

RESEARCH ARTICLE

Evaluating the access to Common Service Centres for banking services from the perspective of rural women entrepreneur

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ABSTRACT

The present research investigates the potential for women's economic involvement to bring about transformational outcomes, specifically focusing on developing countries. This study explores how women's engagement in economic activities might effectively address poverty and promote gender equality. This study examines the emerging landscape of internet enterprises, providing a crucial opportunity for women who face limitations due to household and societal factors. This study adopts a scholarly perspective by examining the implementation of Common Service Centres (CSCs) by the Indian government. It employs a comprehensive research approach that integrates qualitative and quantitative methodologies. The primary objective is to analyze the usage of government programs, specifically focusing on the engagement of rural women entrepreneurs with CSCs and internet connectivity. The results derived from a comprehensive examination of secondary data and surveys conducted among CSCs and small women-owned offline firms in Chhattisgarh highlight the significant impact of information and communication technology (ICT) on the dissemination of information. The advent of ICT and the integration of CSCs in banking activities have ushered in profound changes in our economic landscape. Cost reduction and increased knowledge accessibility through technological advancements have been instrumental.

Keywords: Common Service Centres; banking services; rural development; women entrepreneur

1. Introduction

1.1. National situation and motivation

Recently, there has been a growing recognition of the need to empower rural women, who often face significant challenges and inequalities. To bridge this gap, several digital initiatives have emerged as potential tools for empowering rural women and enhancing their agency. This paper aims to explore the role of digital initiatives in empowering rural women.

Gender inequality and poverty pose enduring concerns in numerous emerging nations, necessitating inventive strategies to tackle these problems^[1]. An advised strategy by the Economic and Social Commission for Asia and the Pacific is to promote the involvement of women in wage-earning activities. This study examines the convergence of gender disparities, efforts to alleviate poverty, and digital interventions in rural

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areas of India. It highlights the significant contribution made by female entrepreneurs in bringing about positive changes within their communities^[2].

In the context of developing nations such as India, a notable underrepresentation of women entrepreneurs exists, primarily attributed to the inherent tension between their professional pursuits and familial obligations^[3,4]. In some instances, women assume the role of managing small firms using self-help groups (SHGs) facilitated by government assistance and the provision of financial services at their place of residence. Although these programs provide essential tools and help, they frequently neglect a crucial element of achieving business success: product marketing. Furthermore, it is worth noting that in rural India, women's mobility is restricted due to the influence of conventional gender roles and societal standards^[5]. Women are also responsible for the caring responsibilities associated with family members with impairments, elderly folks, and children. The obstacles mentioned above exacerbate the difficulties individuals encounter in pursuing activities that provide revenue^[6-8].

1.2. The phenomenon of digital transformation

The emergence of the Internet has significantly altered the business environment, presenting prospects for manufacturing, banking, and marketing, even within a society that prioritizes family and community values. The COVID-19 pandemic has significantly expedited the implementation of contactless commerce, rendering the digital platform an essential component. The Internet offers cost-effective promotional alternatives and possibilities for growth, which can be particularly beneficial for women entrepreneurs who have challenges obtaining significant money for expansion.

Entrepreneurs operating small businesses frequently need additional financial resources, irrespective of gender, to commence and grow their enterprises^[9]. Information and communication technology (ICT) can significantly improve individuals' ability to access various funding alternatives and acquire operational knowledge^[10]. Providing women residing in remote rural and tribal regions with business expansion plans and an understanding of banking procedures can enhance their economic empowerment and significantly contribute to poverty eradication^[11,12].

Nevertheless, female individuals who wish to engage in the online platform face significant obstacles, such as inadequate access to crucial infrastructure, little practical knowledge, and difficulties with payment systems^[13,14]. The digital gender disparity in India is notably significant, with males constituting 82% of internet users while females comprise 18%. The discrepancy is notably more prominent in rural regions of India than in metropolitan locales^[15,16].

