

## THE IMPACT OF DIGITAL ACCESS AND LITERACY ON WOMEN'S E-COMMERCE ADOPTION IN THE PHILIPPINES

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### ABSTRACT

The primary objective of this study was to investigate the influence of Filipino women's existing digital access and literacy levels on their adoption of e-commerce. The researcher utilized the Multivariate Linear Regression Model via Ordinary Least Squares (OLS) Regression in exploring and quantifying the relationship and influence of the regressors and regressand. The OLS estimates suggest that higher data privacy awareness correlates with increased e-commerce adoption of women for purchasing goods and services online. On the other hand, improved digital skills are linked to increasing women's e-commerce adoption in terms of selling goods and services online. The two regression models have different significant variables, implying that consumers and sellers prioritize different factors when deciding to adopt e-commerce.

**Keywords:** digital access, digital literacy, e-commerce, women, Philippines

### I. INTRODUCTION

The COVID-19 pandemic fueled the remarkable growth of e-commerce and the acceleration of digital transformation, thereby opening unprecedented opportunities for women and girls (UN Women, 2023). However, while digitalization is theoretically assumed to be gender-neutral, persistent socioeconomic gaps between men and women seamlessly extend into the digital world, revealing the sobering reality that access to and utilization of digital resources often remain unequal along gender lines. Over the years, several studies have shown that men have a higher probability of using e-commerce because of gender disparities in the digital world (Zerbini et al., 2022; Ariansyah, 2021; Garin-Muñoz et al., 2019; Valarezo et al., 2018). Bridging this digital gender gap has become crucial to the economy as the ramifications of women missing out on online opportunities translate into a significant economic setback. For instance, while there is a notable presence of women entrepreneurs in Southeast Asia, women-owned businesses continue to encounter challenges, often characterized by smaller scale operations, lower average revenues, and fewer employees (World Bank, 2019, as cited in International Finance Corporation, 2021). Furthermore, closing these gender disparities by 2025 could add over \$280 billion to the total value of the region's e-commerce sector by 2030 (International Finance Corporation, 2021); this presents a transformative economic opportunity for the entire region.

Meanwhile, the Philippines has emerged as one of Southeast Asia's fastest-growing digital economies, driven by the emergence of information and communications technologies (ICTs)

that have facilitated digital transformation, especially during the COVID-19 pandemic (Bayudan-Dacuycuy & Serafica, 2023). However, Abadilla (2023) highlights the country's economic loss due to the digital gender gap, with women's exclusion costing 32 nations \$1 trillion in gross domestic product (GDP). Along with this, the Department of Information and Communications Technology (DICT) conducted the 2022 Women and ICT Development Index (WIDI) Survey, revealing significant differences in women's e-commerce engagement, with 55% of women being online consumers while a mere 6% engaged in selling goods and services. Further, the government has addressed that closing the digital divide and gender gap, especially in entrepreneurship and ICT, will enhance women entrepreneurs' competitiveness and productivity in the digital economy, leading to a significant economic benefit (CNN Philippines, 2023). Moreover, closing the digital gender gap is not only crucial for women's opportunities but also imperative for fostering a more inclusive and equitable digital future.

With that, as the country strives to bridge the divide while empowering women, a comprehensive study is needed to assess how the current state of digital access and literacy affects women's e-commerce adoption in the Philippines. This paper aimed to explain how digital access, or the lack thereof, affects their ability to engage in e-commerce, an area with immense potential for economic growth with the inclusion of women. The researcher used regional survey data from the Department of Information and Communications Technology (DICT) to measure this study's dependent and independent variables, with digital access and literacy as the regressors and e-commerce adoption as the regressand.

*H1: Internet availability has a significant impact on e-commerce adoption among women in the Philippines during 2022.*

Throughout the years, studies have shown that the extent of e-commerce adoption by individuals and businesses has been significantly influenced by the level of digital access available to them. In a systematic literature review by Hendricks & Mwapwele (2023), they found a recurrent challenge impeding e-commerce adoption in developing countries. This challenge revolves around the instability and suboptimal quality of internet networks, coupled with unreliable and slow internet connections, all of which are exacerbated by the high costs associated with internet access. These issues collectively form a significant barrier hindering the integration of e-commerce in developing nations.

