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Technology as a catalyst of change: Redefining gender roles and women's agency in India

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Abstract
Technological innovation has been the epicentre of strategy to empower women in India. Till few decades ago, Indian women have been considered as the recipient of consequences of any development. Despite the growth of education, there exists gender inequality in Indian society. In last two decades, many technologies have helped to bridge those gaps. Some of those technologies discussed in this paper are a). Information & communication reducing information asymmetry in the society, b). Finance technology enabling easy financing, c). Mobility interventions increasing job opportunities, and d). Energy enabling better environment for rural woman. As a result, gender inequality in society is on declining trend. Present era is a golden age for women to work in various fields. For example: introduction of technology in Indian society, through information technology women are getting awareness, security, employment, knowledge, popularity, and confidence etc. Further, Government of India and various NGOs are running new schemes and plans for betterment of women's life. This article analyses the role of technology in women empowerment and their corresponding impact on socio-cultural changes in women.

Keywords: Women, technology, empowerment, ICT, socio-cultural change

Introduction

"Empowering women is a prerequisite for creating a good nation, are when women empowered, society with stability is assured. Empowerment of women is essential as their value system leads to the development of a good family, society and ultimately a good nation"

Dr. A. P. J. Abdul Kalam
(Former President of India)

Women constitute half of the world's population, but they are not able to contribute to societal development to the level of their ability. No society can be considered developed till half of the world's population view is considered and has participated in its developmental activities. Additionally, science and technology become a key enabler of pace of growth of any country. The birth of technology in 18th century in England has led a drastic change in the socio-cultural aspects of society. Women in England and other parts of Europe changed their way of living. Taking an inspiration from aforementioned example of England and Europe, there is a need of larger contribution of woman in developing countries such as India. Women need to use latest technological interventions to contributein the building ofthe nation.

In 1983, India introduced policy of technology with a focus on technological competence and self-reliance. These policies of science and technology indicate that there is a need of innovation through science and technology for intensive growth towards progress in the society. A quick review of IT revolution in India shows that the first IT revolution in India was held in 1990 and the second phase was held in the year 2010 (Pattnaik 2013) [8]. The current phase is of digitization of every interaction of society while bringing transparency and accountability. COVID19 pandemic has accelerated this innovation and adoption in the society. It has a wide impact on every segment of society such as UPI: Unified payment interface touching every member of the country through digital transaction, e-commerce

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marketplace enabling seller of all sections to reach customers affordably.

The recent Science Technology and Innovation Policy of 2013 of Government of India has further accelerated the digitization in the country. In this policy, woman is mentioned for the first-time enhancing participation of every section of the society *(*Kurup 2016) [12].

Technology acted as a saviour in the life of women. From the last two centuries the relation between women and technology has improved. Technology who became helping hand has now considered of being a denude for women of 21st century. Technology has made the life of women much easier than earlier. India is one of the great example as how women who used to be a succumb of patriarchal attitude but now the perspective of thinking gradually has been changing due to impact of technology.

Technology and social culture directly influence each other. Socio- Culture aspect keeps on changing accordingly. Social needs results in technological innovation and intervention. Technology has been hard on stereotype thinkers. Because a few years ago, women were not allowed to go outside the four walls of their houses. They were compelled to keep themselves with a long veil on their faces but now the impact of technology on socio-cultural aspects of women can clearly observed. Now-a-days, women are uploading their photos on Facebook, Instagram etc. No doubt technology is advancing day by day. The same way women's status or position in any society is increasing. In present scenario, women's condition is far better than what it used to be about couple of decades ago. Technology has a positive impact on women's freedom of expression, education, and employment opportunity, or it can be clearly speculated how the technological revolution of 21st century brought a drastic change in women's life. Following section assesses the impact of technology in socio-cultural aspects of women.

Methodology

This study uses a qualitative research approach to investigate how technology affects Indian women's sociocultural shifts. The qualitative method was used because it provides a deeper comprehension of women's lived experiences, perspectives, and stories than can be obtained solely from quantitative data.

Secondary data sources, such as government reports, policy documents, NGO publications, and scholarly journals, are the main source of information used in this study. According to these sources, women's empowerment and cultural involvement have been impacted by a variety of technical interventions, including financial technology, mobility solutions, information and communication technologies, and energy advancements. The methodology also acknowledges the role of government initiatives and NGO-led interventions as mediating factors in shaping outcomes. By focusing on narratives and contexts rather than numerical measurement, this qualitative design provides a comprehensive understanding of how technology has reshaped the socio-cultural landscape for Indian women.