The Gender Gap Index reveals that India is positioned at 112 out of 153 nations, indicating the enduring presence of gender disparity across multiple sectors, such as economic inclusion and development^[17]. According to Mukherjee et al.^[18], it has been found that women in India experience digital exclusion, which manifests in their limited access to cell phones and the Internet. The government's involvement is essential in enabling women to engage in e-business and banking activities allowed through CSCs^[18]. Nevertheless, many government initiatives have faced criticism due to their gender-blind nature, resulting in unintentional bias towards male entrepreneurs^[19].

1.3. The empowerment of women through CSCs

Several financial institutions have implemented transformative initiatives to improve the quality of life for individuals through the establishment of CSCs^[20,21]. These centers function as community-based hubs providing access to a range of governmental welfare services, encompassing activities promoting financial inclusion. Village-level entrepreneurs (VLEs) can establish these centers, enabling residents to avail of

banking support programs in exchange for a charge. These programs are characterized by their digital nature since they entail the transfer of personal data to databases and banks operated by the government. This facilitates the development of digital literacy and enhances economic opportunities throughout the country.

The Stree Swabhiman program is an innovative virtual learning environment (VLE) initiative that aims to educate women entrepreneurs in producing and selling sanitary pads, which are marketed under several regional brand names. Although the software can operate without an internet connection, its web platform provides extensive potential for marketing and the dissemination of information. Nevertheless, the pivotal inquiry is around the ability of rural women to effectively utilize ICT and capitalize on CSCs within virtual learning environment (VLE) programs.

1.4. Addressing the research gap

The present study addresses a notable need for more scholarly work by assessing the efficacy of digital interventions in rural regions. This study focuses on examining the strategies employed by digitally marginalized rural women to overcome various challenges and establish a sustainable source of income for their families through utilizing Village Level Entrepreneurship (VLE) programs. Despite the innovative character of the digital India program, there has been a need for more comprehensive assessments of CSCs^[22–25].

A study conducted by the Indian School of Business has investigated the economic viability and societal implications of community service organizations (CSOs) and their role in promoting financial inclusion^[26]. However, a comprehensive assessment of the transformative role played by government programs in fostering entrepreneurship and digital literacy in rural regions needs to be included. This study aims to fill the existing research vacuum by having a gender perspective and employing Sen's capabilities approach^[27,28].

The present study utilizes cross-sectional regression analysis to elucidate the negative correlation between gender disparities and the predominance of woman-owned firms that use ICT and depend on CSCs. Case studies provide insights into the use of online tools by women participating in the CSC-VLE and Stree Swabhiman programs to manage their firms effectively. By employing fieldwork and Sen's capabilities theory, we analyze the skills and variables of change in the examples mentioned earlier^[29–31]. The present study utilizes enterprise-level data from the National Sample Survey Office (NSSO) to conduct a thorough and comprehensive analysis.

1.5. Entrepreneurship at the village level (VLE): Applicable plans

Two government efforts seem relevant when we think about entrepreneurship among women and the use of the web platform at the community level. Some of those particulars will be covered in what follows.

1.5.1. The common services center-village-level entrepreneurship

The Common Service Center (CSC) project, conceived by the Government of India and the banking sector, is one of the most notable efforts for implementing e-governance in the nation and remote banking practices, respectively. These service centres were first set up to provide localized availability of computerized services for a range of government welfare programs, which included those aimed at promoting financial inclusion. Participants of state assistance programs should register via government portals and banking channels to improve monitoring and transparency and reduce fraud. The tasks at hand are typically beyond the capabilities of the general public. In this context, CSCs play a crucial role as intermediaries, charging a nominal fee to facilitate the completion of these tasks. As of 2022, there are over three lakh CSCs actively operating in India^[32]. This initiative represents a significant endeavour aimed at nurturing entrepreneurial spirit in rural areas.

