

## Innovation in the It Sector - Opportunities for the Visually Challenged

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**Abstract:** For a greater number of people, getting employed is considered to be "A Major Life Activity" that not only offers financial self-determination, improves one's self-esteem, and also gives a feeling of contributing towards the society while enhancing the quality of life.

The above statements are also true among the people with disabilities for whom employment is an important factor in garnering self-confidence, having independence, achieving social inclusion and also ensuring equal participation in all aspects of life.

Persons with disability in India face many challenges when they look towards developing employable skills and gaining meaningful employment. **There are around 7.8 million blind people in India, which accounts for at least 20 per cent of the world's 39 million blind population across the globe, we have to be concerned about our visually challenged population when it comes to being financial independent and leading a respectful social life.** In this context, this study aims to understand the issues faced by the persons with disability in the Indian labour market and how the use of information systems and innovations in technology has helped the visually challenged to identify, create and make use of employable opportunities, leading to an inclusive society.

**Key words:** Information technology, innovations, visually challenged, inclusive society.

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### I. Introduction

The unemployment rate for visually impaired people in India has reached to an upsetting proportion. The evidence for the same can be concluded from the number of people who gained good qualifications but still are being seated at home and cannot secure a decent employment in the job market. Against this background it was felt that we need to find more facts about the real ground situation as well as to analyse and determine what can be done to identify and address the various problems faced by the visually challenged people. Most of the visually challenged acquire relevant and eligible qualifications necessary for employment through integrated programmes but in spite of having the necessary and appropriate qualifications most of them are still being discriminated in the labour market. The differently abled who have acquired appropriate and necessary qualifications for the jobs they want to do should have all the rights to be given equal chances of getting employed just like their sighted counterparts. This study hence is set out against this background to investigate the problems of unemployment faced by the visually challenged in India and how has the innovation in the Information Technology Sector helped the visually challenged people find more opportunities in the labour market and be more employable and financially independent.

### Problem Statement

Visually challenged people in India face various problems while seeking employment and how Information Technology has been a boon and helped address this issue.

### Objectives Of The Study

- To determine which softwares are available for the visually challenged people.
- To determine the strengths and weaknesses of the different softwares.

### Research Questions

The study seeks to answer the following questions:

- Why does the job market discriminate against visually challenged people?
- How has the innovation in technology helped the visually challenged people excel at the workplace?
- How has the new softwares helped the visually challenged make their life easier?
- A comparative study of the available softwares and how it helps different kinds of visually impaired people.

### **Significance Of The Study**

- It is hoped that results of the study conducted will provide appropriate information on the technological help needed by the visually impaired.
- It is also hoped that the study will help in identifying the new innovations that should be carried out for preparing visually impaired people more eligible for employment.
- It is also anticipated that the study conducted would help to create an awareness on the technological needs and expectations of visually challenged people regarding employment opportunities.

### **Assumptions Of The Study**

The study assumes that:

- Visually challenged people are competent with regards to their sighted counterparts at the work place.
- Visually challenged people are motivated, reliable and willing to learn as equal as normal sighted people at their work place.
- Visually challenged employees are loyal to their employers.

### **The Research Design**

The survey method was chosen for conducting this study.

The survey method was selected because of its suitability in soliciting information in a study of this nature. The survey method mainly makes use of the questionnaires, interviews and of rating scales (likert scales) in the collection. Questionnaires, observations and also informal discussions were used to collect data in this study.

It was selected for the following reasons:

- It gathers data from a good number of respondents in particularly less time.
- Respondents have relatively enough time to think about their responses and respond appropriately.
- It reflects a general idea of the sample population.
- It is relatively economical and cost effective.

Some of the disadvantages of the survey method are that:

- The researcher is constrained towards testing the theories she has hypothesised or postulated on.
- The researcher believes that she knows importance of the parameters being asked and also that the respondents cannot provide answers to the questions that were not asked.

These disadvantages of the survey method were tried to overcome by first carrying out a pilot study to determine the appropriateness of the sample questionnaires. Open ended questions that were asked provided respondents with a chance to express their views freely. The researcher also read widely around the topic before deciding on research questions.

### **Population**

The population of the survey comprised of all the employed, unemployed and seeking opportunity visually challenged people from Mumbai and across Maharashtra . It also consisted of employers of visually challenged people.

#### **1.1 Sample Size**

A sample of 50 unemployed and employed visually challenged personnel.

## **II. Research Instruments**

Questionnaires, observations, interviews and informal discussion were used to gather and collate data in this study.

### **2.1 Questionnaire**

The main instrument used for the study was the questionnaire. It was selected because of its ability to give the respondents enough time to think and respond properly. Responses were most likely to be genuine because of the anonymity involved and also because of the fact that the study was conducted for their own benefits. Questionnaires also had been used because of their reputation in time saving.

### **2.2 Questionnaire to unemployed visually impaired persons :**

A questionnaire was designed and distributed to 20 unemployed visually impaired persons. This questionnaire extracted information from unemployed visually challenged persons on their views and

experiences on looking for employment.

### **2.3 Questionnaire to employed visually impaired persons :**

A questionnaire was also designed and distributed to 20 employed visually impaired persons. This questionnaire elicited information from employed visually challenged people on their views and experiences about that employment.

### **2.4 Questionnaire to employers of visually impaired persons:**

A questionnaire was designed and distributed to 10 employers of visually challenged people. This questionnaire garnered information from employers of visually impaired people on their experiences and views about visually impaired employees at their respective work places.