Furthermore, studies by Ariansyah et al. (2021) and Agren & Barbutiu (2018) conducted in Indonesia and Pakistan, respectively, illustrate various factors affecting e-commerce adoption. While both studies revealed that greater digital access, measured by factors like fixed broadband subscriptions, mobile internet coverage, and logistic services, positively influences e-commerce adoption, Ariansyah et al. (2021) highlight an inverse relationship between distance to financial services and e-commerce adoption, implying that as the distance to the nearest financial service provider increases, the likelihood of an individual adopting e-commerce decreases. This emphasizes the need for improved and extensive infrastructure, highlighting the government's responsibility to fully support its development and deployment nationwide. Meanwhile, Agren & Barbutiu (2018) further identified a gender-based digital divide, wherein men exhibited a higher likelihood of adopting e-commerce due to them having greater access to IT and internet resources. This gender

disparity in digital access also plays a crucial role in influencing e-commerce adoption patterns.

In an inter-regional analysis, Bala & Singhal (2018) exposed a concerning gender gap in India's digital access, including availability, access time, and internet usage. Despite owning more computers than men, women face challenges due to limited internet availability and adherence to societal norms, such as devoting much of their time to household and caring responsibilities, thus resulting in limited usage time and a lack of basic technological skills. However, it is important to note that it is mostly in urban and developed areas that women have more ICT ownership than men. Basically, the patriarchal system does not give equal opportunities to women which restricts their access to the digital world, thus negatively affecting their economic well-being. This disparity is further supported by Ayob's (2021) study of the ASEAN economic bloc, which found that countries with strong individualism and low masculinity exhibit higher rates of e-commerce adoption among its citizens.

On the entrepreneurial side, Chatterjee et al. (2020) conducted a comprehensive study on technology adoption and the entrepreneurial orientation of women using the structural equation model. They analyzed various dimensions of access, including mental, material, skill, and usage access, and concluded that each of these factors had a positive and significant influence on Indian women's intention to adopt information and communication technology (ICT). Furthermore, their research revealed that as women embrace ICT, it contributes to their entrepreneurial development. Widespread internet access facilitates e-commerce adoption among entrepreneurs by enabling them to minimize costs and maximize profits through efficient transactions, access to competitive prices, and broader market reach (Ariansyah et al., 2021).

Similarly, a recent mixed methods study on rural women entrepreneurs in Bangladesh revealed that utilizing mobile phones facilitated their market entry and access to pricing information for agricultural products. This significantly enhanced their market intelligence and empowerment across various domains. Further, access and proficiency with mobile phones brought transformative changes to the empowerment journey of traditionally marginalized rural women in agriculture (Rahman et al., 2023).

Furthermore, enhanced access to ICT infrastructure incentivizes firms to embrace e-commerce as it allows them to overcome geographical barriers and extend their market reach. The availability, speed, quality, and affordability of internet connectivity plays a crucial role in e-commerce adoption, as efficient and cost-effective access is vital for e-commerce businesses to thrive and reach a broader customer base. Moreover, the quality and affordability of internet services can either enable or hinder their success (Mthembu et al., 2018). This barrier is particularly evident in developing countries, as illustrated by the case of Bangladesh. Even amid the pandemic-driven surge in e-commerce, internet connectivity demonstrated a negative yet statistically insignificant relationship with SMEs' adoption of e-commerce in Bangladesh. This discrepancy can be attributed to the limited access of SMEs to high-speed and reliable internet services compared to multinational firms. Given that internet connectivity serves as the backbone of e-commerce globally, Bangladesh's ongoing struggle to expand coverage to all areas continues to impede SMEs from fully and seamlessly embracing e-commerce, as highlighted by Hossain et al. (2023). Meanwhile, Kabir et al.

(2020) found a direct link between the growth of e-commerce and increased economic growth in Bangladesh. Their study focused on various factors, revealing that accessibility has the most significant positive impact. In simpler terms, enhancing accessibility for better e-commerce access can directly contribute to higher economic growth.

In a related study focused on women-owned SMEs in Southwestern Nigeria, Omiunu (2019) found that ICT adoption had no significant impact on the performance of such businesses in the country. The study attributed this to the limited resources available in developing countries for fully integrating these technologies into businesses, particularly in terms of adopting e-commerce, as ICT implementation is still in its early stages compared to more developed nations.

On a similar note, a recent study in Morocco sheds light on the challenges impeding e-commerce adoption, pointing to potential barriers such as limited internet accessibility, information gaps, and the high cost of technology in various regions. Employing logit, probit, and CMP models, the study emphasizes the crucial role of specific factors—namely, computer use, the presence of a firm website, and internet access—as critical precursors that enhance the likelihood of successful e-commerce adoption (Youssef & Dahmani, 2023).

Meanwhile, in the Chinese context, Zhang & Li (2018) conducted a study to examine the relationship between regional ICT access and "guanxi," a concept representing close interpersonal ties or support from friends within the entrepreneurial context. Utilizing key indicators such as internet broadband, fixed phone, and mobile phone availability to measure ICT access, the study revealed it has a positive and substantial influence on entrepreneurial performance. Consequently, it was inferred that widespread ICT access enhances the positive impact of guanxi on entrepreneurial performance. In essence, entrepreneurs with easy access to digital resources can leverage the support from their close networks more effectively. These emphasize the crucial role of an extensive and accessible digital infrastructure in empowering entrepreneurs.