Prospective business owners interested in becoming CSC-VLEs must apply via an official government website and banking portals. Creating a CSC point, or digital Seva Kendra, also requires a certificate that may be earned by completing an online exam; the nature of this test will vary based on the services offered by the VLE. Candidates who meet the requirements for enrolment and registration will be issued an ID that may be used to access the CSC portal and begin providing solutions. No VLE-related quotas or limits are in place. While some of these offerings are duplicated by government entities, working with CSCs has benefits due to less need for travel, improved communication, and accessibility. Nevertheless, due to the abundance of CSCs, the competition among business owners is fierce, necessitating the consistent delivery of high-quality services to expand their market presence.

1.5.2. The VLE program's Stree Swabhiman initiative

Additionally, the Stree Swabhiman initiative is an essential aspect of the VLE system as it empowers women-owned businesses to manufacture sanitary napkins and compete with international corporations. Sometimes the government helps them advertise their goods. In addition, they serve a vital purpose by teaching girls and women in rural communities the value of menstruation hygiene and the benefits of utilizing sanitary products. Local VLEs market their goods using regionally relevant brands^[33].

Many banks have launched a revolutionary program to improve the lives of their citizens by creating Common Service Centers (CSCs)^[20,21]. Financial inclusion initiatives are only one of several state welfare programs for which CSCs are established as local access points for banking activities. Village level entrepreneurs (VLEs) may set up these centres to let locals sign up for banking assistance programs in exchange for a fee. It is inherently a digital enterprise since it calls for transferring personal data (such as biometrics and any banking activities) to a government-run database and banks, respectively. These initiatives have now reached every part of the nation, facilitating the distribution of state benefits and fostering the growth of digital literacy and economic prospects. The state's Stree Swabhiman (self-respect of women) program is another innovative VLE initiative that empowers women business owners to educate and empower other women via producing and selling sanitary pads under regional brand names. The functionality of these schemes may be used offline if desired. However, this firm's web platform has enormous marketing and information dissemination possibilities. The topic of whether or not women in rural areas can use information and communications technology and take the maximum benefit of CSC to their advantage in these two major VLE programs is critical.

2. Methodology

2.1. Approach

This study employs a mixed-methods approach, integrating qualitative and quantitative techniques. It employs statistical analysis, including regression modelling, to examine relationships between variables such as Gender Development Index (GDI), Gender Inequality Index (GII), and internet usage among female business proprietors. It uses a probit model for binary outcome analysis. The study also adopts a case study approach, using critical instances and individual cases to understand the experiences of women entrepreneurs. Analyzes interview responses for qualitative insights into factors like starting points, challenges, and family support. We examine secondary data from the NSSO collected at the firm level to set the stage for the investigation^[34]. The poll sampled 3, 11,283 businesses, of which 56% were in rural regions, and retrieved data for women-headed private organizations that utilize Internet services. While the NSSO statistics give details on women-run businesses, information needs to be supplied on CSCs; thus, we performed a field study to address this issue.

Critical instances from our primary survey are developed to show the results at the field level using a case study approach. The case study technique helps study multifaceted social units like women business owners affected by various factors. To better understand the influence of external factors on the outcomes, this study adopts a case study framework that examines multiple cases. By comparing and contrasting the impact of a similar program on different individuals, researchers can gain a deeper understanding of the significance of these external influences^[35].

2.2. Data from primary sources

In terms of primary data collection, our research focuses on two states: Chhattisgarh, which is considered more advanced, and Odisha, a comparatively less advanced state. Through random selection, we chose five regions from each state: Balod, Dantewada, Durg, Surajpur, and Raipur in Chhattisgarh, and Bhubaneswar, Cuttack, Angul, Rourkela, and Puri in Odisha. To obtain an overview of women-operated CSCs in these regions, we gathered information on a total of 245 CSCs in the mentioned districts, with 120 in Chhattisgarh and 125 in Odisha. Our preliminary research suggests that the CSC program in Odisha is just getting started and is less active than its counterpart in Chhattisgarh. Since data was scarce in Chhattisgarh, we opted for a more accurate representation from Chhattisgarh. Twenty-three women from Odisha and thirty-nine from Chhattisgarh, who run offline enterprises including trade, baking, and jewellery manufacturing, were chosen for this study. Both phone and in-person interviews took place.

