2026 | Mizania: Jurnal Ekonomi dan Akuntansi 6 (1): 199-216
2808-4322(Print)/ 2808-6821(Online)
DOI: 10.47776/mizania.v6i1.1994

Gender Gaps in Digital Enterprise: The Role of Care Burden and Human Capital in Indonesia

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Received	*Revised*	*Accepted*	*Published*
20 February 2026	*7 March 2026*	*16 March 2026*	*31 March 2026*

Abstrak
Penelitian ini bertujuan untuk menganalisis kesenjangan gender dalam partisipasi usaha digital di Indonesia, dengan menekankan peran beban pengasuhan dan modal manusia. Meskipun digitalisasi sering dipandang sebagai kekuatan yang mampu menciptakan kesetaraan dalam kewirausahaan, bukti empiris mengenai bagaimana gender dan keterbatasan rumah tangga membentuk keterlibatan dalam usaha digital masih terbatas. Menggunakan data mikro Survei Sosial Ekonomi Nasional (SUSENAS) 2024, usaha digital didefinisikan sebagai keterlibatan dalam aktivitas usaha yang didukung oleh pemanfaatan teknologi digital. Model regresi logistik biner digunakan untuk mengestimasi probabilitas partisipasi usaha digital, yang kemudian dilanjutkan dengan analisis subkelompok rural–urban untuk menangkap heterogenitas spasial. Hasil penelitian menunjukkan adanya kesenjangan gender yang kuat, di mana perempuan secara signifikan memiliki probabilitas lebih rendah untuk berpartisipasi dalam usaha digital dibandingkan laki-laki setelah mengendalikan karakteristik rumah tangga dan demografis. Namun demikian, beban pengasuhan, yang diproksikan melalui keberadaan anak usia di bawah lima tahun, berasosiasi positif dengan partisipasi usaha digital, mengindikasikan bahwa usaha digital dapat menjadi strategi kerja yang lebih fleksibel di tengah tuntutan pengasuhan. Modal manusia dan akses digital berperan penting dalam mendorong partisipasi. Pendidikan meningkatkan peluang keterlibatan dalam usaha digital, khususnya di wilayah perkotaan, sementara kepemilikan handphone menjadi faktor pendorong terkuat di seluruh konteks wilayah. Estimasi desa–kota menunjukkan bahwa kesenjangan gender lebih tajam di wilayah perdesaan, mencerminkan interaksi antara norma gender dan ketimpangan spasial.
Kata Kunci: *kesenjangan gender, usaha digital, beban pengasuhan, modal manusia, heterogenitas desa-kota*

Abstract
This study aims to analyze gender disparities in digital enterprise participation in Indonesia, with particular emphasis on the roles of caregiving burdens and human capital. Although digitalization is often viewed as a force that can promote equality in entrepreneurship, empirical evidence on how gender and household constraints shape participation in digital enterprises remains limited. Using microdata from the 2024 National Socioeconomic Survey (SUSENAS), digital enterprise is defined as engagement in business activities supported by the use of digital technology. A binary logistic regression model is employed to estimate the probability of digital enterprise participation, followed by rural–urban subgroup analysis to capture

2808-4322(Print)/ 2808-6821(Online)
DOI: 10.47776/mizania.v6i1.1994

spatial heterogeneity. The results reveal a pronounced gender gap, with women significantly less likely to participate in digital enterprises than men after controlling for household and demographic characteristics. However, caregiving responsibilities, proxied by the presence of children under five years old, are positively associated with digital enterprise participation, suggesting that digital entrepreneurship may serve as a flexible work strategy under childcare constraints. Human capital and digital access also play important roles in shaping participation. Education increases the likelihood of digital enterprise engagement, particularly in urban areas, while handphone ownership emerges as the strongest predictor across all contexts. Rural–urban estimates further show that the gender gap is more pronounced in rural areas, reflecting the interaction between gender norms and spatial inequality.
Keywords: gender gaps, digital enterprise, care burden, human capital, rural–urban heterogeneity

Introduction

Digital transformation has reshaped the landscape of entrepreneurship across developing economies, expanding market access, lowering entry barriers, and enabling new forms of self-employment (Díaz-Arancibia et al., 2024; Jawad et al., 2021). In Indonesia, the rapid diffusion of mobile technology and digital platforms has created opportunities for micro and small enterprises to reach consumers beyond traditional local markets. Digital enterprise, defined as entrepreneurial activity supported by digital tools such as online platforms, mobile communication, and electronic transactions (Corvello et al., 2022; Sahut et al., 2021; Kraus et al., 2019), has therefore emerged as a potentially inclusive pathway for economic participation. However, the assumption that digitalization automatically reduces structural inequality, particularly gender inequality, remains contested. While digital technologies may lower certain barriers to entry, they may also reproduce or even amplify pre-existing gender gaps rooted in social norms, household responsibilities, and unequal access to resources (Mariscal et al., 2019).

