ICT Tools & Implications for the Wellbeing of Divyangjan Working in Different Service Sectors

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Abstract

In this ever changing fast paced rapid world, the relevance of the information and communication technology (ICT) tools is acknowledged by almost every individual. Since the last decade, there has been a significant upsurge in the usage of such tools. Technology has helped in bringing a major revolution that was otherwise unimaginable. It has not only been a constituent factor in bridging the gap among people residing in different countries by bring them together on one platform for communication but has also been one of the major reasons for an interconnected and integrated economy. Due to such technological upgradation, globalization is no more a mere dream. In every sector of economy such as primary, secondary or tertiary, the role of ICT is evident. Recently, COVID-19 pandemic made an impact on almost the lives of every individual in various different ways, the entire nation had no option but to make a widespread shift by primarily focusing more on the increase usage of the Information and communication technology tools as per the changing need of the moment. As a major portion of people experience some of the form of disability, there is certainly no doubt about the injustice faced by them in day-to-day life as disability is still seen as a evaluative There are various forms of barriers which are faced by disables in their different aspects of life including the professional and social barriers. As everything is related to one another, this can also affect the mental and physical well-being of disabled population in the negative manner. People with disabilities working in organizations undergo through many issues. One of them is related to a gap that is visible between development of ICT tools for general workforce and for people with disabilities workforce in HRM at workplace. ICT tools can also be a source of maximizing the optimal functioning, making the community more effective and efficient. Therefore, the study aims to review the existing ICT tools with respect to the people with disabilities by doing a meta-analysis. The study will serve an important two-fold purpose through which not only the efficiency of "Divyangjan" will be maximized but will further also contribute to the organizational success by doing a deeper analysis. The knowledge of the ICT tools with respect to people with disabilities in India, thus becomes important. The findings will also add to the empirical evidence regarding the already existing literature of digital technology.

***Keywords**: Information and Communication Tools (ICT), divyangjan, people with disabilities (PWDs), Assistive Technology (AT), inclusion, accessibility.*

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Introduction:

'PWD can't do anything' let's break this old rule,
India has a huge PWDs Talent Pool.
Let us disable the disability,
Let us take a wakeup call and utilize the PWD talent with research on specialized ICT Tools.
Mainstreaming, inclusion and accessible technology are the budding thoughts in today's Research School.' - Artee Gupta (30 Aug.)

"चार बांस चौबीस गज, अंगुल अष्ट प्रमाण,
ता ऊपर सुल्तान है मत चूके चौहान।"

– *कवि चंदबरदाई* (Baradāī, Chanda; Mōhanasiṃha, Kavirāva (1954)

Indian History has perfect examples when there was neither information technology nor any kind of digital access. When people with disabilities in ancient times, in absence of information technology, were able to excel in various fields in their life, then in recent times with more usage of technology, people with disabilities can maximise their potential at the workplace with proper accessibility, development of information technology, mainstreaming and inclusion. There are evidences in the Indian mythology which have depicted that people with disabilities can act as source of strength and can-do great wonders such as Shakuni, Dhritrashtra, Shikhandi in the great Mahabharata are few prominent examples. A famous Indian movie 'Lagaan' that comprised of a character "Kachra" who was handicapped but due to the immense support of his team members and his own ability of belief, his move of one run made the entire team win.

But with the changing time, the attitudes and beliefs of people towards disabled have changed in the negative connotation. It has been reported that people with disabilities are at the greater risk of having a poor well-being. The present times thus calls for the need to carry out research and development of ICT tools and their access to PWDs.

S. No.	Name	Type of disability	Famous work
1.	Sage Ashtavakra	Physical deformities	Despite of multiple physical deformities, Sage Ashtavakra wrote Ashtavakra Samhita and passed on knowledge to the world.
2.	Dhritrashtra	Blindness	Despite the blindness, Dhritrashtra had the strength to fight with 100 elephants at one time.
3.	Surdas	Blindness	Surdas was blind but he was a great devotional poet and singer.
4.	Kalidaas	Intellectual disability	Despite of intellectual disability, Poet Kalidaas wrote Indian Epic – Meghdutam.
5.	King Prithvi Raj	Blindness	The brave King Prithvi Raj was made blind by Mohammad Gauri. He was presented his court as a war prisoner. Prithvi Raj who was an expert in archery, calculated the exact distance just by hearing and following the famous poetic clue of the poet Chand Bardai and hit the arrow on Sultan Mohammad Gauri.

Source: Wecapable.com (n. d.)

