

## Tecnologías de la Información y Comunicación como Catalizadoras del Desarrollo Emprendedor y el Liderazgo Femenino en Contextos Sociales Vulnerables en Ecuador

### Information and Communication Technologies as Catalysts for Business Development and Female Leadership in Social Sectors in Ecuador

### Tecnologias da informação e comunicação como catalisadoras do desenvolvimento empresarial e da liderança feminina nos setores sociais no Equador

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## Resumen

socioeconómico de las mujeres. Sin embargo, existe evidencia empírica limitada sobre cómo la adopción de TIC fortalece simultáneamente las competencias emprendedoras y las capacidades de liderazgo en contextos vulnerables de países en desarrollo como Ecuador. Este estudio analiza la contribución del uso de TIC al desarrollo de habilidades emprendedoras y liderazgo en mujeres emprendedoras de comunidades socialmente vulnerables de la provincia de Los Ríos. La investigación se realizó en zonas urbanas y rurales caracterizadas por limitada infraestructura digital, alta vulnerabilidad socioeconómica y predominio de negocios informales liderados por mujeres que enfrentan barreras de acceso a mercados, financiamiento y recursos tecnológicos. Se empleó un enfoque mixto de tipo explicativo–descriptivo. Los datos cuantitativos se obtuvieron mediante una encuesta aplicada a 300 mujeres emprendedoras, complementada con entrevistas semiestructuradas a emprendedoras digitalmente activas, especialistas en TIC y actores del desarrollo local. Los resultados muestran que las TIC actúan como habilitadores multidimensionales que fortalecen el marketing digital, mejoran la gestión financiera y aumentan la autonomía en la toma de decisiones. Además, contribuyen al empoderamiento psicológico, reflejado en mayor autoconfianza y participación en entornos digitales. No obstante, estos beneficios están condicionados por barreras estructurales y socioculturales, como los costos de conectividad, las limitadas habilidades digitales y el temor a la exposición en línea. El estudio resalta la importancia de políticas de inclusión digital, expansión de infraestructura y programas de capacitación para impulsar el emprendimiento digital y el liderazgo femenino.

**Palabras clave:** empoderamiento digital; emprendimiento femenino; capital social digital; adopción de tic; inclusión digital; vulnerabilidad socioeconómica; economías en desarrollo.

## Abstract

Information and Communication Technologies (ICTs) have become important drivers of inclusive entrepreneurship and tools for advancing women's socioeconomic empowerment. Nevertheless, limited empirical evidence exists on how ICT adoption simultaneously strengthens entrepreneurial competencies and leadership capacities in vulnerable contexts of developing countries such as Ecuador. This study examines the contribution of ICT use to the development of entrepreneurial skills and leadership among women entrepreneurs in socially vulnerable communities in Los Ríos Province. The research was conducted in urban and rural areas characterized by limited digital infrastructure, high socioeconomic vulnerability, and a predominance of informal female-led businesses facing barriers to markets, financing, and technological resources. An explanatory–descriptive mixed-methods approach was applied. Quantitative data were obtained through a survey of 300 women entrepreneurs, complemented by semi-structured interviews with digitally active entrepreneurs, ICT specialists, and local development stakeholders. The findings indicate that ICTs function as multidimensional enablers that strengthen digital marketing practices, improve financial management, and enhance autonomy in business decision-making. ICT adoption also contributes to psychological empowerment, reflected in increased self-confidence and participation in digital environments. However, these benefits remain conditioned by structural and sociocultural barriers, including connectivity costs, limited digital skills, and concerns about online exposure. The study highlights the importance of inclusive digital policies, infrastructure development, and targeted training to support sustainable digital entrepreneurship and female leadership.

**Keywords:** digital empowerment; women entrepreneurship; digital social capital; ict adoption; digital inclusion; socio-economic vulnerability; developing economies.

## Resumo

As Tecnologias da Informação e Comunicação (TIC) tornaram-se importantes motores do empreendedorismo inclusivo e ferramentas fundamentais para o empoderamento socioeconómico das mulheres. No entanto, há pouca evidência empírica sobre como a adoção das TIC fortalece simultaneamente as competências empreendedoras e as capacidades de liderança em contextos vulneráveis de países em desenvolvimento como o Equador. Este estudo analisa a contribuição do uso das TIC para o desenvolvimento de competências empreendedoras e de liderança em mulheres empreendedoras de comunidades socialmente vulneráveis da província de Los Ríos. A investigação foi realizada em zonas urbanas e rurais caracterizadas por infraestruturas digitais limitadas, elevada vulnerabilidade socioeconómica e predominância de negócios informais liderados por mulheres que enfrentam barreiras de acesso a mercados, financiamento e recursos tecnológicos. Foi utilizada uma abordagem mista de tipo explicativo-descritivo. Os dados quantitativos foram obtidos por meio de uma pesquisa aplicada a 300 mulheres empreendedoras, complementada com entrevistas semiestruturadas a empreendedoras digitalmente ativas, especialistas em TIC e atores do desenvolvimento local. Os resultados mostram que as TIC atuam como facilitadores multidimensionais que fortalecem o marketing digital, melhoram a gestão financeira e aumentam a autonomia na tomada de decisões. Além disso, contribuem para o empoderamento psicológico, refletido em maior autoconfiança e participação em ambientes digitais. No entanto, esses benefícios são condicionados por barreiras estruturais e socioculturais, como os custos de conectividade, as habilidades digitais limitadas e o medo da exposição online. O estudo destaca a importância das políticas de inclusão digital, expansão da infraestrutura e programas de capacitação para impulsionar o empreendedorismo digital e a liderança feminina.