## **III. Difficulties When Software Was Not There:**

### **3.1 Background**

Visual impairment can be defined as, for people who have very poor vision, to people who can see light but no shapes, or as people who have no perception of light at all. However, for general discussion it is considered to classify this population as representing two broad groups: those with low vision and those who are legally (by definition) blind. Low vision has been defined as vision that is between 20/40 and 20/200 after being corrected. (20/200 means an object at 20 feet would be visible same as the object at 200 feet would be to someone with normal 20/20 vision) There are 9-10 million people recognized with low vision. Some of them can read the print if it is large enough and held close (or when viewed through a magnifier). Others can only detect large shapes, colors or contrasts. It is approximated that 1.2 million people have severe visual impairments who are not considered legally blind.

A person is termed to be legally blind when their visual acuity (sharpness of the vision) is 20/200 or worse after being corrected, or when the field of vision is less than 20 degrees.

Blindness can be by birth, acquired later through illness or accidentally through some mishaps, or it maybe associated with aging (glaucoma, cataracts, macular degeneration, optic nerve atrophy, diabetic retinopathy and other diseases). With the current demographic trends in India there is a larger proportion of elderly, which leads to the prevalence of visual impairment.

### **3.2 Functional Limitations Caused by Visual Impairments**

Functional limitations of a visually challenged person include increased sensitivity to glare, no central vision, no peripheral vision, loss of visual acuity or focus, poor night vision, reduced color distinction ability or a general haziness of whole vision. Those who are legally (by definition) blind may still retain some kind of perception of shape and contrast or of light vs. dark (the ability to locate a light source), or they may be totally blind (having no awareness of environmental light).

### **3.3 Difficulties Using Computers and Software**

As would be expected, people with severe visual problems have the greatest problem reading the information displayed on the computer screens. However, it is also seen that the use of a mouse or other pointing device requiring coordination between eyes and hand gestures on the mouse is also a huge problem for many. Special programs already exist nowadays to provide visually challenged individuals with the ability to magnify images/texts on the screen. There are also programs which read aloud the content of the screen for the benefit of the visually challenged. However, such application softwares and programs sometimes execute in a manner that makes things difficult or impossible to work well with such programs or sometimes not to work at all. Individuals with very low vision may also miss messages which pop up at different times on the screen, since their attention is usually focused on only a small area of the screen at any given point of time.

### **3.4 Access to Documentation**

Instructions for operation of the software and other documentation (eg: FAQs) necessary to would also be inaccessible if they are not provided in an alternate form (for e.g., audio or braille) and even then we cannot negate the possibility of people may face difficulty accessing the graphic or pictorial information provided in documentation. As many people with visual impairments still have some amount of visual capability left, many of them still can read with the help of assistive devices such as magnifiers, bright lighting (for printed text), and glare reducers. Many visually challenged are helped immensely by use of larger fonts, sans-serif typefaces, and high contrast colouring.

Major strategies for coping up with these difficulties for visually challenged include the use of braille, large raised lettering or raised line drawings, braille and audio tapes. However, it is interesting to note here that

braille is preferred by only about 10% of people who are blind (normally who are taught to use it from early in life). However it was also found that those who use braille, usually have strong preferences for it, especially for reading shorter documents. Raised and large lettering must be big enough and is therefore better for providing simple labels on raised line drawings rather than for exhaustive text.

#### **IV. Softwares Available For Visually Impaired**

##### **4.1 JAWS**

JAWS (Job Access With Speech) is a powerful software program designed to work with a speech synthesizer to improve the productivity level of visually challenged employees, students and even for the casual user. By streamlining keyboard functions, automating commands, and eliminating repetition, JAWS allows the operator to learn faster and easier than ever before. JAWS is based upon a whole new approach to talking computers - that of designing software with the priorities of the blind user in mind. Yet, the sighted trainer or supervisor has not been forgotten, since JAWS offers both audible and visual flexibility.

##### **4.2 NVDA**

NVDA (NonVisual Desktop Access) software is a free “screen reader” which enables the blind and vision impaired people to use computers. It reads out aloud the text on the screen in a computerised voice. NVDA can also convert the text into braille if the computer user owns a device called a “braille display” device. NVDA provides the key to education and employment for many blind people. It also provides the visually challenged, the access to social networking, online shopping, banking and news. NVDA works with Microsoft Windows. One can also download it to PC, or to a USB stick which can be used with any computer. NVDA is free. It’s been downloaded 70,000+ times, in 43 languages.

##### **4.3 Kurtzweil OCR**

The Kurtzweil OCR software is a software which speaks out the text on the screen aloud in different variety of natural-sounding voices that can be modified to suit individual preferences. In addition, it also provides the visually challenged users with the feature of creating a document and its editing. Also it can be used for note taking, summarizing and outlining of the text. Kurtzweil 1000 delivers quick access to a treasure of online information including electronic books, magazines and encyclopedias so users can pursue their reading interests. They can also convert their files in Braille by sending files to Braille note takers and embossers as well as portable devices such as DAISY and MP3 audio players. With its wide array of useful features, its users save time and gain independence - whether they are at home, at school, or at work.