Table 1*:* Illustrations of people with disabilities from Indian History

In recent times, due to the development of Information Technology and ICTs, the world has become a 'global e-village'. It has impacted human life in variety of ways. The ICTs are easily reachable to all the people at the workplace. The Diverse composition of individuals is referred to as strength of the organization that include people from different background, nations, culture, society, gender as well as people with disabilities (PWDs) or 'Divyangjan' as per the new term coined by the Indian Govt. Divyangjan are people who have some physical limitations. Due to which, they undergo through serious concerns both family as well as professional life. Because of the disability, often at times they feel incomplete. This adds negatively to their self-esteem, which is a belief about oneself. Therefore, efforts should be made to make them feel as normal individuals, capable of doing and becoming anything. ICT. It can give them new opportunities in terms of employment, education, social/ cultural/ urban services such as a bed-ridden PWD can work or study through e-learning, tele-working. ICT ensures accessibility and self-dependence for PWDs and elderly people. In European countries, Internet has also played a major role in eliminating discrimination. Access to Information technology has now become a citizen's right and absence of the information accessibility can lead to their exclusion, social injustice and discrimination. Also, Divyangjans, which are having a lot of potential can become an important resource if their accessibility to ICT tools can be worked on. Hence, there lies a need to understand the problems of Divyangjans in accessing ICTs. There many places where Divyangjans are not even considered, resulting in unequal treatment. One such example is making ICT tools without considering disabled section.

Objectives of the study:

1. To find out the problems faced by Divyangjan due to the challenge of digital technology.
2. To understand the information technology gap to improve efficiency of Divyangjan at workplace.
3. To know whether the technology at workplace is user-friendly for Divyangjan.
4. To assess the special needs of Divyangjan in terms of utilizing ICTs.

Recent literature and research gap:

This study is based on review of the work related to ICT tools and its development for people with disabilities at workplace. Through the review, it can be highlighted that there is less focus on the development of ICT tools along with not promoting the use of Artificial Intelligence for PWDs (Divyangjan) as part of inclusive workforce. Also, there is a lot of work done on accessibility of digital tools for PWDs, but proper study has not been conducted on development and customization of ICT tools specially in Indian context.

Kumari Neha, (2019) in her study titled "Karmic Philosophy and the Model of Disability in Ancient India" aimed to stand against the wrong view of the negative treatment of characters with disabilities in Indian mythology. Shakuni who had a limping leg was remembered for negative actions in Mahabharat. Dhritrashtra was blind but possessed a powerful position. He was also portrayed as a negative character in Mahabharat. But Ashtavakra overcome his deformities and wrote Ashtavakra Samhita defeating his disabilities. Karmic Philosophy still commands social attitude towards disability in India. There should be inclusiveness in mainstream society towards disability without discrimination.

UNESCO, (2009) in its article "Empowering Persons with Disabilities through ICTs" said that 10% of the world's population are affected with disabilities. Unemployed PWDs are around 90% of the total population in developing countries. It further stated that ICTs make people with disabilities efficient, enhances their quality of life. By making ICTs accessible, it improves access to information and employment for PWDs. It also highlighted that ICT tools should be developed based upon human right but not as charity.

Boucher Philip, (2018) European Parliamentary Research Service (EPRS) in its study titled 'Assistive technologies for people with disabilities' presented futuristic role of assistive technology (ATs) analyzing its pros and cons which has been described in below mentioned table:

Mid-tech solutions in an inclusive society There is no marginalisation for PWDs in European Societies as they are matured to understand inclusion. The difference between people with and without disability does not exit largely, rather there is a varied range of ability in European people's life. Use of Mid-tech ATs strengthen inclusion.	**Technological fixes in a prejudiced society** People in European societies have become self – centred and the physically abled people consider themselves superior to PWDs. But the advancement in medical and technology has decreased the frequency of disability occurrence. But the development and accessibility to ATs is limited and leave a s cope of discrimination for PWDs.
High-tech reliance in an individualistic society With the economic and technological progress in Europe, the aged population has led to familiar people with disability population. Advance technology help to fix the differences and disabilities. However, education, employment and social participation of a person depends upon their willingness instead of inclusiveness of the society.	**Privileged use of technology in a divided society** There are economic and social divisions in European society. The accessibility of ATs in Europe depends upon a person's economic condition. The financially sound people can access the ATs from the private market. Though the State provides medical facilities for health but many PWDs are unable to access them.