**Palavras-chave:** capacitação digital; empreendedorismo feminino; capital social digital; adoção das TIC; inclusão digital; vulnerabilidade socioeconómica; economias em desenvolvimento.

## Introduction

Information and Communication Technologies (ICTs) have reshaped entrepreneurial ecosystems by lowering barriers to market entry, expanding access to information, and enabling new forms of economic and social interaction. These transformations are particularly significant for women entrepreneurs in developing and emerging economies, where structural inequalities, limited financial access, and mobility restrictions continue to constrain business opportunities (Nafees et al., 2025). Within this context, ICTs are frequently framed as instruments capable of promoting economic inclusion, autonomy, and leadership among women entrepreneurs (Singh, 2024). However, growing evidence suggests that technological access alone is insufficient to generate meaningful empowerment.

Recent scholarship emphasizes that the developmental impact of ICT adoption depends on how digital technologies interact with existing social, institutional, and cultural structures. Consequently, digital inclusion must be understood not merely as technological connectivity but as a multidimensional process involving capabilities, agency, and access to networks of opportunity. This perspective has become increasingly relevant as digital transformation occupies a central place in global policy agendas related to sustainable economic development and gender equality (Mpofu, 2023).

In Ecuador, women entrepreneurs play a fundamental role in sustaining household economies and supporting local production systems, particularly in rural and semi-urban areas where informal economic activity is prevalent (Memanova et al., 2025). Despite their economic contribution, these entrepreneurs often operate in environments characterized by infrastructural limitations, institutional fragility, and restricted access to technological resources. The province of Los Ríos illustrates this intersection of gendered and territorial inequality, as its economy remains heavily dependent on agriculture while facing persistent poverty and limited technological infrastructure (Jaramillo Lizana, 2024).

Within such contexts, women operating micro and small enterprises frequently experience layered forms of exclusion. They remain marginal to formal economic systems while simultaneously encountering barriers to participation in digital markets and online business ecosystems (Rani et al., 2022). Nonetheless, recent initiatives promoted by governments, development organizations, and community actors have begun to position ICT adoption as a pathway for entrepreneurial development and social inclusion (Nkonoki, 2025). These initiatives increasingly focus not only on digital literacy but also on the strategic use of digital tools to strengthen business management, expand market reach, and enhance leadership capacities (Lauring et al., 2025).

Against this backdrop, the present study forms part of a broader research agenda examining digital inclusion and women's empowerment in Ecuador. While earlier research phases explored patterns of ICT access and usage, the current study advances the discussion by investigating how the strategic use of ICTs contributes to the development of entrepreneurial competencies and leadership capacities among women entrepreneurs operating in vulnerable contexts.

This perspective responds to a persistent gap in the literature. Much of the existing research on ICT adoption in entrepreneurship remains focused on descriptive indicators such as access, connectivity, or frequency of use. Such approaches provide valuable insights but often overlook the ways in which digital technologies reshape agency, confidence, and leadership within marginalized groups. This limitation is particularly evident in studies conducted in the Global South, where entrepreneurship is strongly shaped by socio-cultural norms, informal economic structures, and institutional constraints.

The present study therefore adopts a broader analytical perspective by examining ICT adoption as an empowerment process rather than a purely technological outcome. In doing so, it connects digital capabilities with entrepreneurial agency, self-efficacy, and leadership development. This approach contributes to ongoing debates on digital entrepreneurship, women's empowerment, and social capital by demonstrating how technology-mediated learning, networking, and interaction can influence both business performance and leadership trajectories in marginalized communities.

The study also provides relevant practical contributions. Understanding how women entrepreneurs engage with ICTs can help policymakers, development agencies, and program designers develop more effective digital inclusion strategies. Rather than focusing exclusively on technological access, these initiatives must consider how infrastructure, training,

institutional support, and socio-cultural conditions shape the capacity of women to transform digital tools into sustainable entrepreneurial opportunities.

Methodologically, the research advances existing literature through an integrated mixed-methods design that combines quantitative evidence on ICT use and entrepreneurial outcomes with qualitative insights derived from the experiences of women entrepreneurs and key ecosystem actors. This approach allows for a more comprehensive understanding of empowerment as a dynamic process shaped by digital practices, social capital formation, and contextual constraints.

Ultimately, the study contributes new empirical evidence from rural and semi-urban areas of Ecuador—contexts that remain significantly underrepresented in international research on digital entrepreneurship. By linking ICT adoption to behavioural change, confidence building, and the emergence of leadership among women entrepreneurs, the research extends existing theoretical perspectives on digital inclusion in emerging economies.

The study is guided by the following research questions:

- What role does the use of ICTs play in the development of entrepreneurial capacities among women entrepreneurs in vulnerable social contexts?
- How does ICT adoption contribute to the development of leadership abilities and self-efficacy among these entrepreneurs?
- Which socio-cultural, institutional, and economic factors mediate the relationship between ICT use and entrepreneurial empowerment in rural and semi-urban settings?