#### **Features And Highlights Of The Three Softwares And Comparison**

<b>OCR</b>	<b>NVDA</b>	<b>JAWS</b>	<b>FEATURES</b>
Products for free trial and other product updates are available on their website.	Their work for improving accessibility to technology for blind is renowned worldwide.	Events are held at various places	<b><u>Awareness</u></b>
The software Kurtzweil 1000 costs \$995 while the version 3000 costs \$1395	Free and registered charity under Australian law	Between US\$895- US\$1,095	<b><u>Price</u></b>
Setup and installation troubleshooting. Assisting in any technical issues	Provides Support and Training for Organizations	One can learn to use JAWS - from basic steps to more advance	<b><u>User friendliness</u></b>
is very flexible with different hardwares and comes in varied versions to match the customer’s requirements	can be downloaded to the PC, or to portable media such as a USB	easy to get started without sighted assistance. Has been translated into 17 languages worldwide	<b><u>Flexibility</u></b>
OCR applications are easily accessible on the website of the company. They are available in free trial versions which can help the user understand the need of the applications.	works exclusively with accessibility APIs such as Microsoft Active Accessibility, IAccessible2 and the Java Access Bridge	Supports all standard Windows® applications without the need to do special configurations	<b><u>Accessibility</u></b>
These softwares are compatible with Microsoft Windows and Macintosh computers.	NVDA runs on both 32-bit and 64-bit editions of Microsoft Windows XP or later.	Proper licensing is required to run	<b><u>Device support</u></b>
These softwares are compatible with Microsoft Windows and Macintosh computers	NVDA has no additional hardware requirements beyond those of the operating system and requires around 50 MB of disk	compatible with Lotus (IBM) Microsoft Office Suite, MSN Messenger, Corel WordPerfect, Adobe Acrobat Reader, Internet Explorer, Firefox - and many	<b><u>Compatibility</u></b>

	space.	more applications	
widely used as a form of data entry from some sort of original paper data source a common method of digitizing printed texts so that they can be electronically edited, searched, stored more compactly, displayed on-line, and used in machine processes such as machine translation, text-to-speech, key data extraction and text mining OCR is a field of research in pattern recognition, artificial intelligence and computer vision.	Support for popular applications Reporting of textual formatting where available, such as font name and size, style and spelling errors. Automatic announcement of text under the mouse and optional audible indication of the mouse position. Support for many refreshable braille displays & Easy to use talking installer. Support for Windows command prompt and console applications	JAWS reads aloud what's on the PC and gives the user a unique set of intelligent tools for navigating and accesses Web pages and all screen content. With a refreshable Braille display like Freedom Scientific's Focus, JAWS also provides Braille output in addition to, or instead of, speech JAWS also provides Braille output in addition to, or instead of, speech. customizable options for individual needs and preferences	<b>Features</b>

### **V. Survey Carried Out For Finding The Effectiveness Of I.T Software For The Visually Challenged.**

A survey has been carried out for analysing the adequacy and effectiveness of currently available softwares for the visually impaired and the responses were collected and analysed efficaciously for the purpose of the research.

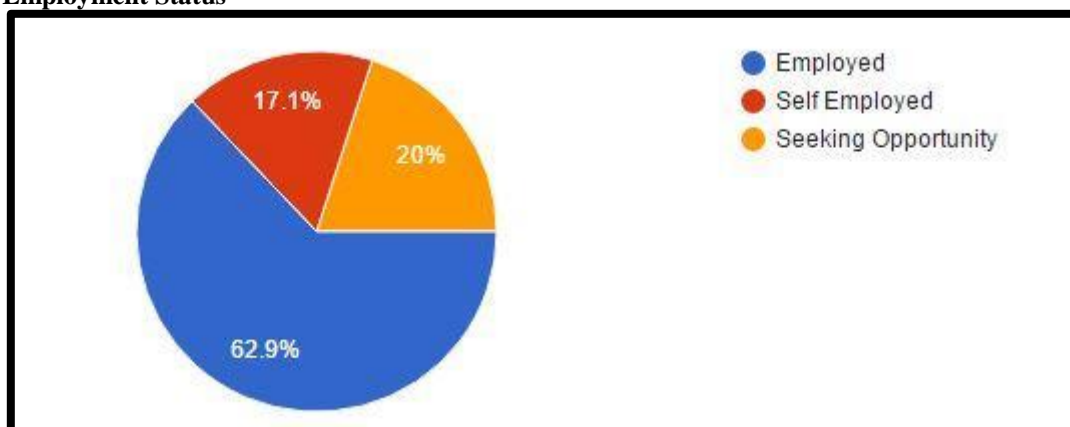
#### **5.1 Objectives Of The Survey:**

The objective of the survey is to determine answers to the following questions:

1. Is there a relationship between gender and unemployment?
2. What are the various assistive aids used by the visually challenged?
3. Which IT software is more popular among the visually challenged ?
4. Since when are they using the I.T softwares aid?
5. How were they introduced to the software?
6. Has the software made their job easy?
7. Has the software increased their chances of progress in their respective career?
8. Has the software increased their chances of social acceptability?
9. How were they accessing print material before the use of software?
10. What are the most important determinants of software selection?
11. Which skills has been enhanced by the use of the software?

#### **5.2 Observations & Interpretations:**

##### **5.2.1 Employment Status**



**Fig1.**Employment status of the population

According to the study, around 20% of the people were seeking opportunity, and out of the other 80%, 62.9% were employed by others and 17.1% were self-employed.