Table 2: Four Scenarios for the future of Assistive Technology (ATs) Source: Boucher Philip, (2018)

The study revealed that assistive devices and technology have a positive influence on PWDs workforce but Society's attitude needs to be changed towards an inclusive society.

Methodology adopted:

As the study is conceptual based on analysis, literature review methodology has been adopted including the extracting and analyzing the data. The study mainly focuses on ICT's impact on people with physical abilities (Divyangjan) national and internationally. The essential requirements and hardships of people with the disabilities are explored for the use of ICTs by reading and reviewing various case studies.

An analysis of Theoretical results:

Meshur, H.F.K (2016**)** in her study titled "Opportunities for disabled people through ICTs"

created awareness about using ICTs for people with disabilities. The study was conducted on Turkey's people having target group of PWD individuals. The study talked about e-learning and teleworking concepts for PWDs. It evaluated about the benefits of ICTs for PWDs in Turkey and bring awareness about the use of ICTs for PWDs.

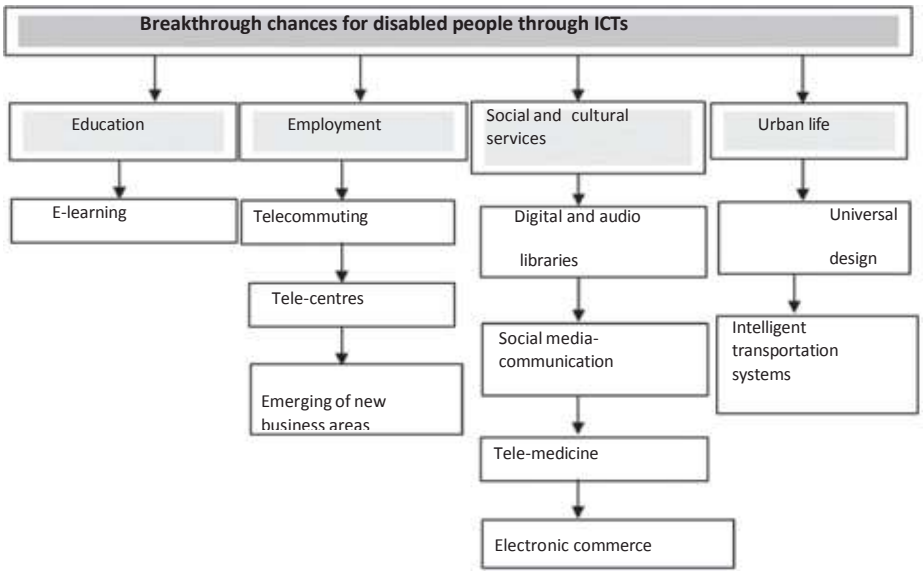

Figure 3: Breakthrough chances for disabled people through ICTs in Turkey (Source: Article in International Journal on Disability and Human Development https://www.researchgate.net/publication/301713057)

ICT Tools for Divyangjan:

S. No.	Type of disability	ICT Tools	Other details
1.	People with hearing impairment	Auditory modes of communication Access of information through internet Thetos Program Evident – Multimedia Tools Project	Auditory modes can be used up to a very limited extent. Thetos automatically transform writing into sign language. Evident is a developed bilingual interactive study software for students.
2.	People with full visual impairment	Braille Touch (iOS), Braille Keyboards	Communicates through information transformed into sound or Braille.
3.	People with partial visual impairment	Braille Screen Magnifiers, Screen reader programs such as COBRA, JAWS (Job Access with Speech) Talking devices such as Voice Over (in OS X and iOS), talking thermostat Audio Exam Player (iOS) Audible (iOS, Android) Mobile Phones with large tactile buttons	Good tools with mobile technology are available for people with partial visual impairment which they can operate at their own. Text to speech systems are quite useful with Optical Character Recognition (OCR). Screen Magnifiers and large print materials help to access information for people with visual impairment.
4.	People with locomotive disabilities	Assistive devices and wheelchairs equipped with Assistive Technology (AT)	Stair climbing wheelchairs are IT equipped and have sensors to which auto detects beginning and ending of stairs.
5.	People with speech impairment	Speech synthesizer Augmentative and alternative communication (AAC) devices	A computer program turns speech into text and text into speech known as AAC device that allows people with speech disabilities to express their communication.
6.	People with cognitive disabilities	Smart watches Audio note taker	Smart watches are very useful for people with cognitive disorders. Audio note taker is useful for people with dyslexia.