## Literature Review

### Women's Entrepreneurship in Vulnerable and Social Economy Contexts

Women's entrepreneurship plays a crucial role in promoting economic survival and social inclusion in developing and emerging economies, particularly within informal and vulnerable sectors (Shet et al., 2024). In Latin America, women-led enterprises are frequently

embedded within the social economy, where entrepreneurial activity is shaped not only by profit motives but also by household sustainability, community resilience, and social value creation (Ramos Farroñán et al., 2024; Sharma, 2024). Despite these contributions, women entrepreneurs continue to face structural constraints including limited access to finance, informality, restricted mobility, and weak institutional support (Martins et al., 2024).

In Ecuador, these barriers intersect with territorial inequalities that affect rural and semi-rural regions more severely (Torres-Díaz et al., 2025). Provinces such as Los Ríos illustrate this dynamic, as local economies remain strongly dependent on agriculture while experiencing persistent poverty and limited infrastructure (Jaramillo Lizana, 2024). Within this context, women entrepreneurs typically operate small-scale or informal businesses with restricted access to markets and capital (Rueda Torres, 2025). Research suggests that this intersection between gender inequality and spatial marginalization significantly limits business growth and reinforces economic vulnerability (Osunmuyiwa & Ahlborg, 2022). Understanding how women entrepreneurs can overcome these constraints therefore remains a central concern for both scholars and policymakers.

### **ICTs and Digital Entrepreneurship: Beyond Access**

ICTs are increasingly recognized as tools capable of lowering barriers to entrepreneurship and facilitating participation in broader markets (Ameen et al., 2023). Early research on digital entrepreneurship primarily focused on infrastructure and technological access, assuming that internet connectivity and device availability would naturally lead to economic participation (Seuwou, 2025). However, this perspective has been widely questioned in recent scholarship.

Contemporary studies emphasize that digital inequality extends beyond access and includes disparities in skills, usage patterns, and outcomes derived from technology use. These

differences are conceptualized as second- and third-level digital divides, which highlight variations in digital capabilities and the benefits obtained from ICT adoption (GBADEBO, 2025). Such divides are particularly relevant for women entrepreneurs in vulnerable contexts. Although access to social media and communication platforms has expanded, the ability to strategically use ICTs for marketing, financial management, and business growth remains uneven (Khanom, 2023). Consequently, research increasingly focuses on how digital technologies are used rather than simply whether they are available.

### **ICTs, Entrepreneurial Skills, and Human Capital Development**

From a human capital perspective, ICTs can enhance entrepreneurial performance by facilitating knowledge acquisition, improving managerial capabilities, and expanding learning opportunities. Digital platforms enable women entrepreneurs to access tutorials, training resources, and peer communities that support both formal and informal learning processes (Bangun et al., 2022). Empirical studies show that ICT use can strengthen digital marketing practices, customer relationship management, and financial record-keeping, particularly among microentrepreneurs with limited formal education.

Nevertheless, the relationship between ICT use and skill development is not automatic (Weber & Greiff, 2023). The capacity to transform digital technologies into productive resources depends on contextual factors such as education, time availability, and institutional support (Ateş et al., 2025). In rural environments, these challenges are often intensified by gendered responsibilities related to unpaid care work, which restrict the time available for digital learning and business development. As a result, the benefits of ICT adoption vary significantly across social and geographic contexts.

### **Self-Efficacy, Digital Confidence, and Entrepreneurial Behaviour**

Self-efficacy theory provides an important lens for understanding how ICT adoption influences entrepreneurial behaviour (Arifin et al., 2023). According to Bandura (1997),

individuals' beliefs about their abilities shape motivation, persistence, and their willingness to engage in challenging activities (Calicchio, 2023). Within women's entrepreneurship, digital self-efficacy has emerged as a critical determinant of technology adoption and innovative business practices (Abdelwahed et al., 2025).

Research indicates that repeated successful interactions with digital tools generate mastery experiences that strengthen confidence and reduce technological anxiety (Nilufar, 2024). Higher levels of digital self-efficacy have been linked to greater autonomy in decision-making, stronger entrepreneurial intentions, and increased risk tolerance (Al-Ayed & Alateeg, 2025). However, in rural and conservative contexts, digital confidence may remain constrained by socio-cultural expectations and concerns about online exposure or harassment (Fatima, 2024). These dynamics suggest that psychological empowerment constitutes a crucial yet often overlooked dimension of digital inclusion.

### **Social Capital, Digital Networks, and Leadership Emergence**

Social capital theory further enriches the analysis by emphasizing the value derived from participation in networks and social relationships (Li et al., 2024). Granovetter's (1973) concept of weak ties illustrates how broader networks provide access to new information, opportunities, and resources (Aral & Dhillon, 2023). ICTs significantly expand these possibilities by enabling women entrepreneurs to connect with customers, suppliers, institutions, and other entrepreneurs beyond their immediate geographic environments.

Recent research shows that digital social capital contributes not only to improved economic performance but also to leadership development and social recognition (Borah et al., 2022). Through online interaction and visibility, women entrepreneurs can build credibility, exchange knowledge, and assume informal leadership roles within their communities (Warioba & Babune, 2025). These forms of leadership often reflect collaborative and community-oriented approaches typical of the social economy (Kohman, 2022). However, unequal access

to connectivity and digital skills may limit participation in digital networks, reinforcing existing inequalities (Helsper, 2021). Therefore, the leadership potential of ICTs depends on both technological access and relational capacities.