This study uses a qualitative research approach to investigate how technology affects Indian women's sociocultural life. The qualitative method was used because it provides a deeper comprehension of women's lived experiences, perspectives, and stories than can be obtained solely from quantitative data.

Women in multidimensional view

- **Employment opportunity:** Earlier women were expected to live within the four walls of their houses but now women have equal job opportunity in different sectors. There is approximately equal representation in most of the sector. Even in the male dominant sectors such as agriculture, now woman has major responsibility of agricultural works. For example- Kisanchachi (Rajkumari Devi) belongs to an exceedingly small village of Bihar. She formed a self-help group and generating new employment opportunities for poor families. An amazing socio-cultural change in terms of women can be seen. She is not only self-dependent but also generating new employment opportunity for others. Further media has enabled her to become a role model for numbers of women - as a result, number of women are trying to imitate her. Apart of these, many initiatives have been taken by both central government and various state governments in India. As like- 'Beti Bachao and Beti Padhao', 'Sukanya Samridhi Yojana', 'Pradhan Mantri Vandan Yojana' are big mega campaign by which they can be empower themselves financially and can peruse for their higher education and jobs. After that in corporate sectors, administration, law, academics or in mostly sectors contribution of women can clearly be seen.

- **Influence on dressing:** The wearing of certain cloths is the culture of any particular society. But few years ago, society was too much rigid in terms of women's cloths, before marriage salwar kurta and after marriage saree was expected to be worn by most of them. They couldn't wear anything of their own choice. But now, there is a flexibility in terms of women's attire. She can wear the dress of her own choices keeping in mind the culture of her own society. Now rural women can also wear the Jeans, Top and kurta as technology has made them aware about different attires with ease of getting them through online shopping.

- **Expression of ideas:** In patriarchal society, it was considered by male members that women are physically inefficient. She has many more responsibilities based roles to perform - household chores, child rearing, care work of the family as compared to male counterpart. With the advancement in technology through changing scenario, it has been realized that this perception is changing. Technology has provided numbers of platform by which women can raise their voice and also express their views.

- **Technology in the area of Health:** Technology has changed the women's health condition. Now a days women are conscious about their health problems, Menstrual Hygiene, Gynaecological problems, depression and Anxiety, Sexually Transmitted Diseases (STDs) etc. All awareness programs and policies runs by Television, Internet, and other E-resources. Innovation in IVF: In vitro fertility is changed the thought about the infertility among women. Technology has enhanced the life of women's health as well. From different social media, women got aware about their problems. Technology has disseminated the society that if a woman menstruates she should not lead life like an ennui human. Menstruation is a natural process. This thought has led a revolutionized change in the life of

women compared to the life of woman two centuries back. Today woman is openly speaking about her

menstrual health in the society.

Table 1: Indian Women in Science & Technology

Name	Field / Area	Major Contribution	Achievement / Glory	Awards / Recognition
Kalpana Chawla	Aerospace Engineering / Space Science	First Indian-born woman astronaut at NASA (1997, 2003).	Global inspiration in space exploration.	Congressional Space Medal of Honor (USA, posthumous)
Dr. Tessy Thomas	Missile Technology (DRDO)	Led Agni-IV & Agni-V missile projects.	"Missile Woman of India"; 1st woman to head missile proj.	Lal Bahadur Shastri National Award; Padma Shri (2012)
Sunita Williams	NASA astronaut; record-holder for spacewalk time.	Space Science / Aeronautical Eng.	Inspiration for women in space research.	NASA Spaceflight Medal; Padma Bhushan (India, 2020)
Dr. Kiran Mazumdar-Shaw	Biotechnology	Founded Biocon; pioneered affordable biotech medicines.	Global leader in biopharma research.	Padma Shri (1989), Padma Bhushan (2005)
Dr. Aditi Pant	Oceanography / Marine Science	First Indian woman in Antarctic Expedition (1983).	Opened field of polar research for women.	Shanti Swarup Bhatnagar Fellowship (1980s)
Dr. Gagandeep Kang	Virology / Medical Research	Developed vaccines for rotavirus; global vaccine research leader.	First Indian woman Fellow of Royal Society, London.	Infosys Prize (2016), Fellowship of Royal Society (2019)
Dr. Indira Hinduja	Medicine / Reproductive Tech.	Delivered India's first test-tube baby (1986).	Pioneer in IVF & ART in India.	Padma Shri (2011)
Dr. Anuradha T.K.	Space Technology (ISRO)	Worked on GSAT & satellite communication missions.	Senior woman scientist at ISRO.	ISRO Merit Award
Dr. Ritu Karidhal	Space Mission Planning (ISRO)	Deputy Director, Mangalyaan; contributed to Chandrayaan-2 & 3.	"Rocket Woman of India."	ISRO Team Excellence Award; Women Achievers in Aerospace Award
Dr. M. Vanitha	Electronics / Spacecraft Systems	Project Director, Chandrayaan-2.	First woman to lead a lunar mission.	Best Woman Scientist Award (ISRO, 2006); Padma Shri (2020)
Dr. B. Vijayalakshmi	Theoretical Physics	Work in supersymmetry and particle physics.	Trailblazer in advanced theoretical science.	Indian Academy of Sciences Fellowship
Dr. Janaki Ammal	Botany / Cytogenetics	Researched hybrid plants, sugarcane varieties, chromosomes.	First Indian woman botanist recognized globally.	Padma Shri (1977), Fellow of Royal Society (1957)