Table 4: ICT Tools for Divyangjan

In the above table, despite of benefits, these tools are not upto to the mark to fulfil each individual PWDs' need. Secondly, these ICT tools can be costly. Many ICT tools may not be easily available for PWDs specially living below poverty line and in villages.

There is a report by PTI (2021), Economic Times on which reveal that almost majority of disables in India are employable. The findings of the study as per the report released by Unearth Insight have been reviewed in a table form which is as follows:

S. No.	Particulars	Figures
1.	PWDs population in India	3 Crores
2.	Out of the above, employable PWDs population in India	1.3 Crores
3.	PWDs actually employed in self-work/business, organized, un-organized sector and Govt. run schemes	34 Lakhs
4.	Potential Graduates, Poly Tech and Diploma holders PWDs in India that can be adept and mainstreamed to IT industry and Service Sector.	3.4 Lakhs
5.	PWD Graduates in technical areas and other related streams out of which detailed break up is as follows: IT Sector employees with disabilities (8000), Software sector (largely by SAP and Microsoft) related employees with disabilities (5500) and rest of the employees with disabilities are in other Technology fields.	17,000
6.	PWD Professionals employed by Retail Sector in India	13,000
7.	PWD Professionals employed by Technology Sector in India largely by TCS and Accenture	8,000

Figure 5: Majority of disabled population in India are serviceable.

The above table highlights the fact that proper policies and strategies shift can increase employment chances for PWDs in India as half of the total PWDs population in India has capacity to be employed. It's a fact that people with disabilities are sincerer and committed towards their job, there sixth sense is more developed, that's why organizations are more interested in investing and recruiting skilled PWDs. For example, to name a few, in banking and finance service sector, SBI recruits largely PWD professionals (in front office and back office jobs), in technology sector - TCS and Accenture, in software sector – SAP and Microsoft recruit people with disabilities.

Mr. Gaurav Vasu, CEO of Unearth Insight says, "There is a long way to go, as India is sitting on a huge PWD talent pool that can play an important role. With the right policy and strategy shift, there is a real chance that we work towards raising employability rates among the PWD population,".

UNESCO, (2011) Case studies on the development and usefulness of ICTs for Divyangjans

An exhaustive study and evaluation of creative practices conducted by UNESCO Institute for Information Technologies in Education titled as 'ICTs in Education for People with Disabilities' printed as a part of 'ICTs in Education: Best Practices' in 2011 in collaboration with-European Agency for Development in Special Needs Education. The methodology used in the study was an in-depth study (case study). The study also presented instances on the use of ICTs in various educational institutions having people with special needs. It can be inferred that with the use of ICT can lead to aid in learning and more chances of involvement of PWDs.

A review of case studies under the survey conducted by UNESCO IITE and the Agency for using ICT Tool:

S. No.	Agency/ Author	Target Population	Country	Year	Details of Case study
1.	UNESCO IITE and the Agency, Koitla Ene, Kukk Inga.	Teachers and students of The Estonian e-Learning Development Centre (ELDC)	Estonia	2008-2013	Case study: Supporting the development of e-learning for learners with disabilities in Estonia The Estonian e-Learning Development Centre (ELDC) started its work in 2000 and emphasized upon enhancing the ICT competence of teachers and students. ELDC along with Primus implemented a program in 2008-2013 on higher education caliber development and supported teachers and students in choosing different courses available online. Thus, encouraging more browser based instruction and e-studies. It was found that different teachers have different knowledge level to make use of ICTs in learning and education. ELDC developed competencies of teachers and let them use self-assessment tool for mapping of individual ICT skills. ELDC reflected upon the fact that ICTs generate chances of learning for everyone including learners with disabilities, parents of children, adult learners and target groups for distant learning. ELDC followed the principle of universal access and inclusive education. ELDC ensured universal accessibility to ICT and enabled e-study environment for learners related to the population of Divyangjans. This case study also revealed that ICT solutions should be flexible to meet all people with disabilities' needs and individualized approach with adaptation is important for universal access of ICT for all as learners are different either they are affected with any disability or not. At the same time, the study also talked about customary use of ICT in higher schooling and classes. As major chunk of disabled belongs to the student community and having many physical impairments and health issues and e-learning. Thus, access to ICTs can add up to the flexibility to the learning.
2.	UNESCO IITE and the Agency, Cato Leo (Head of ICT in Education).	Students with visual impairments	Grenada	2004	Case Study: ICT supporting the inclusion of students with visual impairments in mainstream schools in Grenada In 2004, a batch of students having visual disablement were shifted from a blind students' school to a secondary school in Grenada for their mainstreaming and provided with assistive technology to support their learning. The ICTs provided include screen reader software, Braille printer, audio players/ recorders, audio converter, magnifiers, special key boards etc. The adaptation of those visually impaired students to a new school was not easy and it was extremely difficult to persuade the instructors in the school that it can be feasible. The Ministry of Education got involved, provided assistive ICT Tools required for the study and monitored the Project. It was concluded that youth with disabilities are well off in mainstreamed schools and had shown improvements not only in their learning abilities but also their self-esteem had also

