

Empowering Women Through Technology: An Empirical Analysis of Digital Inclusion in Malappuram District, Kerala

¹Dr.U.K. Palanichamy, ²Rashida Farsath

¹Assistant Professor, Department of Commerce, Sri Krishna Adithya College of Arts and Science, Coimbatore

²Ph.D. Research Scholar, Department of Commerce, Dr.R.A.N.M. Arts & Science College, Erode.

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ABSTRACT:

Women empowerment is the process of enabling women to gain equal rights, opportunities, and the ability to make informed decisions in their personal, social, and economic lives. It enhances their confidence, independence, and active participation in education, employment, leadership, and sustainable development. Technology refers to the application of scientific knowledge, digital tools, and innovative systems to improve communication, productivity, and the quality of life. Despite the rapid growth of digital technologies and government initiatives promoting digital inclusion, many women continue to face barriers in accessing and effectively utilizing digital resources. Thus, limited digital literacy, affordability issues, inadequate infrastructure, and socio-cultural constraints restrict women's participation in the digital ecosystem. These challenges hinder their access to education, employment, financial services, and informed decision-making. Hence, this study examined that empowering women through technology through digital inclusion in Malappuram District, Kerala. This study adopted a descriptive research design. Both primary and secondary data were utilized for the study. A sample of 163 women respondents in Malappuram District, Kerala was selected using the simple random sampling technique. A structured questionnaire was administered to collect primary data on the respondents' socio-economic profile and empowering women through technology. The questionnaire consisted of closed-ended and five-point Likert scale statements related to digital access, digital technology usage, and technology-enabled empowerment. The collected data were systematically coded and converted into numerical form for analysis. Statistical tools such as percentage analysis, mean, standard deviation, Analysis of Variance (ANOVA) and multiple regression analysis were employed to analyse the data. Null hypotheses were formulated to examine the relationship between empowering women through technology and the selected independent variables. The analysis noticed that there is a significant mean difference in empowering women through technology with regard to selected variables namely education level, digital tools or platforms used mostly and frequency of digital technology using of the women.

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Keywords: Women Empowerment, Technology, Digital Inclusion, Digital Literacy, Digital Technologies, Gender Equality, Digital Access, Digital Participation

1. INTRODUCTION

Technology has become an integral part of modern life, transforming the way people communicate, learn, work, and access services. The rapid advancement of digital technologies has improved efficiency, connectivity, and access to information across various sectors. It plays a crucial role in promoting economic growth, social development, and inclusive opportunities. Women empowerment refers to the process of enabling women to gain equal opportunities, rights, and control over decisions affecting their personal, social, and economic lives. It enhances their confidence, independence, and participation in education, employment, and leadership. Technology-driven empowerment has become a key factor in promoting gender equality and inclusive development. Empowering women through technology has become an important driver of gender equality and inclusive socio-economic development in the digital age. Digital inclusion ensures that women have equitable access to digital devices, internet connectivity, digital skills, and online services. It enables women to improve their educational attainment, employment opportunities, financial independence, and access to government services. Technology also enhances women's confidence, decision-making ability, and participation in economic and social activities. Digital platforms support entrepreneurship, communication, networking, and lifelong learning. However, barriers such as limited digital literacy, affordability, inadequate infrastructure, and socio-cultural constraints continue to hinder women's digital participation. Addressing these challenges requires coordinated efforts from governments, educational institutions, and community organizations. Promoting digital literacy and expanding access to technology can reduce the digital gender gap. Strengthening digital inclusion contributes to women's overall empowerment and sustainable development. As digital inclusion continues to evolve, empowering women through technology remains a key driver for achieving broader economic growth and social equity.