2.3. Data collection tools

The field survey included a well-designed questionnaire. A preliminary pilot survey was done, and its results informed several changes to the final questionnaire. Based on our literature analysis, news articles, governmental documents reviewed, and research queries, we created the surveys utilized in this case study. The survey asked respondents quantitative and qualitative questions on their business's starting points, challenges, family and government support levels, revenue and expenses, CSC support for banking practices, and other relevant factors. Each participant received documentation detailing the study objectives and was told that their opinions would be recorded and made accessible to society. Before beginning, we ensured everyone's verbal approval to record the discussion. Participants' identities have been modified in this study to protect their privacy to encourage them to reply honestly to our questions. About 30 min were allotted to every interview. Additionally, talks with government authorities were also conducted to identify the government schemes and supports for the women entrepreneurs and any ground level issues of such schemes, where it is confirmed the schemes is effectively implemented and accepted but the progress is found to be slow.

2.4. Theoretical foundations

The research uses the recognized capability method proposed by Sen^[29–31]. In this view, metrics of economic success, although practical, are insufficient to gauge true happiness and fulfilment in life^[27]. Having the autonomy to pursue one's goals and pursue life as one sees fit is essential to one's well-being. Thus, the capacity approach views liberty in response to enhancing one's capacities to accomplish one's functions. In other words, whereas skills are a set of all possible functions in a specific domain, an operation is a single observable result^[36]. Functioning is what a person is successful at “doing or being”.

The capacity literature states that the qualities of inputs/resources ultimately define the capabilities that can be achieved^[34]. Revenue, physical assets, skills, and rights are all examples of sources that individuals have access to^[37]. Technology is one of the most critical factors in raising performance levels. However, the capability approach acknowledges that some inputs produce uniform capabilities for everyone^[34].

Conversion variables are circumstances that facilitate or impede an individual's ability to translate their skills into action. People (physical health, literacy, IQ, gender), social (societal hierarchies or power to class, laws, and regulations, government policies/programs, caste, or gender, as well as familial and spousal support), and environmental (climate, geographic environment, infrastructure) factors all play a role in the process of conversion, as described by Robeyns^[38].

It is crucial to note that some scholars have differentiated between inputs' creative and transformational dimensions. Technical objects like computers and cell phones can be utilized because of their inherent abilities to handle and transmit online data and thus serve as a source of input. However, Haenssger and Ariana^[39] said they may also be employed to "change the features (e.g., healthy content) of other components (e.g., food) by changing them immediately (e.g., with a kitchen stove) or by integrating them (e.g., with a recipe)". To rephrase they have said, they serve as "conversion factors" for additional factors in acquiring valuable talents.

Finally, we discuss the idea of authority, central to the capacity approach. Someone's liberty can be summed up as "what exactly he or she is allowed to engage in accomplish in pursuit of any objectives or beliefs he or she considers important"^[28]. Additionally, Crocker and Robeyns^[40] proposed that Sen differentiates between observed autonomy achievement, which occurs when a person's goal becomes a reality through another person, and that occurs when a person actively contributes to the realization of its own goal.

The capability theory transforms the study by transitioning from conventional economic metrics to a person-centered perspective. It encourages researchers to evaluate well-being by considering factors such as skills, rights, and income. It emphasizes conversion variables, such as health and societal factors, influencing an individual's abilities. Additionally, the theory prioritizes authority, prompting research into personal empowerment and goal attainment. As a guiding philosophy, it directs research methods toward a comprehensive comprehension of human development, allowing for more effective policy interventions and societal advancement.

3. NSSO data (macroscopic scenario): An analysis

According to the 78th raise of NSSO data, which analyzes the economic climate where women's company owners operate online, just 4.7% of rural women-owned companies and 9.6% of urban women-owned enterprises access the Internet.