					made a positive transition. This case study showed that ICTs are the best vehicle to access knowledge and information, there is so much on the internet that can be learnt, but it depends on accessibility of technology for PWDs. ICTs should be used as a tool to support inclusion and mainstreaming of PWDs.
3.	UNESCO IITE and the Agency, Karna Eije.	Children with special needs	Finland	2012	Case Study: Ev-Tech: designing and developing research-based technologies for everyday use with children with disabilities and their families in Finland. Ev-Tech was a project initiated for Children with Special Needs in Finland in 2012. The study highlighted that developing a positive attitude towards ICTs is important in order for teachers to have the image that technological tools can be an effective pathway for the knowledge enhancement. The study also emphasized that involvement of all stakeholders such as students with disabilities, their parents and teachers is important as design and development partners for designing new ICT tools. But still there is a need to develop adaptable technology for varied people with disabilities.
4.	UNESCO IITE and the Agency, Creamer Jan De, (2009)	Learners with chronic disabilities including a 6 years old girl Laura	Belgium	2008-2009	Case Study – Bednet: supporting pupils with long-term illness to join their mainstream class activities through ICT in Belgium Bednet is a charitable organization in Belgium that supports disabled with chronic illness in Belgium. Bednet aimed to include learners (6 – 18 years) with chronic disabilities through connecting them with internet access in a normal class environment while remaining at their home or hospital itself so that they remain connected with the outside world. Bednet developed Bednet System in which they provided an interface environment to learners with chronic disabilities that they mirror the learner's classroom situation at home itself. They provided IT enabled learning resources, video – conference tools, remote access with IT in between the teacher and learner. Laura, a 6-year-old girl was the best example to get benefitted by the Bednet system. Necessary equipment and internet connect was set up at the girl's home. The primary environment of the girl were also trained on the use of ICT tools and it's set up. This has not only helped her to learn but also helped made a lot of contributions for showing changes in her self-esteem. Also, it gave her social confidence as she was able to chat online with her friends after the online class.
5.	UNESCO IITE and the Agency, Janssens Els.	Teachers	Portugal	2007 - 2010	Case Study – National network of ICT Resource Centers for special needs education in Portugal. In Portugal, Ministry of Education launched a national network of 25 ICT Resource Centers (situated in mainstream schools) for special needs in 2007-2008. The Centers recommended assistive technology for students like braille printers, embossers, tactile screens, adapted mouse, screen readers, speech synthesizers, hearing devices, adapted toys, assistive software etc. The resource center also trained teachers in use of ICTs as well in

					using AAC software. Most teachers got motivated towards the use of ICT tools. The abovementioned case study showed the way instructors can be assisted for becoming a specialist in the use of the specialized technology while teaching students with diverse form of special needs. But the teachers faced barriers to use ICTs in inclusive settings. It was revealed importance of collaborating with various stakeholders and partners for the development of ICT tools for PWDs.

Table 6: Case Studies on 'ICTs in Education for People with Disabilities' (UNESCO, 2011)

The research disclosed that developing and using ICTs for PWDs have multiple benefits like social inclusion, skill enhancement and self-dependence.