2. REVIEW OF LITERATURE

The author Jamuna (2026) measured that the role of Digital India in empowering women, with special reference to Telangana. This study found that digital transformation has enhanced women's access to education, employment, healthcare, financial services, and e-governance, thereby improving their socio-economic participation. In addition, digital initiatives have strengthened women's economic and social empowerment in Telangana. Moreover, bridging the digital divide, improving digital literacy, and ensuring online safety are important for achieving sustainable women's empowerment and inclusive growth. In view of Kaur et al. (2025) investigated that the impact of digital literacy on women's empowerment by identifying barriers to digital inclusion and evaluating the effectiveness of major digital literacy initiatives in India. It is explored that digital literacy significantly enhances women's access to education, employment, financial independence, and social inclusion. However, barriers such as limited internet access, affordability, social norms, and cybersecurity concerns continue to hinder digital participation. According to Khan (2025) endeavoured to measure the role of technology in empowering women through professional education by identifying the opportunities, challenges, and pathways for enhancing digital inclusion. It is displayed that digital technologies, online learning platforms, and mobile applications have expanded women's access to professional education, skill development, and career opportunities. Furthermore, challenges such as the digital divide, limited digital literacy, inadequate infrastructure, and socio-cultural barriers continue to restrict women's full participation.

The study of Richardson and Wilson (2024) aimed to evaluate a women's digital inclusion and digital storytelling initiative in Zimbabwe using a feminist empowerment framework. It is observed that the initiative enhanced women's digital competencies, strengthened social connections, and fostered self-confidence through collaborative storytelling. Also, the use of

WhatsApp provided an accessible platform for community building, skills development, and sustained engagement. The study indicated that digital inclusion and social inclusion are interdependent and that empowerment-oriented digital initiatives can effectively promote women's participation and digital empowerment. In case of Islam and Rasool (2023) examined that the impact of digitalization on women's decision-making and empowerment in Islamabad, Pakistan. The findings revealed that technology positively influenced women's decision-making in the areas of access to information, financial management, and social communication. The study also identified challenges such as digital literacy gaps, cultural barriers, and limited access to technology. It concluded that enhancing digital awareness, ICT training, and supportive government policies can strengthen women's empowerment and promote gender equality. The researcher Sonkar (2022) explored that the role of technology as a tool for women's empowerment in the 21st century by exploring its contribution to gender equality and social inclusion. The analysis noticed that digital technologies, information and communication technologies (ICTs), mobile innovations, and digital literacy significantly enhance women's access to education, employment, information, and decision-making opportunities. The study also highlighted that technology can promote sustainable empowerment when supported by gender-sensitive policies and digital infrastructure.

3. STATEMENT OF THE PROBLEM

Women empowerment enables women to participate actively in decision-making, education, employment, and entrepreneurship, thereby improving their quality of life and contributing to national development. Technology has become a powerful instrument for promoting women's empowerment by improving access to education, employment, financial services, healthcare, and government programmes. Despite significant advancements in digital infrastructure and government

initiatives, many women continue to experience unequal access to digital devices, affordable internet, digital literacy, and online services. The persistent digital gender divide, influenced by socio-economic status, educational background, affordability, and technological skills, limits women's ability to fully benefit from digital opportunities. Although digital inclusion has the potential to enhance confidence, decision-making, financial independence, and social participation, its impact varies across different groups of women. Therefore, this study attempts to analyze the empowering women through technology through digital inclusion in Malappuram District, Kerala

4. OBJECTIVES OF THE STUDY

- To explore the socio-economic profile of the selected women who involving digital inclusion in Malappuram District, Kerala.
- To investigate the empowering women through technology in the study area.

5. HYPOTHESIS OF THE STUDY

- There is no significant mean difference in empowering women through technology with regard to education level of the women.
- There is no significant mean difference in empowering women through technology with regard to digital tools or platforms used mostly of the women.
- There is no significant mean difference in empowering women through technology with regard to frequency of digital technology using of the women.
- There is significant relationship with empowering women through technology among selected independent variables.

6. RESEARCH METHODS

This study adopted a descriptive research design. Both primary and secondary data were used for the study. The target population comprised women who actively use digital technologies and digital services in Malappuram District, Kerala. The primary data were collected through a

structured questionnaire designed to gather information on the women socio-economic profile, digital inclusion and the level of empowering women through technology. The secondary data were obtained from books, journals, published articles, government reports, and online databases. A simple random sampling technique was employed to select 163 women respondents from Malappuram District, Kerala. The collected data were coded, entered into MS Excel, and analysed using SPSS Version 26.0. The statistical tools such as percentage analysis, mean,

standard deviation, ANOVA and multiple regression analysis.

7. RESULT AND DISCUSSION

7.1 Socio-Economic Profile of the Respondents

The details of socio-economic profile of the selected women and empowering women through technology have been furnished in the following table.