### 5.2.2. Gender wise breakup

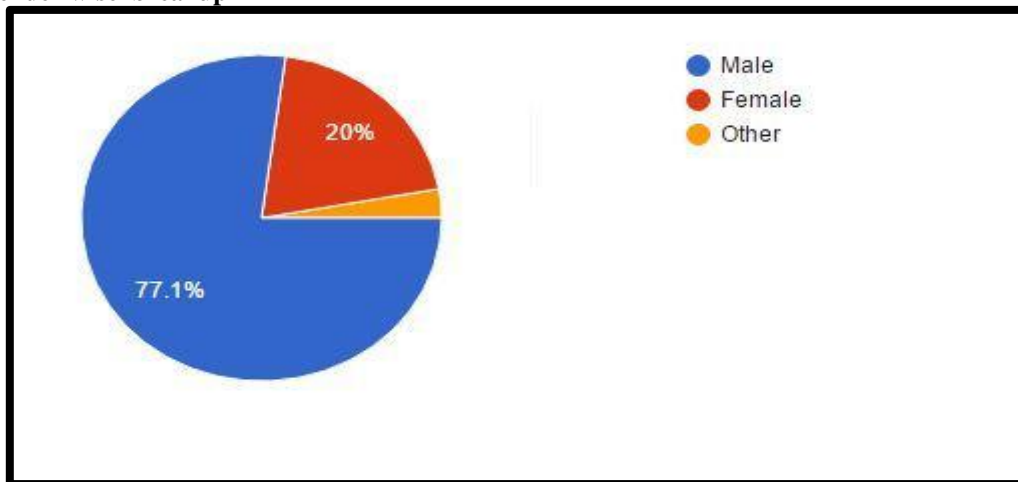


Fig 2. Gender of the sample population

Of, the survey of the population, 77.1% of the visually challenged were males, 20% females and the other 2.9% other gender.

### 5.2.3 Assistive Aids used

The various assistive aids used by the population were as shown in the pie chart:

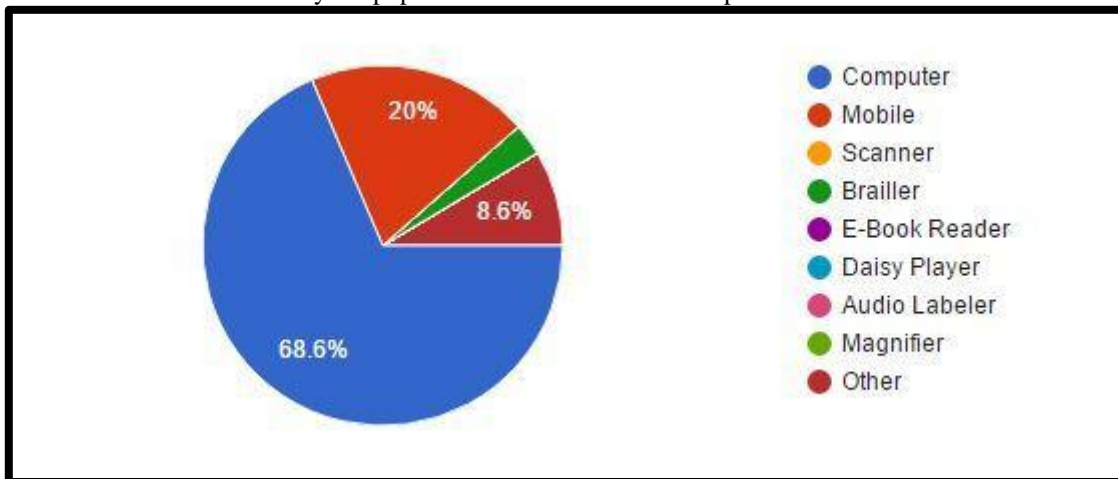


Fig 3. Assistive devices used

As shown in the diagram, 68.6% preferred computers as their assistive aid, while 20% used mobiles, Braille was used by 2.9% and 8.6% used other devices.

### 5.2.4 Popularity of the softwares

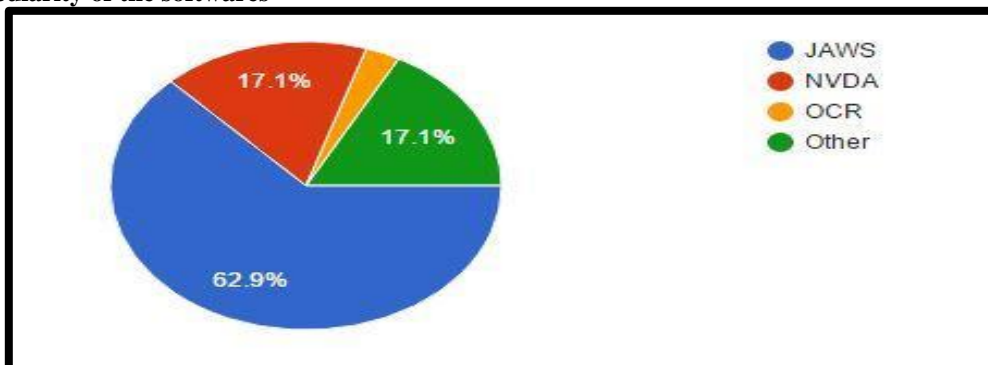
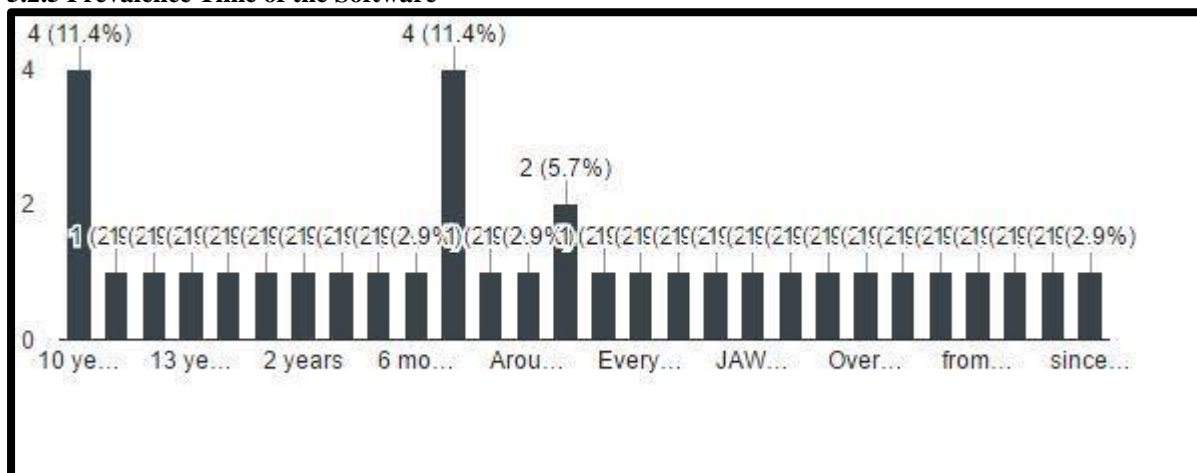