Prominent NGOs / Companies working on accessibility and inclusion in India

S. No.	NGOs	Location	Year	Area	Major Work done in India
1.	Humanity and Inclusion (formerly Handicap International/HI)- An International NGO of France	In India – Delhi, Jammu and Kashmir, Chhattisgarh, Bihar, Odisha, Bihar	1988	Rehabilitation, Emergency Response and Disaster Preparedness, Social and Economic Inclusion	Humanity and Inclusion was co-awarded the Nobel Peace Prize as a member of the International Campaign to Ban Landmines on 20 Dec.1997. In India, Humanity and Inclusion continues to run programs under the operating name 'Handicap International' (HI). In 1988, HI started its first ever operations in India by providing technical assistance to a partnership-based rehabilitation center in the region of southern India and thereafter in Gujarat, after a disastrous Gujarat earthquake in 2001. HI has worked in many areas like advocacy for change for PWDs, accessibility, inclusion, livelihood, Rehab and Disaster Risk Reduction (DRR). (Website reference: https://www.humanity-inclusion.org.uk/ and https://www.hi-us.org/india).
2.	Ability Foundation	Chennai - India	1995	Employment, National awards for PWDs	Ability Foundation is a national organization established in 1995. It works for the strengthening of Divyangjans. It believes in the promotion of equal opportunities for PWDs. Ability India has organized may events over the years breaking the stereotypes and changing people's attitude towards people with disabilities. It's 'Employment Wing' provide employment opportunities to PWDs as per current market needs. Ability Foundation runs various programs like the famous Cavin Kare Ability Awards for Mastery and Eminence. These are the national awards recognizing accomplishment of achievers with disabilities. (Website reference: https://abilityfoundation.org/).

3.	War Wounded Foundation	India	2002	Employment and pension to war wounded personnel	War Wounded Foundation is an autonomous organization which was set up was in Aug. 2002 with an aim to create opportunities of financial independence for all was personnel of the Indian Army, Navy and Airforce. There are 40,000 war disabled people in India specially personnel from the Army who got disability in major terrorists' operations. The foundation help war wounded personnel to live a useful, productive and financially self-dependent life with dignity. (Website reference: https://warwounded.org/).
4.	JaipurFoot Organization (Bhagwan Mahaveer Viklang Sahayata Samiti, BMVSS)	India	1975	Production and distribution of prosthetic devices, rehabilitation, employment to PWDs	The Jaipur Foot Organization Society was found in 1975 due to a traumatic incident in the life of D.R. Mehta, the founder of BMVSS. Mr. Mehta met with a life-threatening accident that crushed one of his leg. The Doctors were about to amputate his leg, but thankfully saved both his life and the limb. But this incidence made him realize the challenges which PWDs face in their life. So, the idea of creating, the Jaipur Foot organization, was born out of a trauma on the hospital bed for Mr. Mehta. The Jaipur Foot is one of the most technologically advanced Organization in the world which makes prosthetic devices. It has changed the lives of several amputees by making and proving them high-tech prosthetic devices. It serves the poor and unprivileged people of the society. It is named by Time Magazine as one of the 50 best inventions in the world. D. R. Mehta founder of Jaipur Foot Organization says *"Our first focus is the most needy, most poor. We are sustainable since last 43 years because we don't charge. We have provided artificial limbs to 1.7 million people. We held 66 camps in 29 countries of the world and it has generated so much goodwill for India you can't believe. Wherever we go, we are welcomed. In Pakistan we set up a camp and fitted 20000 limbs by now. People come full of sorrow but they walk out full of smile. This joy is unlimited and priceless. Remember always that the giver always gets more than the receiver."* (Website reference: https://www.jaipurfoot.org).
5.	Artificial Limbs Manufacturing Corporation of India (ALIMCO)	India	1976	Manufacturing of artificial limbs	ALIMC, is an organization functioning under the Administrative Control of Ministry of Social Justice and Empowerment, Department of Empowerment of Persons with Disabilities, India. It comes under the Govt. of India with an aim to benefit PWDs by doing a mass production of rehabilitation aids. ALIMCO promotes, encourages and develops, supplies and distributes artificial

					limbs and rehab aids. It's a not for profit organization with an aim to provide better quality aids and appliances for PWDs in India. *ALIMCO focuses on technology upgrades develops capabilities for Research and Development through collaboration with research institutions in India and abroad.* (Website reference: https://alimco.in).
6.	Steel Authority of India Limited (SAIL)	India	2021	Steel production (equal opportunity policy, 2021)	SAIL has 'Equal Opportunity Policy' dated 2nd March, 2021in Personnel Policy. SAIL provides post-recruitment and pre – promotion training to employees with disabilities. SAIL provides accessible infrastructure (building, furniture, facilities in building etc.). SAIL provides to PWDs assistive devices equipped with technology, special fixtures and moveables as per the need to improve their efficiency. SAIL also provides accessible workplace with toilets, canteen, lifts etc. Official websites are adapted as per the needs of employees with disabilities and documents uploaded on external websites shall be in e-publication or Optical Character Reader based Format. SAIL provides special equipped training bus to Deepalaya for 'education on wheels' for differently abled children as an effort to contribute in mainstreaming of PWDs. (Website reference: www.sail.co.in).