### **Research Gaps and Conceptual Contribution**

Despite the growing body of literature on ICT-enabled entrepreneurship, several gaps remain. Empirical research focusing on rural and semi-rural contexts in the Global South is still limited, as most studies concentrate on urban or technologically advanced environments. In addition, many studies conceptualize empowerment as a static outcome rather than a dynamic process and provide limited explanation of how ICT use shapes entrepreneurial skills, self-efficacy, and leadership.

This study addresses these limitations by integrating self-efficacy theory and social capital theory within a mixed-methods framework. The research examines how ICT use contributes to the development of entrepreneurial capabilities and leadership among women entrepreneurs operating in vulnerable contexts in Ecuador. By moving beyond access-centered approaches, the study advances a more comprehensive understanding of digital empowerment and provides context-sensitive evidence that contributes to both theoretical debates and policy discussions.

## **Methodology**

### **Research Design**

This study adopted a mixed-methods explanatory–descriptive design based on the sequential explanatory approach proposed by Creswell and Plano Clark (2018). Mixed-methods research integrates quantitative and qualitative techniques to provide a more comprehensive understanding of complex social phenomena. In this design, quantitative

analysis is conducted first to identify patterns and relationships, while qualitative inquiry is used to explain and interpret the underlying processes.

This approach is particularly appropriate for examining digital empowerment among women entrepreneurs because the phenomenon involves technological, social, and psychological dimensions. The study represents the second phase of a broader research project on digital inclusion and women's entrepreneurship in Ecuador. While the first phase focused on ICT access and usage patterns, the present phase explores how ICT use contributes to the development of entrepreneurial skills, self-efficacy, and leadership among women in vulnerable contexts.

### **Quantitative Phase: Secondary Data Analysis**

The quantitative phase consisted of the reanalysis of a dataset collected during the first stage of the project. The data include responses from 300 women entrepreneurs operating in socially and economically vulnerable sectors in the cantons of Quevedo, El Empalme, and Ventanas in Los Ríos Province. These territories were selected because of their high levels of informal economic activity, poverty, and gender-related digital inequalities.

Participants were selected through purposive non-probability sampling and included women who owned or managed microenterprises and had some exposure to ICTs such as smartphones, messaging applications, or social media platforms. The survey examined the frequency and types of ICT use, business skill development, and perceptions of autonomy in decision-making. Descriptive statistics, including frequency distributions and cross-tabulations, were used to identify patterns of ICT adoption and perceived impacts, which also informed the development of the qualitative phase of the study.

The table with the summary of the quantitative data and the main variables is presented below:

#### **Table 1**

*Summary of Quantitative Variables: Measurement, Description, Scale, and Source*

Variable	Measurement	Description	Scale / Type	Source
ICT Usage	Frequency & Type	Use of social media, messaging apps, and digital payments	Ordinal / Categorical	Survey
Entrepreneurial Skills	Marketing, Customer Mgmt., Finance	Perceived improvement due to ICT	Likert scale 1–5	Survey
Self-Efficacy	Decision-making confidence	Confidence in managing business tasks	Likert scale 1–5	Survey
Leadership	Community engagement visibility	Perceived leadership within the community	Likert scale 1–5	Survey

Note: (Authors, 2026).

### Qualitative Phase: Semi-Structured Interviews

The qualitative phase was conducted to contextualize the quantitative findings and explore how ICT use contributes to entrepreneurial learning and leadership development. Semi-structured interviews were carried out with four key actors from the local entrepreneurial ecosystem: two women entrepreneurs with high levels of digital engagement, a local digital influencer who promotes social media use and digital literacy among women entrepreneurs, an ICT specialist from the State Technical University of Quevedo, and a government representative involved in public support programs. Participants were selected through purposive sampling to ensure information-rich perspectives related to ICT adoption, leadership, and institutional support. Interviews lasted between 60 and 90 minutes and followed a flexible protocol that explored experiences with digital learning, the role of ICTs in business practices and leadership, barriers to adoption—including emotional, cultural, and structural factors—and perceptions of existing policies and support mechanisms.

To be clear, a table describing the participants of the interviews and the positions they hold is presented below:

**Table 2**  
*Participant Profiles: Categories, Roles, Expertise, and Relevance to the Study*

Participant	Category	Role / Expertise	Relevance to Study
P1	Woman entrepreneur	Microenterprise owner	High digital engagement and community visibility
P2	Woman entrepreneur	Microenterprise owner	Digital adopter, experience in informal networks
P3	Digital influencer	Social media coach	Promotes women’s entrepreneurship online

P4	ICT specialist	University faculty	Technical and educational support for ICT literacy
P5	MIES representative	Policy officer	Institutional perspective on support programs

*Note:* (Authors, 2026).

### Data Analysis Procedures

Qualitative data were analysed using thematic analysis following the six-step approach proposed by Braun and Clarke (2006). The process included data familiarisation, open coding to identify relevant concepts related to empowerment, entrepreneurial skills, and leadership, and axial coding to group these codes into broader analytical categories aligned with the study's conceptual framework. The resulting themes were reviewed and refined to ensure coherence and analytical relevance.

