision (Baguma 2010).

The World Wide Web Consortium (W3C 2005) categorized disabilities that affect a person’s use of the web into several types. Table 2.1 depicts the disabilities categorized by W3C and their sub types.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Disabilities</th>
<th>Their Sub Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Visual disabilities</td>
<td>Blindness, low vision, color blindness</td>
</tr>
<tr>
<td>2.</td>
<td>Hearing impairments</td>
<td>Deafness and hard of hearing</td>
</tr>
<tr>
<td>3.</td>
<td>Physical disabilities</td>
<td>Motor disabilities</td>
</tr>
<tr>
<td>4.</td>
<td>Speech disabilities</td>
<td>Disabilities in Speaking (will affect when interacting with speech recognition application)</td>
</tr>
</tbody>
</table>
5. Cognitive and neurological disabilities

Dyslexia and dyscalculia (difficulty with calculations, and rapid processing of maths), attention deficit disorder, intellectual disabilities.

6. Multiple disabilities

A person having more than one disability

7. Ageing related conditions

According to Freire (2012) the visual disability is the biggest threat to accessing the web content because the web page is visual centric. The web page revolves around video, multimedia, real-time collaboration and interactive documents, all of which are heavily visually based. The blind web users are particularly more disadvantaged on the web compared to people with other disabilities (DRC 2004).

The next section explains the characteristics of each disability and the common assistive tools and techniques can use to access the web by disabled people.

2.3.1 Visual disabilities

**Blindness:** According to Freire (2012), blindness is the uncorrectable loss of vision in both eyes. To access the web content, the blind mainly use screen reader software, braile display (a system that uses six to eight raised dots in various patterns to represent letters and numbers that can be read by the fingertips), text-based browsers such as Lynx or voice browsers instead of graphical user interface (GUI) browsers and rapid navigation strategies such as using the tab key to go through the headings or links rather than reading every word on the page in sequence. Screen readers can also be used by those who are both deaf and blind, but rather than convert text into speech, screen readers for the deaf-blind convert text into Braille characters on refreshable Braille devices. Figure 2.2 is the picture of Refreshable Braille device. Devices such as this have small pins that can be raised or lowered to form Braille characters which the deaf-blind individual can feel (Web AIM 2011).
Figure 2.2 Refreshable Braille device (Web AIM 2011)

- **Low Vision:** Low Vision is a bilateral impairment of vision that significantly impairs the functioning of both eyes and cannot be adequately corrected with medical, surgical, therapy, conventional eyewear or contact lenses. There are many types of low vision sometimes also referred to as partially sighted for instance, poor acuity (vision that is not sharp), tunnel vision (seeing only the middle of the visual field), central field loss (seeing only the edges of the visual field) and clouded vision (W3C 2005).

  To use the web, some people with low vision use extra-large monitors and or increase the size of system fonts and images. Others use screen magnifiers or screen enhancement software such as Thunder. Some individuals use specific combinations of text and background colors, such as a 24-point bright yellow font on a black background, or choose certain typefaces that are more legible for their particular vision requirements (W3C 2005).

- **Color blindness:** Color blindness is the lack of sensitivity to certain colors. Common forms of color blindness include difficulty distinguishing between red and green, or between yellow and blue. Sometimes color blindness results in the inability to perceive any color. To use the web, some people with color blindness use their own style sheets or system color settings to override the font style and background color choices of the author (W3C 2005).

2.3.2 **Hearing disabilities**

- **Deafness:** Deafness is the uncorrectable hearing impairment in both ears. For some deaf individuals, their first language is a sign language and they may or may not read a written language fluently or speak clearly (W3C 2005). To use the web
many people who are deaf rely on captions for audio content. They need to turn on the captions on an audio file as they browse a page, concentrate harder to read what is on a page or rely on supplemental images to highlight context.

- **Hard of hearing:** These are people with mild to moderate hearing impairment (W3C 2005). To use the web, people who are hard of hearing may rely on captions for audio content and/or amplification of audio. They may need to toggle the captions on an audio file on or off or adjust the volume of an audio file.