Fig 4. Popularity of the I.T software

According to the survey, JAWS was the most used IT software (62.9%).

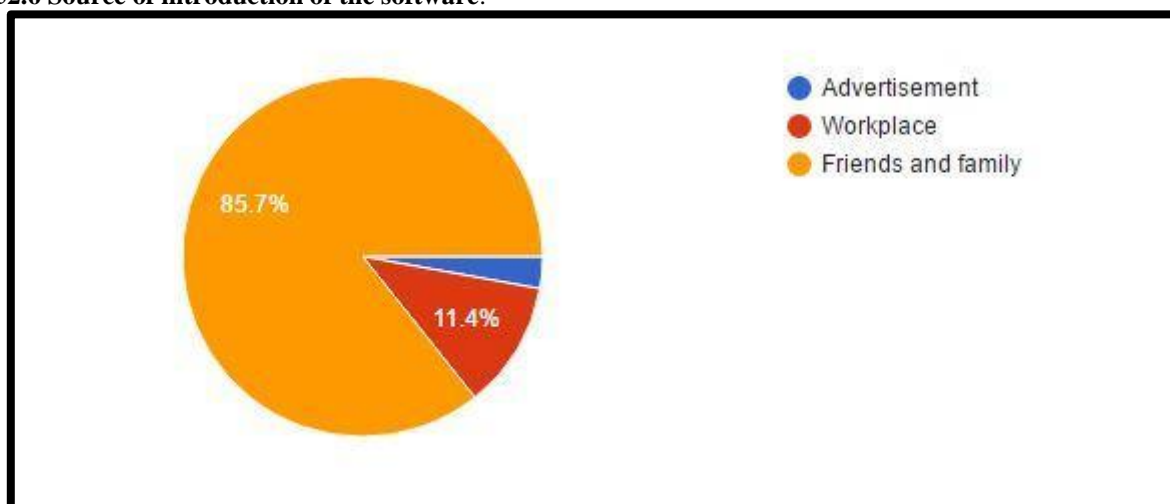
**5.2.5 Prevalence Time of the Software**



**Fig 5.** Time for which the software has been in use

The use of software has been prevalent for more than 10 years by 11.4 % people. Some of them have been using JAWS for more than 16 years.

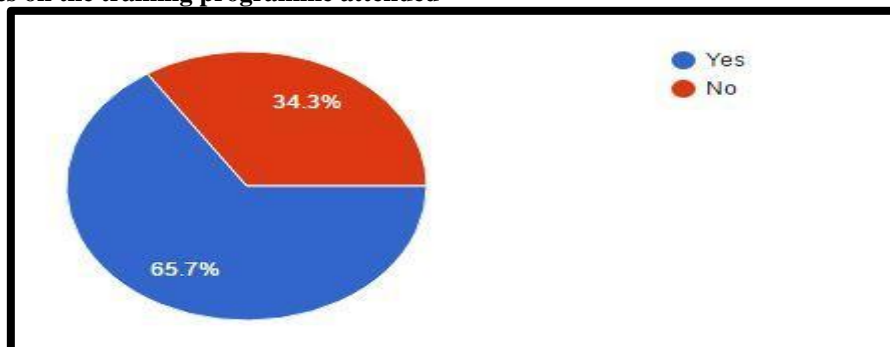
**5.2.6 Source of introduction of the software.**



**Fig 6.** Statistics of introduction of the software

Around 85.7% people were introduced to the software by Friends and Family, 11.4% at workplace and other 2.9% by advertisements

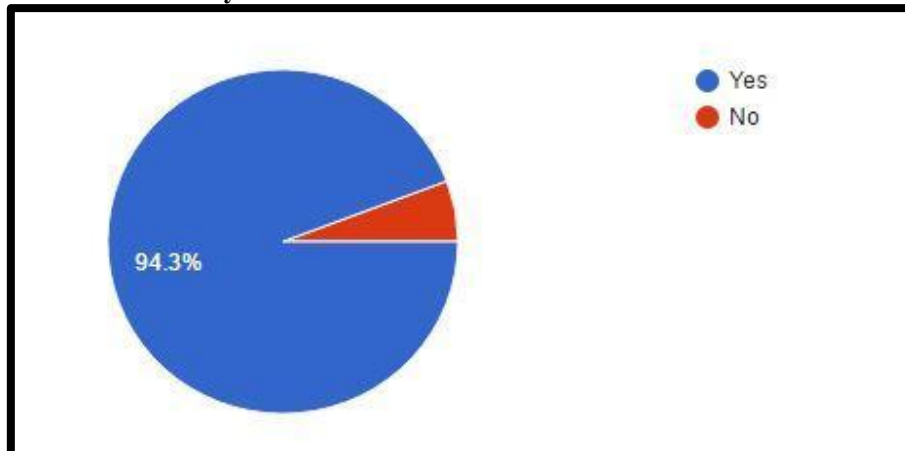
**5.2.7 Statistics on the training programme attended**



**Fig 7.** Statistics on the training programme attended

65.7% of visually challenged people responded that they attended training sessions at various locations.