Eighty-one percent of these businesses rely on email for company communication, followed by online banking (51%) and only a tiny portion for promotion (6.89%), with relatively few delivering items online. When we examined the most pressing daily issues, we found that marketing was the root of the problem. 11.3% of women said they had trouble getting loans to buy things like computers and broadband connectivity for their businesses, and 8.13% said that inconsistent power outages made it challenging to rely on online services for their enterprises.

3.1. Factors influencing women run business in adoption of the Internet

Beyond per capita income, the Human Development Index (HDI) measures well-being by taking capacities into consideration. However, a culture that cherishes the liberties of women ought to assess measurements like the Gender Inequality Index (GII) or Gender Development Index (GDI)^[35]. This research examines whether women with higher GDI scores—which represent their financial situation, well-being, and education—are better at using sophisticated technologies and developing their entrepreneurial talents. According to capability theory, these factors act as amplifiers of individual potential. To examine the

correlation between a higher GDI and the presence of information and communications technology-based women entrepreneurs, we employ a regression model that takes into account a female proprietor's internet usage. Our response (outcome) factor is consequently binary (1/0), necessitating the usage of a probit model. With a minimal set of controls, our regression models provide similar results. Using the fewest possible variables to account for the best regression models, the parsimonious models are preferred because of their high descriptive and forecasting ability.

We find a positive correlation between a state's GDI and its female proprietor's Internet use (**Table 1**). In addition, as GII rises, businesswomen's information and communications technology usage decrease proportionally. It is essential to note that the Internet utilization of female business proprietors correlates positively and substantially with the growth of online, broadband, and WiFi subscribers in a given region. Additionally, improvements in the density of base transmitting stations and the availability of telecom towers per capita positively affect a business owner's ability to provide Internet access for her female employees.

Table 1. Factors affecting women-owned businesses' Internet adoption for commercial purposes.

Variable dependent				
Internet user as 1 and none users as 0 (women businesses)				
Variable independent	1	2	3	4
A constant NSDP income per capita is more than that of national level it is 1 or else it is 0 (dummy of state)	0.311*** (0.0217) {0.0187732}			
It belongs to urban then 1 or else 0	0.397*** (0.0274) {0.0287491}	0.511*** (0.029) {0.041942}	0.516*** (0.027) {0.048734}	
Area in household premises if it is outside then 0 if inside it is 1	(0.904)*** -0.0301 {-0.0686041}			
Yes is 1 and no is 0 if the business firm has any bank accounts of post office savings	0.807*** (0.039) {0.0600419}	0.907*** 0.041 {0.0699275}		0.916** (0.0311) {0.0782294}
Yes is 1 and no is 0 if they are engaging in different activities	0.087* (0.0596) {0.0069931}		0.207* (0.0692) {0.013942}	0.311* (0.0646) {0.0207669}
-				
Yes is 1 and no is 0 if it is a nonprofit firm	0.297** (0.217) {0.0217643}	0.482*** (0.228) {0.0370681}	0.607*** (0.219) {0.0491338}	
-				
HDI			1.264*** (0.22) {0.0903642}	
GDI		0.294*** (0.291) {0.0216316}		

Table 1. (Continued).

Variable dependent				
Internet user as 1 and none users as 0 (women businesses)				
Variable independent	1	2	3	4
GII				-0.293* (0.209) {-0.0209764}
Subscribers to internet (no.)		0.004*** (0.001) {0.0002961}		
Subscribers to broadband (no.)			0.01* (0.003) {0.0007936}	
Subscribers to internet wireless (no.)				0.00313** (0.00194) {0.0002966}
Per capita trans receiver count		79.364*** (22.63) {7.096637}		
Per person tower count for telecom			299.37*** (89.65) {26.39772}	
Constant	-2.667*** (0.0521)		-3.996*** (0.209)	-2.719*** (0.0903)
-				
Log likelihood	-5079.3875	-4695.3374	-4896.6752	-5019.3762
Pseudo R ²	0.2012	0.1097	0.0493	0.0893
LR chi ²	2294.67***	1867.22***	507.34***	969.37***
Observations	42,036	32,197	36,942	36,941

An effect of marginal on the anticipated rate of the computed coefficients of probit are shown in { }; brackets () comprised of standard errors. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Our models also suggest that the percentage of Internet usage by female proprietors is higher in states with higher incomes than those with lower incomes. Female proprietors in metropolitan areas may be more likely to utilize the Internet because of the improved conditions in which they do business. In addition, we have not included size as a variable to prevent multi-collinearity. Our results show that female-owned firms with an actual address or an account with the bank are prone to use the internet for trade.