A substantial body of evidence documents persistent gender gaps in entrepreneurship, with women consistently less likely than men to initiate and scale business ventures across diverse institutional settings. Large-scale cross-country analysis by Rietveld et al. (2022), covering more than 1.9 million individuals across 97 countries, demonstrates that while gender inequality significantly moderates the entrepreneurship gap, disparities remain pronounced in less gender-equal contexts. Financing constraints further reinforce these differences. Guzmán & Kacperczyk (2018) show that female-led ventures are 63 percentage points less likely to obtain venture capital funding, with disparities driven both by differences in startup orientation and by investor bias. Similarly, Meunier et al. (2017), analyzing 44 economies, report that women account for less than one-third of new limited liability company owners in most countries examined.

These empirical patterns are closely aligned with gender role theory, which posits that socially constructed norms allocate women primary responsibility for

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unpaid care and domestic work while associating men more strongly with market-oriented roles. Gender role shape time allocation, access to capital, opportunity costs, and risk preferences, thereby structuring entrepreneurial entry and growth. Consequently, even in contexts characterized by expanding digital opportunities, women's participation in digital enterprise cannot be understood solely through technological access. Rather, digital inclusion must be examined as a socio-institutional phenomenon embedded within household dynamics, gender norms, and structural economic constraints.

Care responsibilities represent one of the most critical yet underexplored dimensions shaping women's economic participation. Household production theory and time allocation models suggest that individuals allocate labor between market and non-market activities based on relative returns and domestic demands (Mariani & Rosati, 2023; Blau et al., 2020). For women, particularly those with young children, digital enterprise may serve as a flexible alternative to wage employment, allowing economic participation to be combined with caregiving obligations. At the same time, care burdens may constrain productivity, scalability, and thus, the capacity to sustain digital engagement (Folbre, 2024). Empirical evidence remains mixed, and limited research has systematically examined whether digital enterprise participation reflects empowerment, necessity-driven adaptation, or a hybrid of both, especially in large developing countries such as Indonesia.

Human capital and digital access further shape participation in digital entrepreneurship. Skill-biased technological change theory posits that technological adoption disproportionately benefits individuals with higher education and digital literacy (Handel, 2025). Access to digital devices and connectivity is therefore a foundational condition for participation. However, digital divide literature emphasizes that access alone is insufficient. Structural inequalities in gender and location substantially condition individuals' ability to benefit from digital readiness. Evidence from multiple contexts shows that women and rural populations face compounded barriers in access, autonomy, and digital skill acquisition. Mathrani et al. (2023) demonstrate that female students are systematically positioned lower on digital access scales and encounter structural and cultural constraints that limit effective digital engagement, with rural–urban disparities intensifying these constraints. Similarly, Spathopoulou et al. (2025) identify statistically significant gender differences in digital readiness dimensions, while Dodel et al. (2020) show that digital skills mediate the translation of structural inequalities into educational and labor market outcomes. Collectively, these findings suggest that digital readiness alone is insufficient without addressing underlying gendered and spatial inequalities.

Despite the expanding literature on digital entrepreneurship, several critical gaps remain. Many of the existing research concentrates on overall entrepreneurship or technology adoption, often overlooking explicit gender differentials in digital enterprise participation. At the same time, empirical models rarely incorporate care responsibilities and intra-household dynamics, even though these factors are central to understanding gendered labor allocation. Furthermore, spatial heterogeneity, particularly the rural–urban divide, is frequently underexamined, resulting in policy recommendations that

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inadequately address place-based inequalities. These limitations are especially salient in Indonesia, where female labor force participation remains moderate while digital transformation continues to accelerate across regions.