### 2.3.3 Physical disabilities

- **Motor disabilities:** Motor disabilities can include limitations of muscular control (such as involuntary movements, lack of coordination, or paralysis), limitations of sensation, joint problems, or missing limbs. Some physical disabilities can include pain that impedes movement and the conditions can affect the hands and arms as well as other parts of the body (W3C 2005).

To use the web people with motor disabilities may use a specialized mouse, a keyboard with a layout of keys that matches their range of hand motion, a head-mouse, voice-recognition software, may activate commands by typing single keywords in sequence with a head pointer and may need more time when filling out interactive forms (W3C 2005).

### 2.3.4 Speech disabilities

According to W3C (2005), speech disabilities include difficulty in producing speech that is recognizable by some voice recognition software either in terms of loudness or clarity. To use parts of the web content that rely on voice recognition a person with a speech disability need to be able to use an alternative input mode to speech input such as keyboard input.

### 2.3.5 Cognitive and neurological disabilities

- **Visual and auditory perceptual disability:** Individuals with visual and auditory perceptual disabilities, including dyslexia (learning disabilities) and dyscalculia

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(difficulty with calculations and rapid processing of maths) may have difficulty processing language or numbers, processing spoken language (auditory perceptual disabilities) and spatial orientation. To use the web such people may rely on getting information through several modalities simultaneously. For instance a person with reading difficulty may use a screen reader to facilitate comprehension while another one with an auditory processing disability may use captions to aid faster understanding of an audio track.

- **Attention deficit disorder:** This is associated with difficulty focusing on information. To use the web people with this condition may need to turn off animations on a site in order to be able to focus on its content.

- **Intellectual disabilities:** Individuals with impairments of intelligence (sometimes called developmental disabilities or mental retardation) may learn more slowly, or have difficulty understanding complex concepts. Down syndrome is one of the causes of intellectual disabilities (W3C 2005). To use the web such people may take more time on a website, may rely more on graphics to enhance understanding of content and may benefit from a simplified language on a website in relation to the intended purpose.

- **Memory impairments:** Individuals with memory impairments may have problems with short-term memory, missing long-term memory or may have some loss of ability to recall language. To use the web effectively, such people may be helped by a consistent navigational structure throughout the website (W3C 2005).

- **Mental health disabilities:** These are associated with difficulty focusing on information on a website or difficulty with blurred vision or hand tremors due to side effects from medications. To use the web they may need to turn off distracting visual or audio elements or use screen magnifiers.

- **Seizure disorders:** Some individuals with seizure disorders, including people with some types of epilepsy are triggered by visual flickering or audio signals at a certain frequency. According to W3C (2005), people with photosensitive epilepsy can have seizures triggered by flickering or flashing in the range of 4 to 59 flashes per second Hertz) with a peak sensitivity at 20 flashes per second as well as quick changes from dark to light. To use the web, people with seizure disorders may need
to turn off animations, blinking text, or certain frequencies of audio to prevent triggering seizures.

2.3.6 Ageing-related conditions

Changes in people's functional ability due to ageing can lead to changes in abilities in sensory, physical and cognitive abilities or a combination of two or more of these (W3C 2005). Assistive tools and techniques for people with ageing related conditions are the same as those used by people with disabilities. According to W3C (2005) combination of two or more disabilities for senior web users is a common occurrence due to concurrent changes in sensory, physical and cognitive abilities.

2.4 Properties of websites

E-Governance websites are websites which are developed and deployed on the cloud or the web to access the information and services from anywhere in the world. These websites have a number of properties, which are used to determine the look and feel of web content to different categories of users. The main properties are:

2.4.1 Non-linear access

Web sites use HTML (Hypertext Markup Language) a web page development programming language for developing hypermedia applications that can be shared over the Internet. HTML structures define the information into multiple linked layers (hypertext), hence accessing of that information is link based and non-linear. Therefore, people who access the website by non-linear means the blind will face challenges (Rehema Baguma 2010).