Moreover, to gain deeper insights into the transformative impact of CSCs on rural women's lives, we conducted a field study, recognizing that such first-hand experiences provide invaluable knowledge beyond what our research, primarily focused on the broader economy, can offer. Some special situations from the investigation are examined to bring attention to the difficulties women experience and the kind of supportive setting they need. However, we begin with some general information from our field research rather than getting straight into the scenarios.

4. Overview statistics from localized information

4.1. Data insights and demographic analysis

A woman’s inclination to do business on the internet (a covariate) may be affected by her age, level of schooling, socioeconomic standing, relationship status, and whether or not she has children. Without including the effects of these factors, the evaluation of the influence of online services on corporate revenues will be subject to a bias toward self-selection. Next, we attempt to compensate for the disparity by estimating the typical treatment impacts (here, Internet use for businesses) on the outcome of interest (profit). It would be excellent for comparing a woman’s earnings on a physical platform with her earnings online. As each woman is a combination of observed as utilizing online sources or not, and not both, it is impossible to draw an opposite conclusion from observational data. The assumption here is that we can divide the population into groups of people who are otherwise similar but in which some receive the treatment (online business owners) and some do not (offline business owners), with the likelihood of receiving the treatment being the same for both groups and then examine the results of these two groups to determine the average effect of treatment.

There are many ways to assess a treatment’s effect on a variable while taking into consideration other variables that affect treatment intake. This analysis uses a specific matching setup to examine how online businesses affect women’s income in Chhattisgarh and Odisha. Propensity score matching (PSM) using logit or probit regression methods is our matching strategy, following Rosenbaum and Rubin^[41]. This PSM method allows for robust treatment-control comparisons.

Our one-to-one matching process carefully pairs online women with traditional businesswomen. This matching aims to align the propensity scores of the matched pairs to improve treatment and control group comparability. Notably, the matching is done without replacement, so each control unit has one treatment group counterpart. This method preserves matching. We also specify a covariate caliper value to improve matching precision. The specific caliper value is 0.15, but it ensures that matched pairs have closely matched covariate values, making the analysis more robust.

We also understand the importance of reporting matching quality. To assess the reliability of our results, we evaluate covariate balance before and after matching to reduce initial differences between the treated and control groups as presented in **Figure 1**. We compare propensity scores before and after checking to ensure an adequate matching process. We explicitly report any sample loss during matching to provide transparency into the dataset’s impact.

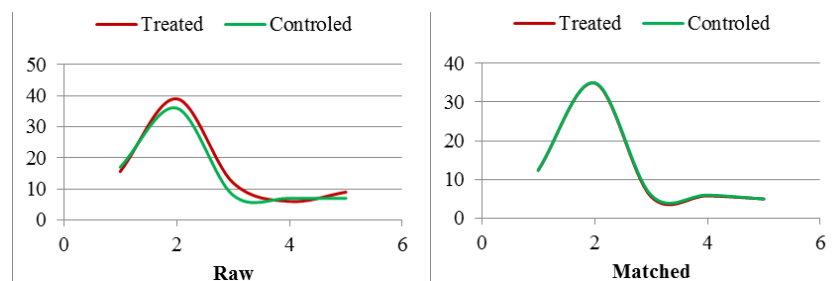


Figure 1. Propensity score matching balance plot.

This method lends credibility to our findings on the effects of online businesses on women’s income in Chhattisgarh and Odisha. These considerations help us construct a comprehensive analysis using the PSM approach. Additionally, variables included family income (which allows for investment in the capital) and relationship status (which indicates whether or not a spouse or children support one). **Table 2** displays the

findings of this investigation.