Addressing these limitations, this study contributes to the literature in several important ways. Unlike much of the existing research that focuses on general entrepreneurship or digital technology adoption, this study explicitly examines gender disparities in participation in digital enterprise. Next, it incorporates caregiving responsibilities and household structure into the empirical analysis, thereby integrating intra-household dynamics that are often overlooked in studies of digital entrepreneurship. Moreover, this study evaluates spatial heterogeneity by comparing rural and urban contexts, allowing the analysis to capture how geographic inequalities interact with gender norms in shaping digital participation. Utilizing nationally representative microdata from the 2024 Indonesian National Socioeconomic Survey (SUSENAS), the analysis evaluates whether gender disparities in digital enterprise participation persist once differences in caregiving responsibilities, household structure, and human capital are systematically accounted for.

By embedding gender role theory within a digital divide framework, this study advances a more comprehensive explanation of participation gaps that extends beyond simple access differentials. It provides robust national evidence on gendered patterns of digital enterprise in Indonesia while integrating care-related constraints and household dynamics into empirical models of digital entrepreneurship. In doing so, the study offers new insights into how structural conditions, household responsibilities, and technological access interact in shaping women's participation in the digital economy, thereby providing a stronger analytical basis for designing more inclusive digital development policies in emerging markets.

Method

This study employs a quantitative approach using a binary logistic regression (logit) model to examine the determinants of digital enterprise participation in Indonesia, with a particular focus on gender differences. The analysis is based on cross-sectional microdata from the 2024 National Socioeconomic Survey (SUSENAS), which provides nationally representative information on individual and household socioeconomic characteristics. The dependent variable captures digital enterprise participation, defined as engagement in business activities supported by digital means, coded as 1 if the respondent operates a digitally supported enterprise and 0 otherwise.

Given the dichotomous nature of the outcome variable, a binary logit specification is appropriate. The model estimates the probability of participating in digital enterprise as a function of gender, care responsibilities, household characteristics, and human capital factors. Key explanatory variables include gender (with male as the reference category), the presence of under-five children in the household as a proxy for care burden, household size, marital status, age and age squared to capture life-cycle effects, years of schooling as a measure of human capital, and handphone ownership as an indicator of digital readiness.

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Care responsibilities and household conditions are central to understanding digital enterprise participation because economic engagement is shaped not only by individual capability but also by time constraints, domestic obligations, and intra-household role expectations. The presence of young children may alter labor allocation decisions by increasing the demand for flexible work arrangements. Household size reflects both potential support networks and cumulative domestic burdens. Age captures experience and non-linear patterns of economic participation over the life cycle, while education represents skill endowment and managerial capacity. Handphone ownership reflects access to digital tools that reduce transaction costs and expand market reach. Marital status accounts for household role structures and risk-sharing dynamics that may influence labor supply decisions.

Detailed operational definitions of all variables are presented in Table 1, and the empirical specification of the logit model is expressed as follows:

$$logit(DigitalEnt_i) = ln\left(\frac{DigitalEnt}{1 - DigitalEnt_i}\right)$$
$$= \beta_0 + \beta_1 Gender_i + \beta_2 Under\_five_i + \beta_3 Marital_i + \beta_4 HH\_size_i$$
$$+ \beta_4 Age_i + \beta_5 Age2_i + \beta_6 Education_i + \beta_7 Handphone_i + \epsilon_i$$

Where $DigitalEnt_i$ denotes the probability that individual i participates in digital enterprise activities, coded as 1 if the respondent operates a digitally supported business and 0 otherwise. The parameter β_0 represents the intercept, β_k(k = 1, …, K) are the estimated coefficients associated with each explanatory variable, and ε_i captures unobserved factors influencing digital enterprise participation.

In addition to presenting the logit coefficient estimates, this study reports marginal effects to provide a more intuitive interpretation of the results. Coefficients in a logistic regression model indicate the direction and statistical significance of associations in terms of log-odds, but they do not directly reflect changes in probability. Marginal effects translate these log-odds estimates into the change in the predicted probability of participating in digital enterprise resulting from a one-unit increase in an explanatory variable, holding other variables constant. For continuous variables, the marginal effect of X_k in the logit framework can be formally expressed as:

$$\frac{\partial P_i}{\partial X_k} = \beta_k . P_i . (1 - P_i)$$

This formulation indicates how the predicted probability of digital enterprise participation responds to a one-unit increase in the explanatory variable X_k. For dichotomous (dummy) variables, the marginal effect represents the discrete change in predicted probability when the variable shifts from 0 to 1. In this analysis, marginal effects are presented as average marginal effects (AMEs), which provide an interpretable summary of probability changes across the sample and allow for clearer comparison of the relative influence of different covariates.