2.4.2 Lack of control over end user access behavior and environment

A web page developer has no control over on how website users will browse the pages such as the appearance, fonts and colors used on a page and, proportions and exact locations of the different web contents. Website users largely determine their own navigation paths and they are free to ‘jump’ to any location that interests them. In addition to web page developers cannot know the exact hardware and software that the various
potential users have. According to Baguma (2010) the way web pages present information is partly determined by the user’s own environment.

2.4.3 Heavy dependence on visual cues for input and output GUI-based

Although GUIs (Graphical User Interface) are widely regarded as a major advance in human computer interaction, their heavy dependence on visual cues for input and output poses a significant problem for users with disabilities particularly visual disabilities (Baguma 2010). In addition to continuous advances in web technology have made it more multimedia oriented to include video, flash, motion pictures and images. Though ideally this is good for enhanced communication certain media formats for people don’t have disabilities, but these are unusable to people with disabilities.

2.4.4 Uses of Multiple Technologies

Now-a-days there are several technologies are available to develop and deploy website, such as HTML, ASP.NET, C#, J#, PHP, object oriented (OO) tools, scripting languages, database management systems (DBMs) etc. All these behave differently even between different versions of the same software.

2.4.5 Young developers with near perfect vision

Most developers are young and have near perfect sensory, physical and cognitive abilities. Nielsen (2001) noted that websites are normally produced by young developers who often assume that all users have near perfect visual and motor control and know everything about the website.

Now we know that the common properties of website, the next section discuss about how these properties affect users with disabilities when interacting with websites.

2.5 How Properties of Websites affect Disabled people

As seen in section 2.2, the disabilities that affect a person’s use of the web include: visual, hearing, cognitive, physical, speech, multiple disabilities and age related conditions. Table 2.2 illustrates how the different properties of websites affect users with visual
disabilities. A full table with all the types of disabilities is attached in the appendix section as appendix 1.

Table 2.2 How properties of websites affect disabled people (extract covering of visual disability) (Baguma 2010)

<table>
<thead>
<tr>
<th>Disability</th>
<th>Associated Property of Web site</th>
<th>Effect of the Property on people with the Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blindness</td>
<td>Non-linear access</td>
<td>Affects linear access used by screen readers</td>
</tr>
<tr>
<td></td>
<td>Lack of control over end user access behavior and environment</td>
<td>Some assistive technologies, e.g. older screen readers may be incompatible with accessibility adaptations included in websites</td>
</tr>
<tr>
<td></td>
<td>Graphical User Interface (GUI) based</td>
<td>Some GUI especially peripheral content like banners and ads slow down the access speed for screen reader users.</td>
</tr>
<tr>
<td></td>
<td>Use of varied technologies</td>
<td>Older assistive technologies may not be compatible with new technologies</td>
</tr>
<tr>
<td></td>
<td>Young developers with near perfect vision</td>
<td>May affect the ability to effectively capture and implement accessibility requirements for the blind</td>
</tr>
<tr>
<td>Low Vision</td>
<td>Non-linear access</td>
<td>Difficult to navigate pages when enlarged due to loss of surrounding context</td>
</tr>
<tr>
<td></td>
<td>Lack of control over end user access behavior and environment</td>
<td>Different screen magnifiers may render the pages with varied color contrasts</td>
</tr>
<tr>
<td></td>
<td>Graphical User Interface (GUI) based</td>
<td>Text presented as images may be unusable when enlarged due to loss of surrounding context</td>
</tr>
<tr>
<td></td>
<td>Young developers with near perfect vision</td>
<td>May affect the ability to effectively capture and implement accessibility requirements for people with low vision</td>
</tr>
<tr>
<td>Color Blindness</td>
<td>Lack of control over end user access behavior and environment</td>
<td>Different end user agents may output pages with varying color contrasts Some user agents may not support user override of author style sheets/color settings</td>
</tr>
<tr>
<td></td>
<td>Graphical User Interface (GUI) based</td>
<td>May be difficult to understand the content presented as color images may be difficult to understand content where color is used as a unique marker e.g. for emphasis</td>
</tr>
<tr>
<td></td>
<td>Use of varied technologies</td>
<td>Different end user agents may produce pages with varying color contrasts Some user agents may not support user override of author style Sheets</td>
</tr>
<tr>
<td></td>
<td>Young developers with near perfect vision</td>
<td>May affect the ability to effectively capture and implement accessibility requirements for color blind users</td>
</tr>
</tbody>
</table>