Table 1: Socio-Economic Profile and Empowering Women through Technology

No.	Variables Name	Number of Respondents	%	Mean	SD
1	Age				
	• Below 30 years	48	29.4	3.77	0.65
	• 30 - 40 years	70	42.9	3.65	0.63
	• 41 - 50 years	32	19.7	3.65	0.54
	• Above 50 years	13	8.0	3.45	0.44
	Total	163	100.0		
2	Education level				
	• UG	74	45.4	3.44	0.55
	• PG	35	21.5	3.80	0.66
	• Professional	54	33.1	3.94	0.46
	Total	163	100.0		
3	Profession				
	• Government Employee	26	16.0	3.49	0.61
	• Private Employee	69	42.3	3.74	0.57
	• Self-employed	43	26.4	4.10	0.38
	• Others	25	15.3	3.33	0.62
	Total	163	100.0		
4	Family Monthly Income				
	• Upto Rs.50,000	57	35.0	3.76	0.64
	• Rs.50,001 – Rs.1,00,000	76	46.6	4.04	0.42
	• Above Rs.1,00,000	30	18.4	3.45	0.56

No.	Variables Name	Number of Respondents	%	Mean	SD
	Total	163	100.0		
5	Digital Tools or Platforms Used mostly				
	• Social Media Platforms	55	33.7	4.06	0.45
	• E-commerce Platforms	18	11.0	3.66	0.64
	• Digital Payment Tools	47	28.9	3.72	0.62
	• Mobile banking or Online banking	28	17.2	3.34	0.46
	• Others	15	9.2	3.66	0.62
	Total	163	100.0		
6	Frequency of Digital Technology Using				
	• Daily	69	42.3	3.94	0.47
	• Several times a week	37	22.7	3.51	0.66
	• Once a week	23	14.1	3.58	0.70
	• Whenever need	34	20.9	3.65	0.58
	Total	163	100.0		

- From the above table, it is justified that 29.4% of the respondents were below 30 years, 42.9% belonged to the 30–40 years age group, 19.7% were in the 41–50 years category, and 8.0% were above 50 years among the selected respondents.
- It is depicted from the analysis that 45.4% of the respondents possessed UG qualifications, 21.5% had PG qualifications and 33.1% held professional qualifications.
- From the analysis, it is displayed that 16.0% of the respondents were government employees, 42.3% were private employees, 26.4% were self-employed and 15.3% belonged to other professions.
- It is illustrated that 35.0% of the respondents had a monthly family income of upto Rs.50,000, 46.6% belong to Rs.50,001–Rs.1,00,000 and 18.4% had above Rs.1,00,000.

- From the analysis, it is mentioned that 33.7% of the respondents mostly used social media platforms, 11.0% used e-commerce platforms, 28.9% used digital payment tools, 17.2% used mobile banking/online banking, and 9.2% used other digital platforms.
- It is evaluated that 42.3% of the respondents used digital technology daily, 22.7% used it several times a week, 14.1% used it once a week and 20.9% used it whenever needed.

7.2 Empowering Women through Technology

Empowering women through technology is reflected in improved access to digital resources, enhanced communication, greater independence, better employment opportunities, and informed decision-making. Alos, technology enables women to participate more effectively in social, educational, economic, and public activities. In

this section, the study has developed eight statements to measure the level of empowering

women through technology among the selected respondents.

Table 2: Empowering Women through Technology

S. No	Factors	Mean Score	SD
1	Technology has improved my ability to access government and public services.	3.69	1.26
2	Technology has increased my confidence in making personal and financial decisions.	3.71	1.16
3	Using digital technology has improved my access to education and learning opportunities.	3.66	1.15
4	Technology enables me to communicate and connect with others more effectively.	3.53	1.35
5	Digital platforms have created better employment or income-generating opportunities for me.	3.65	1.40
6	I feel more independent because I can use digital technologies without assistance.	3.50	1.17
7	Technology has enhanced my participation in household and community decision-making.	3.30	1.20
8	Digital tools have helped me manage my daily tasks more efficiently.	4.29	0.94

It is noticed from the analysis that the Cronbach's Alpha value for the statements relating to empowering women through technology is 0.915, indicating that the scale has good reliability and is suitable for further analysis. It is revealed that most of the women agreed with the statement 'Digital tools have helped me manage my daily tasks more efficiently', which recorded the highest mean score of 4.29 with a standard deviation of 0.94, followed by 'Technology has increased my confidence in making personal and financial decisions' with a mean score of 3.71 and a standard deviation of 1.16. Conversely, the statement 'Technology has enhanced my participation in household and community decision-making' recorded the lowest mean score of 3.30 with a standard deviation of 1.20.