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Table 1. Research Variable

Variable group	Variable	Operational definition
Dependent variable	Digital enterprise	A dummy variable indicating whether the respondent uses the internet for selling goods or services in their business activity (1 = yes, 0 = no).
Independent	Gender	A dummy variable indicating the respondent's gender, coded as 1 if male and 0 if female, used to capture gender differences in digital enterprise participation.
Independent: Care burden	Under-five children in household (0–5)	A dummy variable indicating whether there is at least one child aged 0–5 in the household, reflecting childcare responsibilities (1 = yes, 0 = no).
	Marital status	A dummy variable indicating whether the respondent is married, capturing household partnership and risk-sharing mechanisms (1 = married, 0 = otherwise).
	Household size	Total number of household members residing in the same household, measured as a continuous variable (number of persons).
Independent: Human Capital	Age	Age of the respondent measured in completed years, capturing life-cycle effects (continuous).
	Age squared	Squared term of age to account for non-linear (inverted U-shaped) life-cycle patterns in digital enterprise participation (continuous).
	Education (years of schooling)	Total years of completed formal schooling, measured as a continuous variable (years), representing human capital investment.
	Handphone ownership	A dummy variable indicating whether the respondent owns or has access to a mobile phone, capturing basic digital readiness (1 = yes, 0 = no).
Heterogeneity	Rural vs urban residence	A residence-based subgroup specification where models are estimated separately for rural and urban respondents (rural-only vs urban-only), capturing heterogeneous constraints and opportunities across places of residence.

Source: SUSENAS 2024, modified

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Results and Discussions

This section presents the empirical findings on gender differences in digital enterprise participation and examines how care responsibilities and human capital shape these disparities. The discussion begins with descriptive statistics to outline structural differences between digital and non-digital entrepreneurs, highlighting patterns in gender composition, educational attainment, digital readiness, and spatial distribution. The analysis then turns to the logit estimation results and average marginal effects to evaluate whether these differences persist after controlling for individual and household characteristics. To capture spatial heterogeneity, separate estimations for rural and urban subsamples are also presented, allowing assessment of whether the determinants of digital enterprise participation vary across place-based contexts.

Descriptive Statistics

Table 2 presents the descriptive profile of individuals engaged in digital enterprise compared to those operating non-digital businesses. Several structural differences emerge across gender, human capital, digital readiness, and spatial distribution. First, digital enterprise participation is disproportionately male-dominated, although women still constitute a substantial share of digital entrepreneurs. This initial pattern signals the presence of gender disparities in digital commercialization, which motivates the gender-gap analysis in the subsequent regression models.

Care-related household conditions also appear relevant. Individuals in digital enterprises are more likely to live in households with young children compared to their non-digital counterparts. This pattern suggests that digital channels may offer flexibility that accommodates caregiving responsibilities. Marital status, however, shows only minimal variation between the two groups, indicating that marriage alone does not sharply differentiate digital from non-digital participation at the descriptive level.

Table 2. Descriptive Statistics

Variable	Digital Enterprise (N = 16,739)		Non Digital Enterprise (N = 208,808)	
	N	%	N	%
Gender				
Male	9,491	56.70	138,260	66.22
Female	7,248	43.30	70,548	33.78
Under-five children in the household				
Yes	4,714	28.16	44,899	21.51
No	12,025	71.84	163,909	78.49
Marital status				
Married	13,575	81.10	170,826	81.81
Otherwise	3,164	18.90	37,982	18.19
Education/ Year of				

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Schooling				
No schooling / Incomplete primary	412	2.46	34,377	16.46
Primary school	2,373	14.18	66,618	31.91
Junior secondary	3,354	20.04	41,256	19.76
Senior secondary	7,802	46.61	56,304	26.97
Diploma I / II	156	0.93	654	0.31
Diploma III	503	3.00	1,621	0.78
Diploma IV / Bachelor's Degree	2,066	12.34	7,706	3.69
Professional/ Master's Degree	67	0.40	260	0.12
Doctoral Degree	6	0.04	12	0.01
Handphone ownership				
Yes	16,549	98.87	147,594	70.69
No	190	1.13	61,214	29.31
Rural-urban				
Rural	6,188	36.97	141,737	67.89
Urban	10,551	63.03	67,071	32.11
Variables	**Mean**	**Std. Dev**	**Max**	**Min**
Household Size	3.88	1.60	1	22
Age	45.31	10.92	15	64