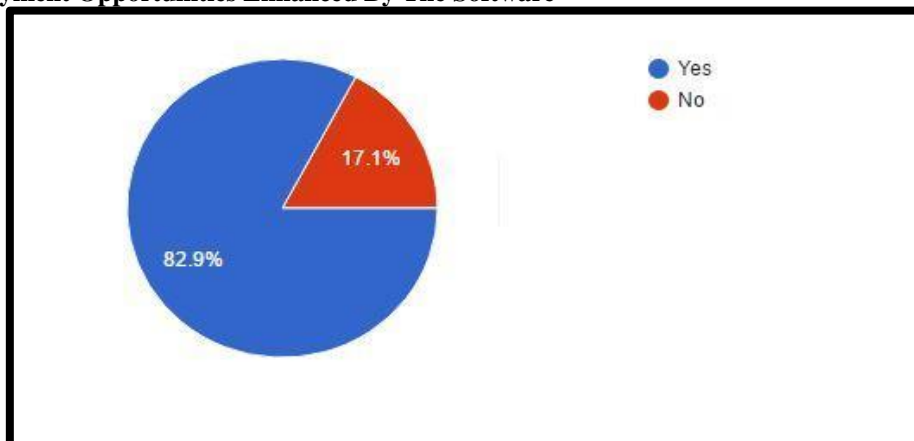
### 5.2.8 Opportunities Enhanced By The Software



**Fig 8.** Opinion of the population on the opportunities enhanced by the software

94.3% of the visually challenged people responded that the software has made their job easier.

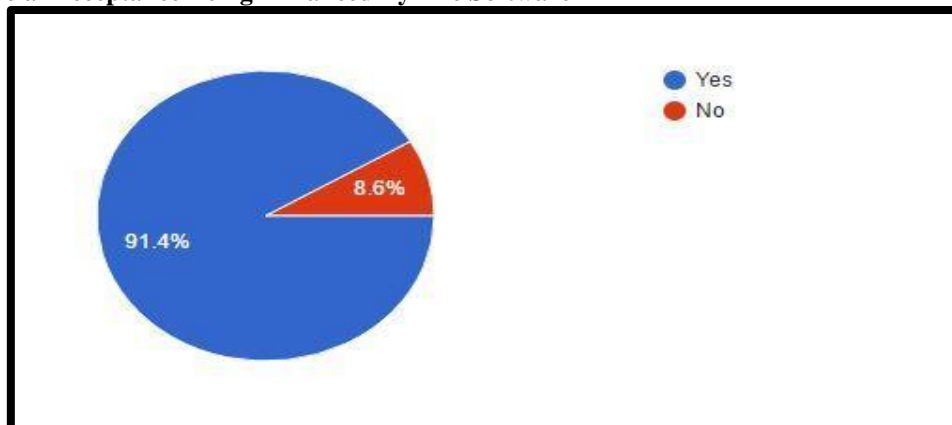
### 5.2.9 Employment Opportunities Enhanced By The Software



**Fig 9.** Opinion of the population on the employment opportunities enhanced by the software.

82.9% of the visually challenged people who participated in the survey admitted that the use of the software has increased the chances of progress in the career.

### 13.2.10. Social Acceptance Being Enhanced By The Software

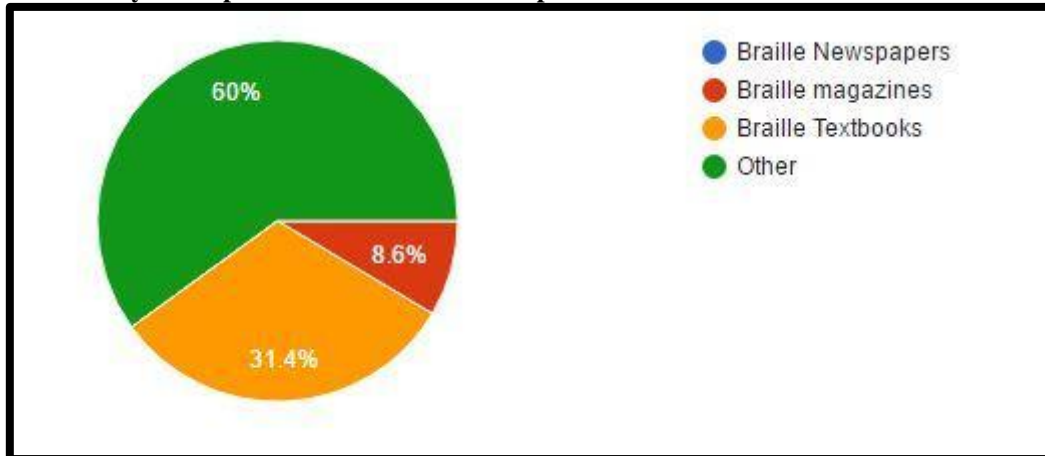


**Fig 10.** Opinion of the population on the social acceptance being enhanced by the software

91.4% of the people agreed to the fact that using the software made them feel socially acceptable.