To strengthen analytical rigour, the study compared perspectives from different participants, including entrepreneurs, digital influencers, ICT specialists, and policy representatives. Qualitative findings were triangulated with quantitative trends related to ICT use and skill development, while contradictions and divergent views were also considered to identify contextual factors influencing empowerment outcomes.

### Ethical Considerations and Research Quality

The study followed internationally accepted ethical standards for social research. Participants provided informed consent, anonymity was guaranteed, and they were free to withdraw from the study at any time. Several strategies were applied to enhance research quality, including methodological triangulation combining quantitative and qualitative data.

The analysis was guided by the theoretical frameworks of self-efficacy and social capital, while detailed documentation of sampling, data collection, and analytical procedures ensured transparency and credibility. Member checking was conducted during interviews to validate interpretations, and an audit trail was maintained to record coding decisions and theme development. Although the use of non-probabilistic sampling limits statistical generalization,

the findings provide analytical insights relevant to similar vulnerable and rural contexts in the Global South characterized by gender inequality and digital divides.

## Results

This section presents the empirical findings of the study, integrating results from the quantitative reanalysis of survey data and qualitative interviews. Consistent with the mixed-methods explanatory design, quantitative findings are presented first to establish overall patterns, followed by qualitative results that elaborate on the mechanisms and contextual factors underlying these patterns. The results are organised according to the analytical categories derived from the conceptual framework: ICT use and entrepreneurial skill development, perceived impact on leadership and self-confidence, structural and socio-emotional barriers, good practices and enabling conditions, and emerging trends in digital entrepreneurship.

### ICT Use and Strengthening of Entrepreneurial Skills

Quantitative analysis revealed that there is a significant perceived contribution to the utilisation of ICT to the development of core entrepreneurial skills in the women entrepreneurs. Over 70 percent of the surveyed registered positive changes in the digital marketing such as promotion of products, communication with customers and online visibility. In a similar vein, most of the interviewees noted that they experienced increased sophistication in their fundamental financial operations covering record-keeping, price discipline, and inventory management since they started using digital applications like WhatsApp Business, Instagram, and Facebook Marketplace. It was also established that participants that interacted more with digital tools more had a higher rate of skill development indicating that there is a positive relationship between frequency of use and perceived entrepreneurial competency.

### Table 3

*ICT Use and Perceived Skill Improvement (N=300)*

Skill Domain	Percentage Reporting Improvement	Most Used Tools / Platforms	Key Observations
Digital Marketing	72%	Instagram, Facebook Marketplace, WhatsApp Business	Increased online visibility and customer engagement
Financial Record-Keeping	68%	WhatsApp, Spreadsheets, Mobile Banking Apps	Improved pricing, record-keeping, and basic budgeting
Customer Communication	75%	WhatsApp, Messenger	Faster and more direct communication with clients
Inventory Management	63%	WhatsApp, Excel	Better tracking of stock and order fulfilment

*Note:* (Authors, 2026).

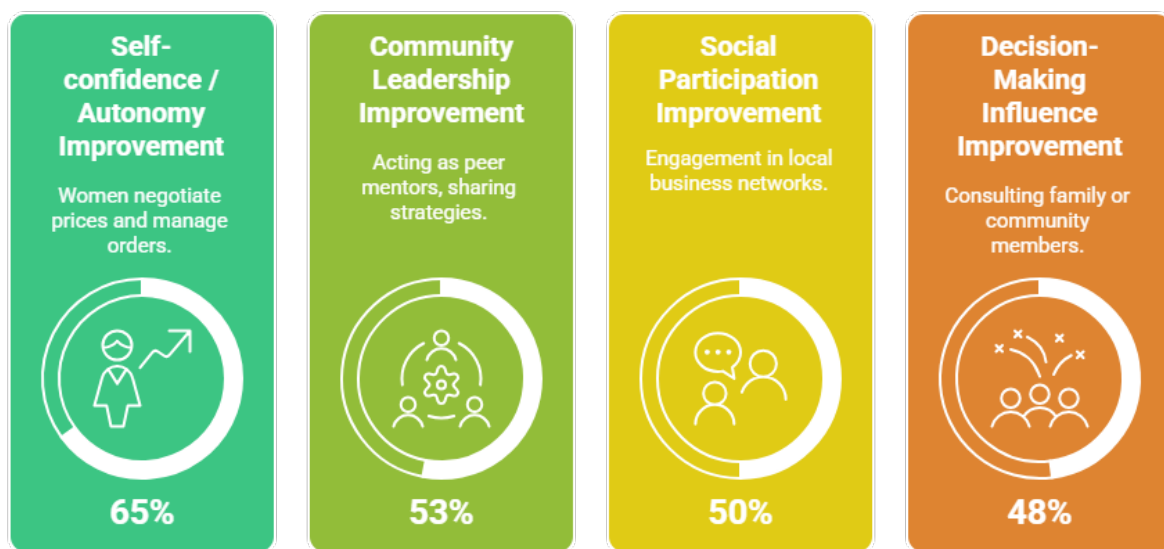
Qualitative interviews reinforced the findings by showing how women entrepreneurs developed practical skills through everyday ICT use. Participants highlighted that accessible and low-cost tools such as social media and messaging applications helped them increase sales, communicate with customers, and manage inventories even without formal training. Some entrepreneurs reported expanding from local markets to interprovincial orders through social media, while others used visual storytelling on platforms like Instagram to attract customers and strengthen their brand despite limited resources. Institutional actors confirmed these improvements, noting progress in digital marketing, product presentation, and basic financial management among participants. Overall, the results indicate that ICT use can strengthen the operational capacity of women-led microenterprises, particularly in contexts characterized by limited capital, low formal education, and scarce business training.