Source: Made by Researcher(Jayashree, S., Ramya, E., Malarvizhi, K., & Kumaresan, N. 2021, October) [14].

Empowerment

Empowerment is a multidimensional process that includes physical, social, political, spiritual, and mental dimensions. Empowered women contribute to the health and productivity of whole families and communities and improved prospects for the next generation. Attributes of society are patriarchal and male-oriented from ancient times, so work is done by women never recognized and appreciated. Empowered women have been playing significant contribution to overall development and productivity of communities, families and next generations.
Technology gives women free platform where without any hesitations they show their talent, feelings, emotions and opinion. The era of 21st century is the era where women have touched the clouds by flying MIG21 in June *2018. Now a days in India, women pilots fly the fighter aircraft very proefficiently.* Technology acted as an entelechy for women to show the world that women can also touch the sky with glory.

ICT Initiatives in India and their Scope for empowerment

In last 2 decades, technology has brought meaningful changes in the society. These technologies have changed the way people meet, interact, learn and do businesses. Few technologies which have uplifted social cultural status of woman in the western countries and started impacting Indian woman in both urban and rural area. To analyse impact of these technologies on woman, we have classified technologies in four groups with their relevance in rural and urban scenario.

Information & Communication

- **Internet:** The intern*et al*lows access to unlimited information and knowledge and provides a platform for economic, social and political participation.
  The anonymity of the internet makes the gender of the user invisible and as a consequence precludes gender bias, allows women to express their opinion fearlessly, access information without censorship and provides a platform for organisation and networking. Movements working for women's rights and gender equality, use the internet foe mobilisation of supporters, for the advocacy of their cause and as a channel for discussion, information and knowledge exchange.
  A Survey conduct by the Internet and Mobile Association of India (2009) reveals that 6.5 million peoples used the internet and 4.18 million peoples, active internet users.
- **Smart Phones:** The mobile phone transforms isolation into connectedness and empowers the individual in the economic and social sphere.
- **E-commerce (Market Place):** It allows women to bypass the male dominated conventional market place by establishing a direct link between producer and consumer, making exploitative middlemen redundant. Information on prices, weather and market development obtained online or through mobile phone enhances the productivity of women and frees them from dependency on the male informant.
- **Education Technology:** It allows women to acquire education.

- **Finance Technology:** NBFC tech, Self-help group, direct benefit transferandE- banking which offers unprecedented potential for the 90% of the unbanked world population, most of them are women.
- **Mobility:** Scotty, Metro and Public transport
- **Energy:** Solar cell, LPG/Gas Stove, Water pumps

India is the country with largest number of ICT for development initiatives. Government committed itself with 'Digital India' campaign to transforming India into "a digitally empowered society and knowledge economy''

Apart from government initiatives a number of private sector and NGO'S initiatives targeting female access and usage of ICTs

Helping Get Women Online Campaign, November 2013, launched by Google instructs women on how to use a computer and internet and how to get access to relevant information's.

Internet Sathilaunched by Google in July 2015 targets digital literacy of rural womenFor many developing and developed countries, ICT provides E-governance (Gupta. D and Gupta. A 2008) [3].

Smile (Savitri Marketing Institution for Ladies Empowerment) and SEWA, runs through NGO'S and collaboration with NIIT Swift Jyoti with the objective of literate women about computers and works to support rural women.

UJJAS, Innovation based on a newsletter channel that brings into light women's conditions and various issues in different areas.

The Dhan Foundation and Swayam Krishi Sangam, this program has been working for uneducated women with help of ICT. So with honor, they can easily share goals, emotions, and thoughts without any boundary.

There are so many industries and companies i.e. IBM, MICROSOFT, and TCS that provide flexible working hours, work from home, and childcare facilities. An article published in Economic Times reveals that approximately 30%of women workers work on TCS and 33.4% in Infosys and 29% in Wipro.