**5.2.11 Accessibility of the print material before the exposure to software**



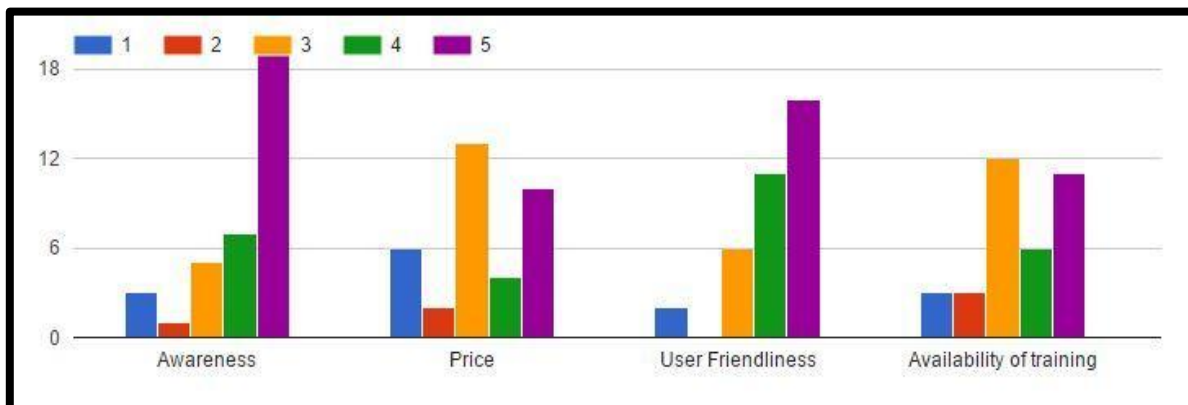
**Fig 11.** Accessibility of the print material before the exposure to software.

Accessibility of the print material around 31.4% was done by the use of braille textbooks, 8.6% by braille magazines and other sources were 60%

**5.2.12 The Determinants Of Selection Of The Software**

The determinants of selection of the software were as follows according to their weights given as per the participants in the survey.

1. Awareness
2. User Friendliness
3. Availability in the market
4. New Features
5. Accessibility
6. Price
7. Device Support
8. Compatibilty
9. Accessibility
10. Availability of training
11. Technical Assistance
12. Open Source