Source: SUSENAS 2024, modified

Table 2 also shows that human capital differences exist. Digital entrepreneurs are significantly more concentrated among individuals with senior secondary and tertiary education, while non-digital entrepreneurs are heavily represented among those with only primary schooling or incomplete basic education. This educational gradient suggests that digital enterprise participation is closely linked to formal human capital accumulation (Shao & Wang, 2025; Sun et al, 2023), likely reflecting the cognitive and technological skills required for online market engagement. The distribution across higher education categories further reinforces the notion that digital business models are more prevalent among the better educated.

Digital readiness emerges as one of the most defining characteristics. Nearly all digital entrepreneurs report owning a handphone, whereas a sizable share of non-digital entrepreneurs do not. This contrast underscores the centrality of mobile connectivity as a foundational requirement for development (Zimmermann et al., 2018). Without basic device access, entry into online commercialization appears structurally constrained.

Spatial differences are also pronounced. Digital enterprise activity is substantially more urban-centered, while non-digital enterprise is predominantly rural (Driss Hanafi & Kably, 2025). This suggests that digital infrastructure, market density, and urban ecosystem effects likely facilitate online business engagement. Finally, the average age and household size distributions indicate that digital

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entrepreneurs are typically middle-aged and embedded in moderately sized households, consistent with life-cycle and household-embedded entrepreneurship patterns.

Logit Estimation on Digital Enterprise Enablement

The full-sample logit estimate for digital enterprise participation is reported in Table 3. The model is jointly significant (LR χ^2 = 16,447.60; $p < 0.001$), indicating substantial explanatory power. The marginal effects provide interpretable probability estimates. Conditional on other covariates, females exhibit a 2.85 percentage-point lower probability of participating in digital enterprise relative to males, suggesting a persistent gender gap in digital commercialization. Handphone ownership displays the largest marginal effect, increasing the likelihood of digital enterprise participation by approximately 19 percentage points, highlighting the centrality of digital access as a structural precondition for online market engagement. The presence of under-five children and larger household size are both positively and significantly associated with digital participation. Marital status is also positively correlated with participation. Age exhibits a non-linear association. The negative coefficient on age combined with the positive coefficient on age squared indicates a U-shaped relationship, reflecting life-cycle heterogeneity in digital enterprise engagement. Although education is statistically significant, its marginal effect is economically small.

Table 3. Logit Estimation on Digital Enterprise (Full Model)

Variables	Coef.	Marginal Effect (dy/dx)
Gender (reference category: male)	-0.4462*** (0.0170)	-0.0285*** (0.0010)
Under-five children	0.1065*** (0.0213)	0.0068*** (0.0013)
Household size	0.1234*** (0.0241)	0.0078*** (0.0015)
Age	-0.0790*** (0.0063)	-0.0050*** (0.0004)
Age^2	0.0322*** (0.0059)	0.0020*** (0.0003)
Education	-0.0007*** (0.00007)	-0.00004*** (0.0000)
Marital status	0.1483*** (0.0024)	0.0094*** (0.0001)
Handphone ownership	2.9630*** (0.0736)	0.1893*** (0.0048)
Constant	-6.1580*** (0.1387)	
Observations	225,547	
LR chi2	16447.60	
Prob > chi2	0.0000	

Source: SUSENAS 2024, data analyzed

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Standard errors (in parathenses)
*** p<0,01, ** p<0,05, * p<0,1

The negative and statistically significant coefficient indicates that, holding other variables constant, women are less likely than men to participate in digital enterprises. The marginal effect is –0.0285 further implies that being female reduces the probability of participating in digital enterprise by about 2.85 percentage points, holding other covariates constant. This pattern suggests that structural constraint, potentially related to time allocation, intra-household bargaining, social norms, or differential access to entrepreneurial network, may limit women's participation in digitally mediated markets. This finding supports a growing body of research shows that gender-based barriers continue to constrain women's participation in digital enterprise, even as digital platforms potentially offer new entry points. Inayah & Maghfiroh (2025), based on a survey of 1,500 women across three countries, report that only 37% of women express digital confidence at work compared to 66% of men, highlighting the role of gender norms and institutional support gaps. Complementing this evidence, Duffy & Pruchniewska (2017), drawing on qualitative research with female digital professionals, describe a "digital double bind" in which structural inequalities compel women to assume greater risk and perform invisible labor, often positioning female self-enterprise as a less valued form of entrepreneurship.