Table 2.2 shows how the properties of websites and their web content affects the usage for people with visual disabilities. The properties are: non-linear access, lack of control over end user access behavior and the environment, graphical user interfaces (GUIs), use of various technologies and domination of the development environment by young developers with fine abilities.
On the full table in appendix 1, seven out of the twelve disabilities that affect the website accessibility are affected by all the five properties of the website. Low vision and color blindness are affected by four properties and deafness, speech and seizure disorders are affected by three of the twelve properties. Each property that affects a given disability poses potential barriers to website accessibility for people with that disability. For example, blindness is affected by all the five properties and each property poses blind people at least one barrier for web accessibility as follows:

The non-linear access nature of the website affects speed of access with linear output based screen readers, a primary assistive technology for the blind; lack of control over end user access behaviour and environment may lead to compatibility problems between authoring tools and some assistive technologies used by the blind; a GUI based interface may slow down page access for blind users (screen readers access and present page content in a linear form); use of various technologies by end users may cause compatibility problems between some authoring tools and assistive technologies e.g. older screen readers may not be compatible with systems developed with newer authoring tools; finally domination of the web page development environment by young developers with near perfect vision may affect the effectiveness of capturing and implementing accessibility requirements for a typical blind user. Examples of problems website users with other disabilities can face due to the properties of website are given in the full version of table 2.2 in appendix 1.

As illustrated in table 2.2 the E-Governance website development process should consider the needs of users with disabilities in relation to the properties of website otherwise this group of users will continue to have facing difficulties accessing E-Governance services. The following section describes about the practical difficulties faced by the disabled people when interacting with websites.

2.6 Practical Difficulties faced by Disabled people On Websites

Given the website’s increasingly important role in society is providing equal access to the web content is vital for all people, including those with disabilities (W3C 2005). However a person with sensory, physical or cognitive impairment faces significant
difficulties accessing the present web contents. This section discusses practical difficulties faced by disabled people on E-Governance websites based on literature.

2.6.1 Barriers People with Disabilities Face on the E-Governance website

According to W3C (2005), common barriers that people with various disabilities can face on the website are as follows:

- **The blind:** Figure 2.3 shows the snapshot of Tamil Nadu E-Governance Agency website. In this website, images that do not have alternative text, complex images (e.g., graphs or charts) that are not adequately described, tables that do not make sense when read serially, frames that do not have "NO FRAME" alternatives, or that do not have meaningful names, forms that cannot be tabbed through in a logical sequence or that are poorly labeled, browsers and authoring tools that lack keyboard support for all commands, browsers and authoring tools that do not use standard application programmer interfaces for the operating system they are based in and non-standard document formats that may be difficult for their screen reader to interpret.

![Tamil Nadu E-Governance Agency website](tnega.in 2014)

- **Low vision:** Web pages have absolute font sizes that do not change (enlarge or reduce) easily, web pages with inconsistent layout hence difficult to navigate when
enlarged due to loss of surrounding context, text, or images on web pages that have poor contrast, and whose contrast cannot be easily changed through user override of author style sheets, text presented as images which prevents wrapping to the next line when enlarged and also many of the barriers for blindness depending on the type and extent of visual limitation. Figure 2.4 shows the snapshot of Indian E-Governance website, this website is providing central and state level E-Governance services to citizens. But this website is only accessible for people with no disabilities and language disability only. The reason is the website consist of different languages support only none other features are added. If this situation continuous the different types of disabled people will not get E-Governance services directly.

Figure 2.4 India’s National E-Governance website (NIC 2013)

Additionally, this website doesn’t have different color forms, increasing or decreasing of text size, same as the text corresponding audio; these problems will affect the low vision, color blindness, mobility and cognitive disabilities.
- **Color blindness**: color that is used as a unique marker to emphasize text on a web page, text that inadequately contrasts with the background color or patterns and browsers that do not support user override of author style sheets. Figure 2.4 shows the snapshot of the Tamil Nadu Government website, this website is supporting to low vision and language disabilities only. For color blindness this site is supported only two colors same as when we change the background color lot of text content are getting invisible. Also, this website is not fully supporting screen reader access because the page consists of lot of frames and tables, but table and frame descriptions are not available.