Figure 7: Prominent NGOs / Companies working on accessibility and inclusion in India

Initiatives by the Government to promote technology for people with disabilities:

The Indian Government is doing its best to make India accessible for people with disabilities. Indian Govt. launched 'Digital India' initiative on 1 July, 2015 with a view to transform India into a digitally empowered and IT knowledge equipped economy.

The National Mission on Education through Information and Communication Technology (NMEICT) is a scheme sponsored by the central government to strengthen the potential of ICT in the arena of education. It is a major digital reform taken by the Ministry of Human Resource Development (MHRD – India) to address all the learning needs and benefit various stakeholders like Higher Education Institutions, teachers, students and life-long learners.

Composition of People with disabled in Various countries:

Globally	1 Billion People
Latin American and Caribbean	85.7 Million People
India	26.8 Million People
South East Asian Nations	17,102,139 People

Table 8: Population of disabled in various nations.

As India is a developing country, the population of disabled need to be given serious considerations. With the data of increasing disables in India, the government as well as the general public need to ensure equal proportion of the said community in every sphere. In the organizations, a specific

department could be built with the special provisions for Divyangjans in terms of job profile, equipment for their use, special leaders and a distinctive counselling center. The government can further collaborate along with the private sector to introduce various technological centers for their enhancement and upskill along with development of vocational skills centers. Well-being which is an umbrella term for the overall health, happiness and prosperity should not be comprised. As being an interdependent being, almost all individuals want to lead a life that is perfect. By living a life that is meaningful, the factors that are related to high life satisfaction rate of divyangjans should also be taken into account. By increasing their literacy rate and by giving equal emphasis on the professional aspects, their contribution can actually contribute to the economy of our nation by increasing the portion of GDP by 3-7%.

Findings of the study:

It is found that there is a need of development and accessibility of ICT tools as per the ongoing challenges faced by Divyangjan (PWDs) at the workplace. The organization's focus needs to shift primarily on the ways to create customized ICTs for Divyangjan as a way to overcome their agony. It can help in eliminating the conflict which they might face due to inappropriate external environment. Also, many studies acts a testament that people with disabilities can go a long way and their contribution in various areas of activity can be significant.

Following are the examples of individuals who excelled in their respective fields overcoming the barriers and making use of the technology:

S.No.	Subject	Country and Year	Details
1.	Dr. Stephen Hawking	England (1942 – 2018)	There is a case study titled '*Dr. Stephen Hawking: A Case Study on Using Technology to Communicate with the World'* conducted by DO-IT (Disabilities, Opportunities, Internetworking, and Technology) and updated on 04.09.2021. Dr. Stephen Hawking was born in 1942 in England. He was suffering with Amyotrophic Lateral Sclerosis (ALS) at the age of 21. He was a Ph.D. in Physics. Despite of severe neurological disorders, Dr. Hawking excelled in life and became a Senior Professor at the University of Cambridge in England. He was brave enough to live with ALS for 50 years and died at the age of 76. He published many readings on theoretical physics the. One of his famous books 'A Brief History of Time' was printed in 1988. Due to the ALS disease, Dr. Hawking was unable to speak without the help of computer, whereas being a Scientist he has to speak in many meetings and conferences. Dr. Hawking used Assistive Technology (AT) to overcome speech and mobility problems. He used thumb and blink switches attached to his glasses for performing the operations on the computer. By squeezing cheeks and blinking, he used to scan characters on the screen to compose speech, explore worldwide web and also communicate via email and he was able to speak through a voice synthesizer. Dr. Stephen Hawking set a perfect example of making maximum use of ICT to remain active in his research work and personal life. Assistive Technology can compensate for the limitations posed by disabilities to a great extent. Disability does not hinder people to follow their passions in life. (Website reference: https://www.washington.edu/doit).
2.	Satya Nadella-Microsoft CEO	India, 2018	Microsoft CEO, Satya Nadella understands need of ICTs for PWDs as his 26 years old son who had cerebral palsy. Mr. Nadella thinks that AI can improve technology for PWDs. He has developed many customized windows and software for people with disabilities. In 2018, Satya Nadella launched a $25 million 5-year program named *'Accessibility for AI'*. The Program aimed to motivate software developers to design ICT products using artificial intelligence that aimed at betterment in life of PWDs. He developed Think apps that explains what people see, improves text to speech technology and predicts the text so that people don't have to type a lot. Satya Nadella said at a talk in UK in Oct. 2018, *"We want to create AI that empowers humans and make that a core, conscious design decision." He also said "Empathy must be embedded in artificial intelligence from the*