### **Perceived Impact on Leadership and Self-Confidence**

Results indicate that ICT adoption generated not only technical benefits but also psychosocial and relational changes among women entrepreneurs. Survey data showed that about 65% of participants reported increased self-confidence and greater autonomy in decision-making, while 53% perceived improvements in leadership and community participation. Although leadership outcomes were less pronounced than skill development, a positive trend was observed across all study locations.

Qualitative findings explained these patterns by showing how digital participation helped women overcome fears of public visibility, particularly when promoting their businesses online. Continuous interaction with digital platforms strengthened self-efficacy, enabling entrepreneurs to present their products, negotiate with clients, and assume more visible roles within their communities. Women with stronger digital presence often became informal leaders, sharing knowledge, advising peers, and connecting entrepreneurs with institutions. Institutional actors also identified the emergence of small leadership networks led by digitally active women, supporting the idea from social capital theory that digital networking can expand both economic opportunities and relational empowerment.

**Figure 1**  
*Perceived Impact on Leadership and Self-Confidence (N=300)*



**Self-confidence and autonomy show the highest improvement.**

*Note:* (Authors, 2026).

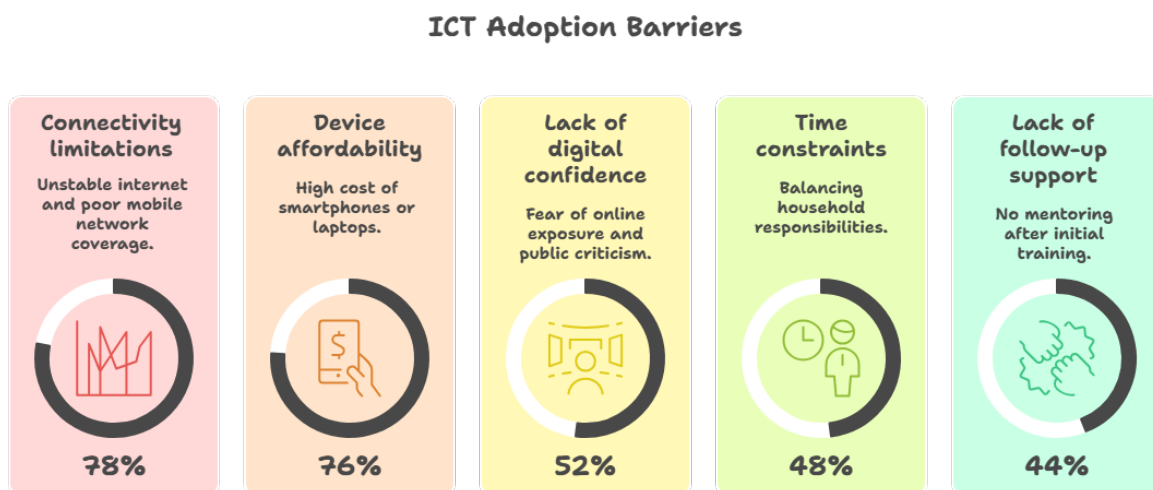
### Structural and Socio-Emotional Barriers to ICT Use

Despite the positive outcomes, the study identified significant structural and socio-emotional barriers that limit the sustained benefits of ICT use. Quantitative results showed that more than 75% of participants faced constraints related to internet connectivity, device

availability, and the cost of mobile data, particularly in rural and semi-rural areas where infrastructure is limited.

In addition, socio-emotional factors such as fear of public exposure, lack of confidence, and concerns about social judgment were reported by over half of the respondents. Interviews revealed that cultural expectations and gender norms often discouraged women from participating actively in digital spaces. Participants also highlighted the lack of continuous support mechanisms; although initial training helped them adopt ICT tools, limited mentoring and time constraints—often linked to caregiving responsibilities—restricted the long-term and strategic use of digital technologies for business growth.

**Figure 2**  
*Key Structural and Socio-Emotional Barriers to ICT Use*



Connectivity and device affordability are the most significant barriers to ICT adoption.

Note: (Authors, 2026).

### Good Practices and Enabling Conditions

La revisión identificó diversas prácticas y factores contextuales que favorecen un uso más efectivo de las TIC. Las personas entrevistadas señalaron la necesidad constante de capacitaciones modulares y adaptadas al contexto, que combinen formación técnica con apoyo emocional. También destacaron la importancia del aprendizaje entre pares y de las redes colaborativas, ya que brindan orientación práctica y refuerzan la confianza de las

emprendedoras. Herramientas digitales como WhatsApp, Instagram y Canva fueron consideradas fundamentales por ser gratuitas, fáciles de usar y permitir una comunicación constante con clientes y comunidades.

Además, se observó que la creación de contenido auténtico, en lugar de un marketing digital excesivamente profesionalizado, resulta más eficiente y culturalmente apropiada para generar confianza y fortalecer la relación con clientes locales. Los actores institucionales resaltaron que los programas flexibles, que toman en cuenta las responsabilidades de cuidado y las limitaciones de tiempo de las mujeres, son clave para sostener la adopción de las TIC y fortalecer la autoeficacia digital. Estas condiciones facilitan que las emprendedoras integren la tecnología en sus actividades económicas de manera sostenible.