![Figure 2.5 Tamil Nadu Government Website (tn.gov.in 2014)](image)

- **Deaf**: lack of captions or transcripts of audio content on web pages, including webcasts, lack of content-related images on text intensive web pages- this can slow down comprehension for people whose first language may be a sign language, lack of clear and simple language and requirements for voice input on web pages.

- **Motor disabilities**: time-limited response options on the web pages, browsers and authoring tools that do not support keyboard alternatives for mouse commands and forms that cannot be tabbed through in a logical order.
- **Speech disabilities**: Web pages without alternative input mode for sections that require voice-based interaction.

- **Visual and auditory perceptual disabilities**: Lack of alternative modalities for audio and visual information on web pages such as lack of alternative text that can be converted into audio to supplement visual content or lack of captions for audio content.

- **Attention deficit disorder**: Distractive visual or audio material that cannot easily be turned off and lack of clear and consistent organization of web pages.

- **Intellectual disabilities**: use of unnecessarily complex language of web pages, lack of graphics on text intensive web pages and lack of clear or consistent organization of web pages.

- **Memory impairments**: lack of clear or consistent organization of web pages.

- **Mental health disabilities**: distracting visual or audio elements that cannot easily be turned off and web pages with absolute font sizes that do not enlarge easily.

- **Seizure disorders**: use of visual or audio frequencies that can trigger seizures such as flickering or flashing in the range of 4 to 59 flashes per second (Hertz) with a peak sensitivity at 20 flashes per second as well as quick changes from dark to light (like strobe lights for people with photosensitive epilepsy).

### 2.6.2 Features that cause accessibility problems on the website

In addition to the web accessibility barriers given in section 2.5.1, current research has identified a number of features that cause web accessibility problems on the website that are depicted in table 2.3.

**Table 2.3 Features that cause accessibility problems**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Features</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Lack of different resolution support</td>
<td>Gipson 2013; Manhas 2014; Rodrigo &amp; Barbosa 2013</td>
</tr>
<tr>
<td>2.</td>
<td>Increase of number of objects in a single page</td>
<td>Website optimization.org 2012; Manhas 2014</td>
</tr>
<tr>
<td>3.</td>
<td>Forms</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Graphical user interfaces (GUIs)</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>The non-linear navigation method of the website</td>
<td>W3C 1999; W3C 2005; W3C 2008</td>
</tr>
<tr>
<td>6.</td>
<td>Visual elements</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Tables</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Frames</td>
<td></td>
</tr>
</tbody>
</table>
Table 2.3 shows the barriers that cause accessibility problems in websites, in that the first two problems are identified recently and these two problems are not addressed in internationally and nationally accepted guidelines, others are addressed and recommendations were made for those problems. The reason for not addressed is the two problems are identified by 2012 and 2013 respectively, and the WCAG 2.0 guidelines were developed in 2008 and national guideline was developed in 2009. The following section describes the first two problems in detail.

In table 2.3 the first feature that cause accessibility problem is “lack of different resolution support”. Now-a-days almost all people having thin clients (Smartphone phones or Mobile phones or tablet), and they are capable of accessing the websites with some interfacing applications (Gipson 2013). The private organizations are developing some interfacing applications that are used to access that particular website in an efficient manner. If that application is not used for accessing that particular website means the websites are not adaptable with other interfacing applications and web pages are not working properly.

As well as, the E-Governance also started to develop interfacing applications, if this situation continues, the citizens need to install all website’s interfacing applications, this is a difficult task and this system can’t be usable for disabled people. So the E-Governance website should get fully accessible when interacting with PC, or laptop or smart phone or Mobile phone or tablet or any other thin clients. John Allsop (2000) stated in his design manifesto, “The Dao of Web Design” Designing adaptable pages is designing accessible pages.
A research shows more than half of U.S. laptop owners also own a smartphone, and nearly a quarter of them own a tablet as well (Mitchell et al. 2012). To avoid the resolution dependent problems the website should be developed based on the liquid layout display property. If the E-Governance websites are developed based on resolution independent property the citizen participation will get automatically increased that will help to improve our Indian democratic as well as government services to all the people including people with disabilities.