			moment it is created to ensure it becomes a positive force in people's lives." Microsoft Company's '*SeeingAI' app* describes in detail whatever your mobile's camera focuses at. Nadella also said about Microsoft's 'Developer flow' technology that *"We want to make it easy for you to go from idea to code, and code to cloud, and cloud to the world."* Mr. Nadella highlighted about following 10 technologies for software developers i.e. Developer flow, Cloud ubiquity, App ubiquity, Cloud native, Unified data, Models as platforms, Hybrid AI, Low code/no code, Collaborative apps and Metaverse. In this way, Mr. Nadella showed how common people and people with disabilities' lives can be made easier by developing Artificial Intelligence. (Website reference: https://www.cnet.com/tech/services-and-software).
3.	Arunima Sinha	India, 2011	Arunima sinha was pushed out of running train by robbers in 2011. A train ran over her right leg which due to which Arunima Sinha was amputated but then she broke all the records when she climbed the highest peaks of Five continents i.e Asia, Africa, South America, Australia and Europe and became the first woman amputee of the world climbing the highest peaks. Arunima Sinha said "Even as I lay on the bed, I decided that I would take up the toughest sport in the world. For me, that was mountaineering." Later, even she created a bond of friendship with Bachendri Pal, who made another major landmark in the history by becoming the first ever Indian woman to climb Mount Everest. She got several months tough training at the Nehru Institute of Mountaineering in Uttarkashi, Uttarakhand. She climbs other peaks as part of preparation and on 21 May 2013, she climbed the highest peak, the Mount Everest. She was awarded with Padma Shri by the Government of India in 2011. (Website reference: Wikipedia https://en.wikipedia.org/wiki/Arunima_Sinha).
4.	Avani Lekhara	India, 2020	Avani Lekhara was confined to wheelchair at the age of 11. She was paralyzed below waist and injured her spine as she met with an accident in 2012. Physicians said that there was no way to repair traumatic paraplegia. Her father is a top Rajasthan admin Official and her mother is also an Officer. Her parents supported and encouraged her to follow her passion for shooting and archery. She created the History in Tokyo Paralympics 2020 by becoming the first Indian woman to win Gold Medal in Paralympics. (Website reference: Marya (2021) https://whatshelikes.in/).

Figure 9: Illustrations of ideal people with disabilities at national and international level

Hence, it can be said that companies can tread on the path of inclusion by developing specialized digital Information Technology for Divyangjans at workplace.

Recommendations for theory and practice:

The study is suitable for understanding the need of development of customized ICTs for Divyangjan. As being an important part of the workforce, efforts need to be made to bring them in mainstreamed through digital literacy and accessibility of ICT tools. The abovementioned findings can act as an awareness to focusing on the need of carrying out an access audit on inclusive information technology related to the disabled section.

Further recommendations for the future research can be related to finding out the solutions for the following problems which are faced by PWDs:

1. Regarding the designing of new digital systems and products with respect to PWDs.
2. Regarding the exclusive websites of all institutions should be designed for the utility of visually impaired PWDs.
3. Regarding the laws and policies that can be framed and updated to protect rights of PWDs.
4. Regarding the training should be provided to specialized HR to use technology.
5. Regarding the awareness campaign through various activities should be created in society for PWDs.

Conclusion:

ICTs make people with disabilities autonomous and further help in upliftment of their confidence and self efficacy levels.Arrangements for PWDs should be made as per international norms. Government and Non-Government sector has social responsibility to

enable all PWDs by benefitting them from IT. Adoption of the norm such as 'leave no one behind' with a focus on computer technologies for PWDs, the section will be benefitted to a major extent. Universal designs, access to ICTs, designs that can be used by everyone/ 'design for all', legal arrangements (PWDs friendly law) are important for PWDs and should also be worked upon. Innovation is also the need of the moment such as flexibility in the ICTs can be gamechanger for everyday use by the PWDs. The corporates can make major changes in their organization culture by giving them equal representation at the workplace.

Especially after Covid-19 pandemic, access to ICT becomes essential for combating the risk of isolation . This way will also help in avoiding the social exclusion. Accessible ICT tools at workplace for PWDs (Divyangjans) will further make them "atmanirbhar" (self-independent and self-reliantt)

Hence, this study can act as wake-up call for various stakeholders such as Researchers, Academicians, NGOs, Government etc. to develop artificial intelligence for a smoother path accessible to all the people with disabilities. This will further pave the way for future research and development in the area of accessibility and development of ICT tools for people with disabilities which is still a less developed area and needs more attention.

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