### **Emerging Trends in Digital Entrepreneurship**

Las personas participantes anticipan un mayor uso de herramientas digitales avanzadas, como aplicaciones basadas en inteligencia artificial para marketing, análisis de ventas y gestión de clientes. Aunque estas tecnologías ofrecen oportunidades importantes para mejorar la productividad y ampliar el alcance de mercado, también generan preocupaciones relacionadas con el acceso, los costos y la sostenibilidad. Por ello, muchas entrevistadas sugieren una implementación gradual y ética, donde la tecnología complemente el negocio sin desplazar los valores comunitarios ni la calidad de los productos.

Asimismo, varias emprendedoras expresaron interés en formalizar sus actividades digitales mediante plataformas de comercio electrónico y sistemas de pago móvil. Sin embargo, indicaron que necesitan acompañamiento institucional, mentoría y apoyo técnico para superar barreras financieras, tecnológicas y regulatorias. Desde la perspectiva institucional, se considera que los programas de empoderamiento digital deben enfocarse en el desarrollo de habilidades a largo plazo, la creación de redes y el fortalecimiento del liderazgo, más allá de simples indicadores de acceso o uso tecnológico.

## Integration of Quantitative and Qualitative Findings

El análisis integrado confirma que el uso de las TIC por parte de las mujeres emprendedoras en Los Ríos tiene efectos multidimensionales. Los datos cuantitativos muestran tendencias relacionadas con el desarrollo de habilidades, el aumento de la autoconfianza y el fortalecimiento del liderazgo. Por su parte, las entrevistas cualitativas permiten comprender cómo el uso cotidiano de herramientas digitales contribuye a estos resultados. Las TIC facilitan actividades clave como el marketing, la gestión financiera y la relación con clientes, lo que fortalece las capacidades empresariales.

No obstante, el proceso de empoderamiento digital también está influido por factores estructurales y socioemocionales. Problemas como la baja conectividad, el costo de los dispositivos, el temor a la exposición en línea o la falta de tiempo pueden limitar el avance de las emprendedoras. Los programas que se adaptan al contexto doméstico, promueven el aprendizaje entre pares y utilizan herramientas accesibles han demostrado ser especialmente efectivos para fomentar la adopción tecnológica. En conjunto, los hallazgos confirman que el empoderamiento digital es un proceso continuo que involucra dimensiones individuales, sociales e institucionales.

**Table 4**

*Integration of Quantitative and Qualitative Findings on ICT Adoption and Digital Empowerment*

Mechanism / Dimension	Evidence from Quantitative Data	Evidence from Qualitative Data	Implications / Notes
Strengthening Entrepreneurial Skills	A high percentage of women reported improvements in digital marketing, finance, and customer management.	Participants described using WhatsApp, Instagram, and Facebook Marketplace to manage sales, communicate with customers, and organise inventories.	ICTs provide practical tools that enhance operational and business skills.
Enhancement of Self-Efficacy	65% reported increased confidence and autonomy	Women overcame fear of public exposure, gained confidence in negotiations, and made independent business decisions.	Repeated engagement with digital tools reinforces psychological empowerment.
Leadership Emergence	53% reported improvements in community leadership	Digitally active women acted as mentors, shared knowledge, and became local reference points	Digital social capital facilitates relational and informal leadership
Structural Constraints	Connectivity limitations (78%) and device affordability (76%)	Interviews highlighted unstable internet, high data costs, and limited access to devices	Infrastructure and affordability are key

Socio-Emotional Barriers	52% reported fear of exposure and limited confidence	Cultural norms and social judgment affected willingness to engage online	moderating factors for empowerment outcomes Psychological and socio-cultural factors must be addressed alongside technical training
Enabling Conditions	Peer learning, context-adapted training, and low-cost tools	Women emphasised modular, culturally relevant training and supportive networks	Tailored, user-friendly interventions enhance sustainability and effectiveness

Note: (Authors, 2026).

## Discussion

This study examined how Information and Communication Technologies (ICTs) contribute to the development of entrepreneurial skills, self-efficacy, and leadership among women entrepreneurs in vulnerable contexts in Ecuador. The findings indicate that digital empowerment is neither automatic nor uniform; rather, it is a gradual and context-dependent process shaped by individual engagement, social networks, and institutional resources (Sharma et al., 2022). Overall, ICT use was associated with improvements in key entrepreneurial competencies such as digital marketing, customer management, basic financial practices, and independent decision-making (Drydakis, 2022).

From the perspective of self-efficacy theory, these outcomes emerge through repeated mastery experiences obtained while interacting with digital platforms. As participants observe tangible results—such as increased sales, wider market reach, and improved business organization—their confidence and sense of capability grow. Consequently, ICT adoption strengthens not only technical capacities but also psychological empowerment and entrepreneurial agency (Almohtaseb et al., 2023; Omar & Ismail, 2021).