**Fig 12.** Determinants of the software selection

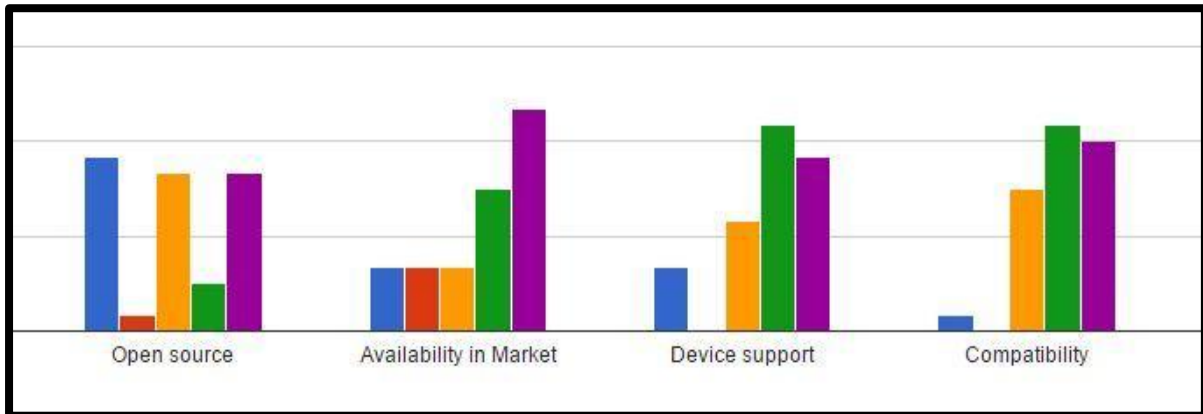


Fig 13. Determinants of the software selection

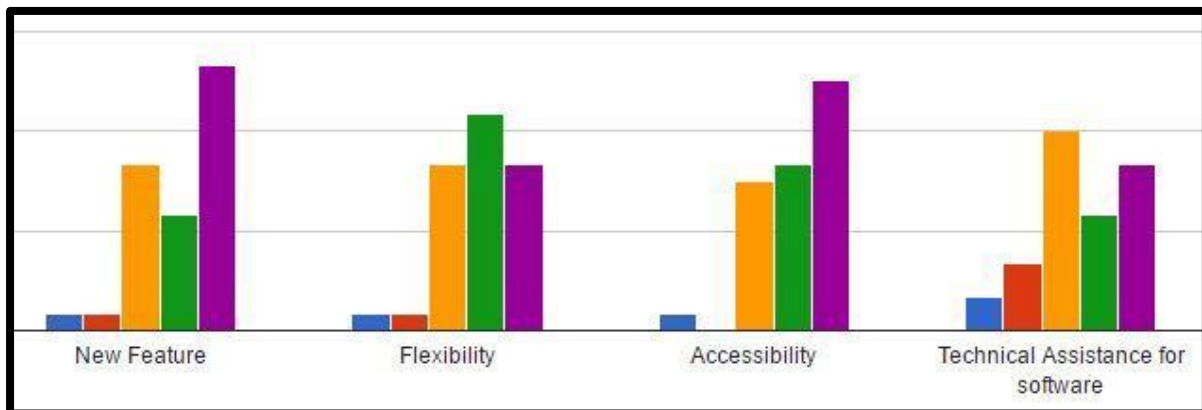


Fig 14. Determinants of the software selection

### 5.2.13. Skill Enhancement By The Softwares

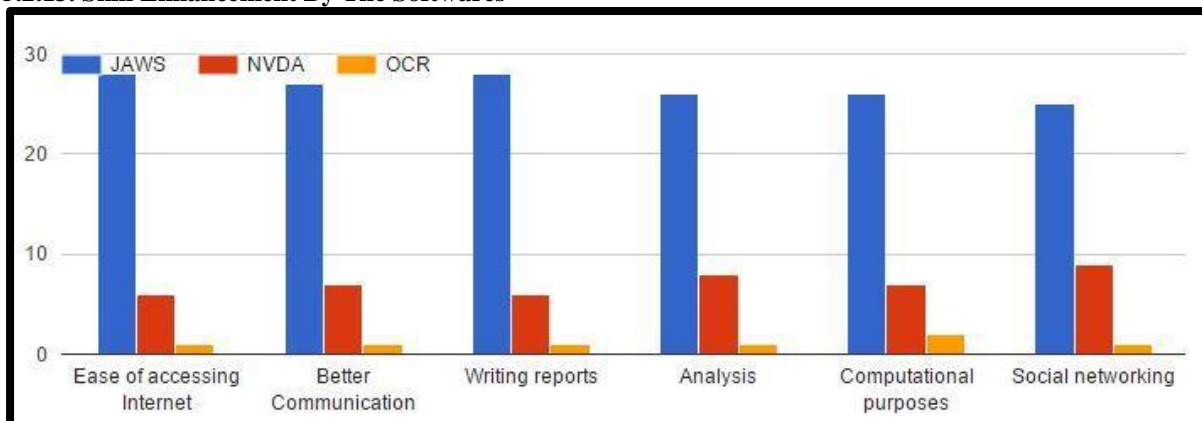


Fig 15. Skill enhancement by the softwares

JAWS has clearly enhanced the skill of the users, as per the survey.

### 5.3 CONCLUSIONS:

1. No relationship between ender and unemployability were found as such.
2. The most used assistive aids by the visually challenged were: computers, mobiles, brailers.
3. JAWS was the most popular and most used IT software among the population.
4. Most of the visually challenged were using softwares since more than 7 years. Some of them even have been using it for more than 10 years.
5. Most of the visually challenged were introduce to the software by their friends and family.
6. The survey assured the fact that use of software has made the life of visually challenged easy.
7. The visually challenged people also agreed to the fact that the use of software increased their chances of progress.

8. Also, it was clear from the survey that the software made the visually challenged more acceptable in the society.
9. Before the use of softwares, visually challenged were accessing print media mostly through the braille textbooks and magazines.
10. The determinants of selection of the software based on their ranks in the survey were found out and the majority of the people voted for Awareness, User Friendliness, Availability of the software in the market, New Features and the Price of the product offered, Accessibility, Device Support and compatibility were next in line to be viewed while selecting. Some of the other factors included Availability of training, Technical Assistance and Open Source of the software to be chosen.
11. According to the survey, the skills that has been enhanced by the use of software were Ease of accessing Internet, Better Communication including Writing reports. Analysis of data for Computational Purposes. Also increased Social networking and the usage of security apps. The most important skill enhancement that was found was Keeping them updated about the current affairs of the world.

## **VI. Limitations Of The Study**

The limitations of the study were:

- Limitations of the researcher to address a larger sample size from across the country.
- The researcher would have wished to have more time observing visually impaired people at work to ascertain some issues about their employability but this was not possible due to limitation of time.

### **Managerial Implications:**

The awareness and subsequent matching of the needs of the visually challenged and the innovations in the IT sector will lead to better growth in terms of scope of higher education and employment possibilities for the visually challenged. The study gives insights on the lacunae of current available software and scope for further enhancement of software technology to make the visually challenged at par with their sighted counterparts.

### **References:**

- [1]. Brillat, J.-L. (1989) Econometric modelling on microcomputers: a review of major software packages: *Journal of Applied Econometrics*, 4, 73-92.
- [2]. Ericsson, N.R (1988) A review of Data- Fit: an interactive econometric modeling pPackage for IBI –compatible PCs: *Journal of Applied Econometrics*, 3, 319-332
- [3]. Kress, G. R., & Van Leeuwen, T. (1996). *Reading images: The grammar of visual design*. Psychology Press.
- [4]. Morey, M.J. (1987) Micro TSP: *The American Statistician*, 41, 143-145.
- [5]. Sharma, F. R., & Wasson, S. G. (2012). Speech recognition and synthesis tool: assistive technology for physically disabled persons. *International Journal of Computer Science and Telecommunications*, 3(4), 86-91.
- [6]. Veal, m.R (1991) SHAZAM 6.2: a review: *Journal of Applied Econometrics*, 317-320
- [7]. Yin, R K, 1984, *Case Study Research: Design and Methods*, Beverly Hills, CA: Sage Publications
- [8]. Zyda, M. (2005). From visual simulation to virtual reality to games. *Computer*, 38(9), 25-32.

### **Websites Accessed for the Study**

- [9]. <http://www.nvaccess.org/> accessed on 13/12/2016
- [10]. <https://www.kurzweilededu.com/products/kurzweil-1000-v13-windows-features.html> accessed on 25/12/2016
- [11]. <http://www.nanopac.com/jaws.html> accessed on 25/12/2016
- [12]. [http://censusindia.gov.in/Census\\_And\\_You/disabled\\_population.aspx](http://censusindia.gov.in/Census_And_You/disabled_population.aspx) accessed 2/12/2017