The positive association between under-five children and digital enterprise participation offers a nuanced interpretation of care responsibilities. Rather than constraining economic engagement, the presence of young children appears associated with greater reliance on digital enterprise, consistent with the argument that online activities provide temporal and spatial flexibility compatible with caregiving demands, supporting Conroy (2019). The positive effect of household size further underscores the embeddedness of enterprise decisions within household contexts, where additional members may generate income pressures or provide informal support mechanisms.

The non-linear age pattern reflects dynamic life-cycle processes, potentially capturing shifts in technological adaptation, accumulated experience, and opportunity structures across age cohorts (Costa et al., 2020). The magnitude of the handphone effect underscores that digital readiness constitutes a foundational enabling condition. Without access to basic communication technology, participation in digital enterprise is structurally constrained. The full model results demonstrate that digital enterprise participation in Indonesia is shaped by the intersection of gender, household structure, life-cycle dynamics, and, most prominently, digital access, reinforcing the importance of integrating social and technological dimensions in analyses of digital economic inclusion.

Subgroup Analysis by Rural-Urban for Heterogeneity Testing

The rural–urban heterogeneity reveals meaningful structural differences in the determinants of digital enterprise participation as shown in Table 4. The rural–urban results reveal that gender gaps in digital enterprise participation are not merely compositional but structurally embedded within differentiated socio-economic environments. From a theoretical perspective, these findings align with

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the intersection of human capital theory, household bargaining models, and digital divide literature, suggesting that digital entrepreneurship emerges at the intersection of individual capabilities, intra-household dynamics, and local opportunity structures. Evidence consistently shows that digital entrepreneurial success depends on individual capabilities. Xiong (2025) found that digital skills, such as platform use and data analytics, enhance opportunity recognition and performance, while Skandalis (2025) identified technical skills, human capital, opportunity orientation, and risk tolerance as core drivers of digital entrepreneurship.

Table 4. Subgroup Logit Estimation on Digital Enterprise (Rural-Urban Heterogeneity)

Variables	Rural		Urban	
	Coef.	dy/dx	Coef.	dy/dx
Gender (reference category: male)	-0.7395*** (0.0271)	-0.0280*** (0.0010)	-0.0938*** (0.0221)	-0.0102*** (0.0024)
Under-five children	0.1988*** (0.0328)	0.0075*** (0.0012)	0.0730** (0.0288)	0.0079** (0.0031)
Marital status	0.4066*** (0.0416)	0.0154*** (0.0015)	0.0513* (0.0307)	0.0056* (0.0033)
Household size	-0.0949*** (0.0101)	-0.0036*** (0.0003)	-0.0798*** (0.0084)	-0.0087*** (0.0009)
Age	0.0218** (0.0095)	0.0008** (0.0003)	0.0264*** (0.0078)	0.0028*** (0.0008)
Age^2	-0.0007*** (0.0001)	-0.00002*** (0.0000)	-0.0006*** (0.00009)	-0.00007*** (0.00001)
Education	0.1048*** (0.0038)	0.0039*** (0.0001)	0.1267*** (0.0034)	0.0138*** (0.0003)
Handphone ownership	3.0483*** (0.1053)	0.1157*** (0.0041)	2.6034*** (0.1033)	0.2844*** (0.0113)
Constant	-5.8661*** (0.2117)		-5.0917*** (0.1890)	
Observations	147,925		77,622	
LR chi2	7247.70		6286.36	
Prob > chi2	0.0000		0.0000	

Source: SUSENAS 2024, data analyzed
Standard errors (in parathenses)
*** p<0,01, ** p<0,05, * p<0,1

The gender coefficient remains negative and statistically significant in both rural and urban areas, yet its magnitude is substantially larger in rural contexts. This indicates that spatially embedded gender norms and structural constraints amplify women's disadvantages outside metropolitan areas (Venkataraman, 2024). Feminist economic theory emphasizes that women's economic participation is mediated by socially constructed gender roles (Gugan et al., 2024), which are often more rigid in rural settings. Limited infrastructure, weaker institutional

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support, and restricted mobility can compound these norms, reinforcing occupational segregation. Urban areas, by contrast, tend to offer denser digital ecosystems, stronger peer networks, and greater exposure to entrepreneurial role models, partially narrowing, but not eliminating the gender gap.