Table 2: Impact of Technology on Rural and Urban areas

	Technology/Initiatives	What does it mean?	How does it impact?	More relevant in Urban	More relevant in Rural
Information & Communication	EdTech	A multilingual teaching platform	A teacher can reach out to students at any location, enhancing productivity and economic well being	Yes	Yes
	Smart Phones	Internet enabled mobile phones	Access information as when available, reducing info asymmetry	Yes	Yes
	Marketplace	Buy and sell virtually	Sell products to a wider customer group, enhancing economically	Yes	Yes
	Internet	Access information as when needed	Learn and earn at ease, enhances skills and economic well being	Yes	Yes
Finance & Technology	NBFC Tech	Get finances as when needed	Helps to launch new businesses, powers ideas enhancing productivity	Yes	Yes
	Self Help Group	Help each other with finances	Get risk free financial help from the same community	No	Yes
	Direct Benefit Transfer	Get government benefits directly	Get direct benefit from government, enhancing productivity	No	Yes
Mobility	Scooty	Move for work at ease	Perform job of any kind, increases employability	Yes	Yes
	Metro	Commute to work easily	Easy movement helps in getting access to better job opportunities	Yes	No
	Public Transportation	Easy movement	Risk free movement at ease for better job opportunities	Yes	No
Energy	Solar Cell	Get electricity for domestic use	Perform activities using electrical appliances, enhances productivity	Yes	Yes
	LPG / Cook Stove	Live in smoke free environment	Cook in smoke environment, enabling faster cooking and healthy environment	No	Yes
	Water Pumps	Access to drinking water at ease	Access to clean water at ease, enhances productivity and healthy environment	No	Yes

Source: Made by researcher

Dairy Information System Kiosk (DISK), Dairy information System Kiosk (DISK) project run by the Gujrat Government which provides internet connectivity for buying 2,500 rural milk. Akash Ganga software has been developed by the government with special features for to collection of milk and dairy farmers' payments.

Conclusions

For any technology, no matter how pure one would consider it, will produce many consequences, some wanted and some unwanted, some that were planned for and others that could not have been foreseen during its development and implementation fazes (Rogers 1995) [2].

Undoubtable, technology has been brought drastic positive changes in the socio cultural aspects of women, but with lots of challenges on daily basis. Women who are working in corporates sectors, they were unable to differentiate their personal life with professional life. In corporate sectors, employees have to complete certain task within given days and if for any reason women couldn't do that in their offices, they are expected to do those works in their homes because of that they have to compromise with their family

times and other family chores and that ultimately leads to stress, and sometimes because of this family breakdown too happens.

Women's privacy has been also hampered in this technological era. CCTV camera in trial room, bedroom, and hotel room captures the unwanted pictures of women and few stupid people spread its everywhere. Ultimately, that woman has been excluded by the society or people started neglect her. Female foeticide is the major factor of decreasing sex ratio due to availability and accessibility of ultrasound facilities for antenatal sex determination of foetus in urban as well as rural areas.

Suggestions

Merely creating digital literacy amongst women cannot be the magic bullet that automatically shifts power relations within our societies towards more equality for women. Male have to be involved in the process of gaining awareness on the social construction of female subordination, inequality and the injustice this constitutes. A male who is committed to improving gender equity needs to be both principled and pragmatic. The principle is to treat women as equal human beings with equal cognitive abilities, deserving of equal opportunities, and to make sure this is widely understood and accepted. The pragmatic approach is to make those small efforts that can have a significant impact to redress past injustice in the future. Incentivizing, women students, particularly those who face negative social pressures, making workplaces more women-friendly, are all small steps that can have a cascading impact. But finally, it is an increased representation of women on faculties and decision-making bodies that has the greatest potential to redress the balance and create a truly gender-neutral environment. To this end, institutions and their leaders need to lay down guidelines on how to enhance gender representation in small but steady increments.

The majority of women in the developing world do not have access to ICTs due to a variety of barriers as such the infrastructural, social, cultural, and linguistic. To make women independent, powerful, and strong in all fields with the help of ICT necessary actions are to be taken at regional, national, and international levels. Some of the recommendations are listed below:

- All educational institutes by law should offer free basic knowledge of computers to women of all ages.
- ICT awareness camps should be organized on regular basis in rural areas
- Internet facilities should be available at all locations including the remote areas.
- Free computer centers should be opened at rural area for providing basic knowledge of computer.
- E -government should be deployed everywhere so that women can also participate freely in decision making

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