TESTING OF HYPOTHESIS (ANOVA)

Table 3: Education Level and Empowering Women through Technology

7.3 Relationship between Socio-Economic Profile of the women and Empowering Women through Technology

This section examines the relationship between the socio-economic profile of the respondents and empowering women through technology. To analyse this relationship, hypotheses have been formulated, and the association between the selected independent variables and empowering women through technology has been tested using Analysis of Variance.

Education Level and Empowering Women through Technology

H_0 : There is no significant mean difference in empowering women through technology with regard to education level of the women.

	Sum of Squares	df	Mean Square	F	'p' value
Between Groups	7.538	2	3.769	11.491	0.000*
Within Groups	52.479	160	0.328		
Total	60.018	162			

Note: * – Significant at 1% level

It is mentioned from the analysis that the 'p' value is lesser than 0.05 accordingly the null hypothesis is rejected. Hence, there is a significant mean difference in empowering women through technology with regard to education level of the women.

Digital Tools or Platforms Used mostly and Empowering Women through Technology

H_0 : There is no significant mean difference in empowering women through technology with regard to digital tools or platforms used mostly of the women.

Table 4: Digital Tools or Platforms Used mostly and Empowering Women through Technology

	Sum of Squares	df	Mean Square	F	'p' value
Between Groups	5.839	4	1.460	4.257	0.003*
Within Groups	54.179	158	0.343		
Total	60.018	162			

Note: * – Significant at 1% level

From the analysis, it is observed that the 'p' value is lesser than 0.05 therefore the null hypothesis is rejected. So, there is a significant mean difference in empowering women through technology with regard to digital tools or platforms used mostly of the women.

Frequency of Digital Technology Using and Empowering Women through Technology

H_0 : There is no significant mean difference in empowering women through technology with regard to frequency of digital technology using of the women.

Table 5: Frequency of Digital Technology Using and Empowering Women through Technology

	Sum of Squares	df	Mean Square	F	'p' value
Between Groups	3.651	3	1.217	3.433	0.018**
Within Groups	56.367	159	0.355		
Total	60.018	162			

Note: ** – Significant at 5% level

It is evinced from the analysis that the 'p' value is lesser than 0.05 thus the null hypothesis is rejected. Therefore, there is a significant mean difference in empowering women through technology with regard to frequency of digital technology using of the women.

Relationship of Empowering Women through Technology (Multiple Regression Analysis)

The relationship between empowering women through technology and the selected independent variables is examined using multiple regression analysis. The results of the regression model are presented in the following table.

H₀: There is significant relationship with empowering women through technology among selected independent variables.

Table 6: Relationship of Empowering Women through Technology (Multiple Regression Analysis)

No.	Variables	Coefficient	SE	't' value	'p' value
	(Constant)	2.501			
1	Age	0.080	0.070	1.154	0.250 ^{NS}
2	Education level	0.291	0.064	4.550	0.000*
3	Family Monthly Income	0.119	0.075	1.590	0.114 ^{NS}
4	Frequency of Digital Technology Using	0.110	0.049	2.239	0.027**
	R Value	0.983			
	R² Value	0.966			
	F Value	96.786*			

Note: * - Significant at 1% level; ** - Significant at 5% level; NS-Not Significant

The regression model demonstrates an excellent fit, with an R value of 0.983 and an R² value of 0.966, indicating that 96.6% of the variation in empowering women through technology is explained by the selected independent variables. Further, the F value of 96.786 confirms that the overall regression model is statistically significant at the 1% level. From the analysis, education level has the strongest positive effect on empowering women through technology, with a coefficient of 0.291 and a highly significant p-value of 0.000. This is followed by family monthly income, with a coefficient of 0.119, although its relationship is not statistically significant ($p = 0.114$), and frequency of digital technology using, with a coefficient of 0.110 and a significant p-value of 0.027. Age also shows a positive coefficient (0.080), but its relationship with empowering women through technology is not statistically significant ($p = 0.250$).