The positive association between under-five children and digital enterprise participation in both subsamples provides important insights into how household constraints shape labor allocation decisions. From the perspective of role-strain and time-allocation theories, rising childcare demands typically force individual, particularly women, to reorganize their economic activities in ways that better accommodate domestic responsibilities. Household labor supply models suggest that when time constraints intensify due to caregiving obligations, individuals tend to shift toward more flexible forms of work that allow them to balance market and household roles. In this context, digital enterprise may serve as a form of adaptive labor allocation that enables economic participation without requiring rigid schedules or physical workplace presence. Evidence from labor market research reinforces this interpretation. For example, Simintzi et al. (2025) demonstrate that earlier access to childcare increases employment among new mothers and facilitates transitions into more demanding jobs, highlighting the strong interaction between childcare arrangements and labor market participation.

Recent studies on digital and platform-based work highlight flexibility as a key factor shaping women's participation in digitally mediated economic activities. Research by Dunn et al. (2023) identify temporal, spatial, and task flexibility as central dimensions of platform work that influence workers' participation decisions. These findings suggest that flexible work arrangements can make digital enterprise particularly attractive for individuals who must balance income-generating activities with household responsibilities.

However, the literature also presents a more critical perspective on the flexibility narrative. Dunn et al. (2021) document that during the COVID-19 pandemic women were significantly more likely than men to reduce working hours in order to absorb additional caregiving responsibilities, highlighting the persistent interaction between labor supply decisions and household constraints. Other studies question whether platform-based work actually delivers the degree of flexibility often attributed to it. James (2024) argue that algorithmic management can produce contradictory work–family outcomes, limiting workers' control over schedules and income stability. Similarly, Dhar & Thuppilikkat (2022) characterizes flexibility in platform work as a "false promise," emphasizing how algorithmic insecurity, safety concerns, and precarious working conditions can constrain workers' autonomy.

These findings suggest that the positive association between childcare and digital enterprise participation should not be interpreted as evidence that caregiving directly promotes entrepreneurship. Rather, digital enterprise may represent a form of economic participation that remains compatible with caregiving responsibilities despite existing structural constraints. In rural areas, digital platforms may help reduce mobility barriers by enabling home-based market access, whereas in urban settings they may alleviate time rigidity by allowing individuals to organize work schedules more flexibly. Consequently,

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caregiving responsibilities may not necessarily suppress economic participation, but instead reshape its form toward digitally mediated self-employment.

Marital status exhibits a stronger effect in rural settings, which can be interpreted through household risk-sharing and cooperative bargaining frameworks. In household economics, marriage often functions as an informal institution that allows the pooling of labor, assets, and income streams, thereby reducing income volatility and providing internal insurance when households engage in entrepreneurial activities. Such mechanisms become particularly important in rural environments where formal credit markets, insurance systems, and institutional support remain limited, making entrepreneurship decisions more closely embedded within collective household strategies rather than purely individual choices.

Empirical research highlights the relevance of these dynamics. Moeeni (2021) and Wellington (2022) shows that social norms and intra-household bargaining structures continue to shape women's economic participation in developing countries, while Kiruthika & Geetha (2025) find that spousal support and household resource pooling play a crucial role in enabling women's entrepreneurial engagement where institutional support is weak. These findings help explain why marital status plays a more pronounced role in rural areas, where households rely more heavily on internal cooperation and risk-sharing arrangements. In contrast, urban environments offer broader access to wage employment, financial services, and diversified income opportunities, allowing institutional and market-based mechanisms to partially substitute for household-level risk sharing. Consequently, although marital status still influences entrepreneurial participation, its relative importance tends to decline in urban contexts where individuals can rely on a wider set of economic opportunities outside the household structure.