Figure 2.6 shows the snapshot of Madras University website, this site was chosen to show the sample of resolution dependent. The website developers has mentioned in the bottom place this site will get better performance on 1024*764 resolution screens only.

The appendix 2 shows the result of different resolution support of the Madras University website. If the website is viewed from different resolution screens mean part of the web page contents are missing and web page processing is not working properly. The different resolution support is verified by an automatic tool “Screen fly” and latest Firefox web browser version 27.0.1. In Firefox we can check the resolution support by pressing (shift + control + M) keys sequentially in keyboard when a particular website is opened.

Figure 2.6 Madras University website (unom.ac.in 2014)
In table 2.3 the second feature that causes accessibility problems is the increase of the number of objects in a single web page that is in a simple way, increase of the page size in kilobytes. The size and complexity of web pages have increased at an alarming rate. Despite increases in bandwidth, the load times of web pages has increased by 48% over the past two years. Reducing HTTP requests has become a critical skill in speeding up page load times (websiteoptimization.org 2012).

Figure 2.7 shows the number of objects in the average web page has reached triple digits. In just under 4 years, the number of objects in the average top 1000 web page has doubled from 49.9 objects in January 2009 to 100 objects in November 2012. By the end of the year, the average top 1000 web page is on track to break 100 objects per page.

![Graph showing growth of objects in average web page](image)

Figure 2.7 Growth of object in the average web page (websiteoptimization.org 2012)

When the number of object increases in a single web page, which will automatically increase the size of the page, the increase of size will lead to inaccessibility of web pages to people including the disabled (Charzinski 2010). According to Websiteoptimization.org (2012) the size of the average web page of the top 1000 websites has more than tripled since. Figure 2.8 shows that in the past five years from 2008 to late 2012 the average web page grew from 312K to 1114K, over 3.5 times. During the same five-year period, the number of objects in the average web page has more than doubled from 49.9 to 100 objects per page in November 2012.
Figure 2.8 Growth of average web page size vs. objects (websiteoptimization.org 2012)

Figure 2.9 shows the average web page size and objects versus survey size. In that, the data reveals the average web page for the top 292,880 pages is 1249K in size made up of 86 objects on average. So the top 1000 pages have more objects (100 vs. 86) but less K (1114K vs. 1249K). The top 100 web pages average 955K with 71 requests per page. So page size appears to be inversely related to site traffic and leads to inaccessible for disabled. Further the increase of page size and objects will make delay the page load time.

Hence the E-Governance websites should focus on the above mentioned (discussed in section 2.5) features to develop an accessible website for disabled people. All the
features given in the literature are related to the properties of websites (discussed in section 2.3), some directly like GUIs and others indirectly like lack of keyboard support. This is evidence that the problems faced by people with disabilities and from the non inclusive nature of the features of the website and its continuous developments.

2.7 Summary and Conclusion

This chapter presented the first part of the literature “relating multiple disabilities and Website’s accessibility”. This includes the current situation of disabled users in India, different types of disabilities and how the disabilities are affecting the disabled people to access the websites. Then this chapter explains the properties of websites and how the properties are affecting disabled people when accessing the website.

Next, this chapter extended to address the practical difficulties faced by the disabled people on E-Governance websites and features that causing the accessibility problems on websites. In the features of accessibility problems the resolution support with different client devices is very important for E-Governance websites as well as they should be developed with limited objects in a single web page for better accessibility on disabled people.

Next chapter describes about website accessibility guidelines, accessibility evaluation methods, tools and metrics used to measure the accessibility level, people’s needs of E-Governance, challenges of E-Governance, accessibility of E-Governance website, E-Governance development in India, about MMPs, the accessibility level of E-Governance websites in India and some recommendation of better accessibility on E-Governance websites.