Table 2. A propensity score: offline and online business’s profit contribution.

	Chhattisgarh	Odisha
(Offline vs. online profit)	4305	-107.91
A treated result with average treatment	(0.000)* {598.33}	(0.914) {697.49}

Statistics utilizing propensity score pairing; * significance at the 1% level; AI robust standard errors in {}; *p*-values in ().

Table 2 shows that women in Chhattisgarh may expect an average income increase of Rs 4305 (\$53.8) per year by choosing an online company over a traditional one. It is mainly because the CSC-VLE system has been effectively operating in the state for quite some time, allowing many women to participate in and perform all banking-related activities through CSC. Our case studies show that a substantial amount of direct experience is also required. According to our analysis, there was no statistically significant disparity in profit between online and offline enterprises in Odisha. Since CSC operations in the state are only getting started, enrolment for just a few government programs and banking activity is currently being conducted. It means that the money they are making right now is relatively minor. It might be attributable to various variables, including exposure and education. We find that the levels of GDI and GII, which account for several of these aspects, are lower in Odisha than in Chhattisgarh in the secondary data we analysed. These indices offer insights into regional gender disparities, complementing individual-level survey data and providing a comprehensive backdrop for understanding the challenges faced by rural women entrepreneurs.

4.2. Social effects

Other social advantages, detailed in **Table 3**, are also realized the economic ones, which aid in women’s independence. These women note increased self-sufficiency and recognition within their families as two primary advantages. The ability to advocate for one’s rights and those of one’s female child was cited by them as the most significant advantage. In addition to empowering people to engage in dispute resolution within the community and local government system, business ventures, significantly dependent on CSCs that assist other residents avail themselves of specific advantages, have helped them socialize and increase their agency and all kinds of financial transactions.

Table 3. The effects of online trade on society.

Responses in percentage	Only to certain extent	Not at all	Yes
Assisted in gaining respect from relatives	29.8	9	61.2
Assisted the family in making a decision	24.7	23	52.3
The family’s increased money partly supported the daughter’s freedom due to an online business	0	31.3	68.7
Assisted in the search for own right	2.1	58.2	39.7
Supported you and your friends for an outing	8.7	61.6	29.7
Contributed to negotiations initiatives in the community	10.8	74.5	14.7
Assisted in becoming active in local government	11.07	68.23	20.7
Assisted in relieving your spouse’s habit of different addictions as excessive drinking	2.7	89.5	7.8

Note: combined both Chhattisgarh and Odisha.

5. Conclusion and recommendations for policy

The advent of information and communications technology and the introduction of CSC in banking activities have had far-reaching effects on the structure of our economy. It has revolutionized how individuals get their hands on resources and run their businesses. In particular, technological advancements have decreased costs and increased knowledge access. Despite these positive developments in the economy, a great deal of Indians has yet to experience the benefits of the digital revolution. The Digital India initiative has strengthened the CSC (Common Service Centre) system to address this problem, notably in rural banking. The program has garnered support from banks, which have played a vital role in supporting the government's initiatives and implementing innovative and effective measures in rural banking. To advance their economic and social standing, the government strongly recommends that women become CSC-VLEs.

Despite the transformative nature of this shift, there has been limited research into the positive outcomes experienced by rural women entrepreneurs who decide to establish their businesses online. Using a case study methodology, this research examines such businesspeople in Odisha and Chhattisgarh, India. Cases are studied utilizing Sen's capability framework^[28-30]. Our studies illustrate local entrepreneurs' challenges in competing with international corporations and how they make a difference in rural communities by using village SHGs and digital tools like WhatsApp.