Beyond individual changes, the results highlight the importance of digital networks in building social capital and expanding economic opportunities. Through social media and messaging platforms, women entrepreneurs were able to connect with customers, peers, and institutional actors beyond their immediate communities (Son & Niehm, 2021). These

connections, often described as weak ties, facilitate access to new information, commercial opportunities, and practical advice that would otherwise be unavailable in geographically constrained environments (Davis, 2023). Continuous participation in these digital spaces also contributed to the emergence of informal leadership roles, where more digitally active women became local references who guide and support others (Potluka, 2021; Frade & Vairinhos, 2023).

Such relational leadership strengthens legitimacy, social recognition, and collective influence within communities (Sienkiewicz-Małyjurek, 2022; Stead et al., 2021). These findings align with research suggesting that women's leadership in entrepreneurial and community contexts often emerges through collaboration, shared knowledge, and social influence rather than formal authority (Dixit et al., 2023).

Despite these positive outcomes, the study also shows that the empowering potential of ICTs remains conditional on structural and socio-emotional barriers. Connectivity limitations, high device costs, and gaps in advanced digital literacy restrict the strategic use of technology, particularly in rural and semi-rural settings (Aryeh-Adjei et al., 2025). In addition, psychological and cultural barriers—such as fear of public exposure, lack of confidence, and concerns about social judgment—can discourage women from participating actively in digital environments (Setchell et al., 2021).

In many cases these factors emerge even before technical constraints, suggesting that policies focused solely on infrastructure or technical training are insufficient. The findings therefore emphasize the importance of institutional mediation, mentorship, and supportive entrepreneurial ecosystems capable of integrating technical, social, and emotional support (Emma, 2024; Higgins et al., 2023; Zaman et al., 2021). Overall, digital empowerment appears as a dynamic process produced through the interaction between personal capabilities, social

networks, and institutional environments (Sitaridis & Kitsios, 2024; Sreejith & Sreejith, 2023; Mattucci & Nasser, 2024; Morte-Nadal & Esteban-Navarro, 2025).

### **Future Research and Policy Recommendations**

Although this study provides relevant evidence on the role of ICTs in empowering women entrepreneurs, several avenues remain open for future research. Longitudinal studies are particularly necessary to evaluate whether ICT-driven empowerment can be sustained over time and whether improvements in skills, confidence, and leadership translate into long-term business growth and socioeconomic mobility. Comparative research across regions, countries, and sociocultural contexts could also clarify how institutional environments and cultural norms influence women's digital entrepreneurship trajectories. In addition, intersectional approaches examining age, education, ethnicity, rurality, and caregiving responsibilities would help identify inequalities within groups of women entrepreneurs that are often overlooked in aggregate analyses. The rapid expansion of emerging technologies such as artificial intelligence, automation, and data-driven tools also raises important questions about accessibility, ethical implementation, and the potential creation of new digital divides.

From a policy perspective, the findings suggest that initiatives promoting digital entrepreneurship should adopt an ecosystem-based approach rather than isolated interventions. Effective strategies must combine connectivity infrastructure, affordable devices, continuous training, mentorship, and peer learning networks to sustain engagement (Prabavathy et al.). Digital training programs should also incorporate socio-emotional components aimed at strengthening confidence, communication skills, and public participation alongside technical instruction in digital marketing and financial literacy.

Program designs need to be flexible and sensitive to women's realities, particularly caregiving responsibilities, time constraints, and financial limitations. Strong collaboration among government institutions, universities, civil society organizations, and the private sector

is essential to increase institutional legitimacy, mobilize resources, and scale successful initiatives (Higgins et al., 2023). Through these integrated strategies, ICTs can become effective tools for fostering inclusive entrepreneurship, strengthening women's leadership, and promoting sustainable digital empowerment in vulnerable communities.

## Conclusion

This study examined the role of Information and Communication Technologies (ICTs) in strengthening entrepreneurial skills, self-efficacy, and leadership among women entrepreneurs in vulnerable contexts in Ecuador. Using a mixed-methods approach, the findings demonstrate that ICTs can function as important drivers of both economic and psychosocial empowerment. However, these outcomes do not emerge from technology alone; rather, they develop through continuous engagement with digital tools, supportive social networks, and enabling institutional environments that provide training, mentorship, and resources.

At the individual level, ICT adoption improved key entrepreneurial capabilities such as digital marketing, customer communication, basic financial management, and inventory organization. These improvements were closely associated with greater confidence, autonomy in decision-making, and increased entrepreneurial agency. At the relational level, digital technologies facilitated the development of digital social capital, allowing women to expand professional networks, reach broader markets, and assume informal leadership roles within their communities.

Despite these benefits, the results also reveal important structural and socio-emotional barriers that condition digital empowerment. Limited connectivity, high costs of devices, and gaps in advanced digital skills restrict the sustained use of ICTs, particularly in rural areas. In addition, psychological factors such as fear of public exposure and lack of confidence reduce

active participation in digital environments. The study therefore suggests that access-focused interventions or short-term training initiatives are insufficient to produce meaningful empowerment unless they are complemented by social, psychological, and institutional support. Theoretically, the research contributes by integrating self-efficacy and social capital perspectives to explain ICT-based empowerment processes. Practically, it highlights the need for ecosystem-based strategies that combine infrastructure, continuous capacity building, mentoring, and inclusive policies. Under supportive conditions, ICTs can become strategic tools for promoting inclusive entrepreneurship, strengthening women's leadership, and advancing gender equality in vulnerable settings.

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