Next, the negative association of household size in both contexts, stronger in urban areas, reflects the cumulative burden hypothesis. Larger households may imply greater unpaid care responsibilities (Furtado et al., 2024), reducing the time and mental focus available to manage the business effectively. In dense urban environments, where living costs and opportunity costs are higher, the trade-offs between domestic obligations and digital enterprise engagement may become more acute. This aligns with household production theory, which frames domestic responsibilities as competing uses of time that directly affect market participation.

The life-cycle pattern on positive age effect with a negative quadratic term, remains consistent across space, reinforcing entrepreneurship lifecycle theory. Mid-life individuals often possess accumulated human capital, social networks, and financial stability that enhance entrepreneurial capacity. However, digital enterprise may require adaptability and technological updating, which could decline at older ages, explaining the eventual downward slope. This pattern's stability across rural and urban areas suggests that lifecycle dynamics operate relatively independently of spatial context.

Education demonstrates a stronger positive effect in urban areas. Digital enterprise, particularly in urban ecosystems, may require higher levels of cognitive skills, digital literacy, and strategic capability. Urban markets may better reward formal education through more sophisticated consumer bases, stronger

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competition, and better integration into online marketplaces. In rural areas, even when individuals are educated, infrastructure limitation, such as connectivity quality and logistics, may constrain the full return to schooling. Infrastructure limitations significantly constrain the economic returns to rural education, though direct evidence on this specific mechanism is limited in the available sources. Chen et al. (2017) found that rural schooling in China generates 7.6% returns when school accessibility is improved, suggesting that infrastructure proximity matters for realizing educational returns. Supporting this, Stringer et al. (2025) documented that improved road accessibility correlates with 0.21-year increases in average schooling attainment in rural Mexico.

Handphone ownership emerges as the strongest determinant of digital enterprise participation in both settings, although its marginal effect is notably larger in urban areas. This pattern aligns with digital divide concept, which argues that access to digital devices is a necessary but not sufficient condition for meaningful participation in the digital economy (Lombardi, 2023). The economic value of device ownership depends on complementary resources and infrastructure that enable individuals to translate connectivity into productive activity. In urban environments, smartphones are more likely to interact with supporting ecosystems such as reliable internet connectivity, digital payment systems, delivery services, and larger consumer markets, which collectively amplify the impact of device ownership on entrepreneurial engagement.

Empirical evidences support this interpretation, showing that digital technology access significantly increases entrepreneurial participation when supported by enabling infrastructure and institutional conditions (Munir, 2025; Jiao et al., 2022). In contrast, rural areas often face weaker ecosystem complementarities, including limited broadband availability and less developed logistics and digital payment systems, which may constrain the ability of entrepreneurs to fully capitalize on digital opportunities. Consequently, although phone ownership still facilitates entry into digital enterprise in rural contexts, its transformative effect remains more limited compared with urban settings.

Conclusion

The findings confirm that digital enterprise participation is not gender-neutral. Women are significantly less likely than men to engage in digital enterprise, even after controlling for demographic and household factors. At the same time, care responsibilities, proxied by the presence of under-five children, are positively associated with digital enterprise participation, suggesting that digital self-employment serves as a flexible labor-market adjustment mechanism under childcare constraints. Human capital and digital access play central enabling roles, particularly handphone ownership, which emerges as the strongest predictor of participation. Education also increases the likelihood of digital enterprise, with stronger returns in urban areas. The rural–urban disaggregation further demonstrates that gender disparities are more pronounced in rural settings, indicating that spatial inequality compounds gender-based constraints. Digital enterprise participation reflects the interaction of gender norms, household bargaining structures, lifecycle dynamics, and digital infrastructure conditions rather than purely individual entrepreneurial preferences.

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DOI: 10.47776/mizania.v6i1.1994

The results suggest that narrowing gender gaps in digital enterprise requires integrated, place-sensitive policies. Expanding affordable digital infrastructure and device access remains fundamental, but it should be complemented by gender-responsive digital literacy programs, childcare-support mechanisms, and targeted capacity-building for women entrepreneurs, particularly in rural areas where structural constraints are stronger. Policies should also recognize digital entrepreneurship as a flexibility-based coping and opportunity strategy, and therefore design interventions that reduce time burdens and improve access to online markets and financial services. Future research could explore causal pathways using longitudinal data, examine platform-specific dynamics and income outcomes, and investigate how digital enterprise translates into productivity and welfare improvements across gender and spatial contexts.

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