8. FINDINGS

- It is indicated that most (42.9%) of the respondents belonged to the 30–40 years age group. In addition, Further, women below 30 years have perceived the highest level of

empowerment through technology among all age groups.

- It is obtained that most (45.4%) of the respondents were UG graduates. Moreover, women with professional qualifications have exhibited the highest level of empowerment through technology compared to other educational groups.
- It is found that majority (42.3%) of the respondents were private employees. Also, self-employed women have obtained the highest level of empowerment through technology among all occupational groups.
- It is showed that most (46.6%) of the respondents belonged to the Rs.50,001–Rs.1,00,000 family monthly income group. Further, the women with a family monthly income of Rs.50,001–Rs.1,00,000 have recorded the highest level of empowerment through technology compared to other income groups.
- It is identified that majority (33.7%) of the respondents mostly used social media platforms. However, women who mostly use social media platforms have attained the highest level of empowerment through technology among all digital platform users.

- It is stated that the most (42.3%) of the respondents used digital technology daily. Additionally, women who use digital technology daily have achieved the highest level of empowerment through technology compared to other usage frequency groups.
- It is mentioned from the mean score test that most of the women agreed with the statements 'Digital tools have helped me manage my daily tasks more efficiently' and 'Technology has increased my confidence in making personal and financial decisions' with a mean score of 4.29 and 3.71 respectively.
- The ANOVA confirmed that there is a significant mean difference in empowering women through technology with regard to education level of the women.
- From the 'F' test, it is displayed that there is a significant mean difference in empowering women through technology with regard to digital tools or platforms used mostly of the women.
- It is illustrated from the ANOVA that there is a significant mean difference in empowering women through technology with regard to frequency of digital technology using of the women.
- The multiple regression analysis noticed that the variables namely education level and frequency of digital technology using have the positive significant effect on empowering women through technology with a coefficient of 0.291 and 0.119 respectively. The equation proved that empowering women through technology is predicted by 8.0% increase in age, 29.1% increase in educational level, 11.9% increase in family monthly income and 11.0% increase in frequency of digital technology using.

9. SUGGESTIONS

- The findings displayed that women below 30 years have perceived the highest level of empowerment through technology, possibly due to their greater familiarity with digital technologies. Therefore, digital literacy and technology awareness programmes be

strengthened for middle-aged and older women to enhance their digital inclusion.

- It is mentioned from the study that women with professional qualifications have exhibited the highest level of empowerment through technology, possibly according to their better digital knowledge and technical exposure. Hence, it is suggested that digital skill development and professional training programmes be extended to women with lower educational qualifications.
- From the study, it is evinced that self-employed women have attained the highest level of empowerment through technology, possibly because they frequently utilize digital tools for business and financial activities. So, it is pointed out that entrepreneurship development programmes and digital business training be promoted among women to encourage technology adoption.
- It is noticed from the findings that women who mostly use social media platforms have achieved the highest level of empowerment through technology, possibly due to their greater exposure to digital communication, information sharing, and online learning opportunities. Therefore, social media platforms be effectively utilized to disseminate digital literacy, financial awareness, and entrepreneurship-related information, thereby promoting greater digital inclusion and empowering women across different socio-economic groups.
- It is depicted from the study that women who use digital technology daily have attained the highest level of empowerment through technology, possibly due to their continuous interaction with digital platforms. Hence, it is suggested that regular digital engagement through training programmes, community digital centres, and awareness campaigns be encouraged to improve technology usage among women who use digital technology less frequently.

10. CONCLUSION

This study examined that the empowering women through technology on digital inclusion

in Malappuram District, Kerala. It is noticed from the study that high level of empowerment through technology is perceived by the women who belong to below 30 years of age group, professional qualification, self-employed, family monthly income of Rs.50,001–Rs.1,00,000, mostly use social media platforms and use digital technology daily. It is suggested that government agencies, educational institutions, non-governmental organizations and digital service

providers should implement targeted digital literacy, skill development, and technology access programmes for women to promote inclusive digital participation in Malappuram district, Kerala. Furthermore, affordable digital infrastructure, continuous training, and awareness initiatives should be strengthened to ensure equitable technology-driven empowerment among women in the study area.

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