The study emphasizes quantitative and qualitative insights from various sources in its comprehensive data collection method. These sources include NSSO data, on-site investigations, surveys, and interviews. This comprehensive data collection strategy ensures a complete understanding of rural female entrepreneurs' challenges. The study also includes age, education, caste, family income, and relationship status. These factors are crucial to understanding women's online banking and entrepreneurial challenges. Propensity score matching (PSM) controls for confounding variables and improves statistical robustness in assessing women's online business income. This study examines the relationship between the GDI and women's business use of information and communications technology to determine how gender development affects women's entrepreneurial use of digital resources. Empirical case studies from Odisha and Chhattisgarh illuminate rural women entrepreneurs' pragmatic use of CSCs and digital resources to overcome challenges. These case studies show how such initiatives can transform. In addition to economic benefits, these entrepreneurs gain self-reliance, familial recognition, and the ability to advocate for their rights, according to research. Collectively, these factors empower women. The research concludes with policy recommendations emphasizing government support for women's CSC-VLE participation. It also recommends more digital policies to empower rural women entrepreneurs. This comprehensive study examines rural women entrepreneurs' complex environment as they seek banking services and entrepreneurial opportunities through CSCs and digital technology.

The findings of our study provide essential policy suggestions aimed at augmenting the involvement of women in online enterprises and Common Service Centre (CSC) endeavors. In Odisha, where persistent challenges such as limited Internet connectivity and inadequate energy supply are prevalent, it is imperative to invest in computer hardware, printers, and biometric equipment to ensure the success of Common Service Centre (CSC) initiatives. Convenient access to formal banking systems is imperative for women entrepreneurs to obtain financial support. In addition, it is essential to emphasize the importance of increasing awareness and delivering comprehensive training on diverse online business opportunities, given the distinctive procedures associated with each scheme. The COVID-19 pandemic initially had adverse effects on businesses; however, it subsequently led to a surge in online shopping and e-commerce, creating novel prospects. The imperative nature of registering for government disaster relief programs, which are solely accessible via CSCs, cannot be overstated. In the context of Chhattisgarh, confident women who

possess advanced education and computer literacy can gain knowledge by utilizing instructional videos and online platforms such as YouTube and WhatsApp. However, it is crucial to acknowledge the existence of diverse levels of technological proficiency among individuals. Customized, experiential education is imperative, particularly for women with limited educational backgrounds and individuals residing in rural regions, encompassing socially marginalized populations. Efforts should prioritize empowering marginalized groups, specifically scheduled tribes and castes, within e-commerce. The registration process, which is frequently impeded by limitations in server capacity, necessitates optimization to cater to the needs of busy entrepreneurs and enhance enrollment rates. Many women undergo training in traditional manufacturing industries but must enroll in prominent online marketplaces like Amazon and Flipkart. To address this disparity, it is imperative to possess fundamental computer competencies and self-assurance in navigating the CSC portal, bolstered by multiple financial establishments. The pandemic has presented significant opportunities for women to leverage the potential of the internet, provided that the challenges they encounter are adequately addressed. By overcoming these obstacles, women can effectively utilize the internet's capabilities to foster business growth and promote financial inclusion.

6. Limitation and future scope of study

Women business owners in India's rural areas, especially those involved in the CSC and Stree Swabhiman programs are the subject of this research. The results may only apply to women business owners within India or even outside India's metropolitan centers. Data from the National Sample Survey Office (NSSO) were used to provide a cross-sectional picture of the state of affairs at a given moment for the research. Response bias may occur when people provide responses they think would make others happy or don't reveal all the difficulties they have faced.

Future research on the impact of CSCs on rural women entrepreneurs can be undertaken to explore long-term economic sustainability, scalability, and the role of digital literacy programs in fostering empowerment and business growth.

Author contributions

Conceptualization, DKS and SCN; methodology, AK; software, AK; validation, AK; formal analysis, DKS and AK; investigation, SCN and BB; resources, SCN; data curation, DKS; writing—original draft preparation, BB and AK; writing—review and editing, BB; visualization, SCN and BB; supervision, SCN and BB; project administration, SCN. All authors have read and agreed to the published version of the manuscript.

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Ethics approval and consent to participate

The research was approved by the Internal Review Board for Research in KIIT Deemed to be University, number of approval: KIIT-DU/KSFH/2023/454 (C).

Conflict of interest

The authors declare no conflict of interest.

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