This study then drew upon the Diffusion of Innovation Theory, which explores how, why, and at what rate new ideas and technologies spread within a social system (Rogers, 2003, as cited in Ariansyah et al., 2021). In this case, internet availability acts as the innovation that influences the diffusion of e-commerce among women. This theory further posits that individuals demonstrate varying levels of willingness to adopt innovation; similarly, an organization's capacity to innovate and embrace change depends on a combination of internal and external factors (Chatterjee et al., 2020). Moreover, the Diffusion of Innovation Theory comprises five key factors: (1) relative advantage, indicating how much an innovation is seen as better than what it replaces; (2) compatibility, reflecting how well the innovation aligns with individuals' existing values, needs, and experiences; (3) complexity, signifying the perceived difficulty of understanding and using the innovation; (4) trialability, relates to the ease with which individuals can experiment with and test the innovation; and (5) observability, which involves witnessing others' experiences, contributing to innovation diffusion (Rogers, 1995, as cited in Rura-Polley, 2001).

*H2: Digital skills have a significant impact on e-commerce adoption among women in the Philippines during 2022.*



In today's digitally driven world, the accelerated shift towards e-commerce emphasizes the crucial role of digital literacy. Suryani et al. (2022) posits that digital literacy plays a critical role in forming the foundation for embracing e-commerce and succeeding in the Fourth Industrial Revolution. This skill empowers individuals and businesses to use digital tools effectively, especially in e-commerce. However, digital literacy has turned into a major challenge in developing countries. Hendricks & Mwapele's (2023) systematic review on e-commerce adoption highlighted the prevalence of this issue, indicating that the absence of awareness and proficiency in IT knowledge and technical skills is a significant impediment. This deficiency hampers organizations' capacity to fully harness the potential benefits of e-commerce, emphasizing the pressing need for initiatives that enhance digital literacy and bridge the knowledge gap in these regions.

On the other hand, Omiunu (2019) found a contrasting result in their study of women-owned SMEs in Southwestern Nigeria. While ICT adoption lacked significance, ICT literacy, mainly digital and information literacy, significantly impacted the performance of these businesses. This suggests that simply having access to digital technology is not enough. To truly benefit from ICT opportunities, women entrepreneurs need the knowledge and skills to use them effectively for business growth and development. Without these skills, inefficient use of ICT can hinder their performance.

Furthermore, it is also worth noting that digital empowerment is not equally accessible to all, with gender disparities in digital literacy and their implications for e-commerce adoption becoming a critical concern. A study conducted in Pakistan by Agren & Barbutiu (2018) revealed notable gender-based differences in digital literacy and e-commerce adoption. It found that men had greater accessibility to IT and were more extensively engaged with it. At the same time, women encountered cultural barriers in e-commerce and struggled with navigating new products on e-commerce platforms. Bala & Singhal (2018) explained that even though women can have more access to ICT, they still struggle to improve their technological skills and literacy as they have to devote a significant amount of their time on reproductive work.

By the same token, Long et al. (2023) found a significant gender gap in digital literacy among different age groups in Indonesia. Consistent with prior cited studies, this disparity is also primarily attributed to women facing various forms of disadvantage, referred to as the endowment effect. This effect underscores unequal access to essential resources such as mobile phones, education, income sources, and occupations. These disadvantages ultimately result in women having lesser capabilities than their male counterparts.

Furthermore, utilizing the binary logistic model, Ariansyah et al. (2021) uncovered a significant relationship between digital skills, encompassing internet and PC skills, and e-commerce adoption in Indonesia. Their findings suggest that the utilization of social media, instant messaging, email, and internet-surfing services can be differentiating factors between e-commerce adopters and non-adopters. Consequently, individuals possessing adequate internet skills in these areas are more likely to embrace e-commerce services. Furthermore, the study's gender-related findings align with other research, as they observed that men exhibit a higher probability of engaging in e-commerce activities.

In another study, Garin-Muñoz et al. (2019) looked into the drivers for individual adoption of e-commerce, e-banking, and e-government in Spain. Utilizing logistic regression analysis, the study revealed that gender plays a significant role in e-commerce and e-banking adoption, with males exhibiting higher odds of adopting these digital services. Moreover, the research highlighted that the level of an individual's internet and PC skills is a critical determinant that positively influences their likelihood to adopt all three services, emphasizing the pivotal role of digital literacy in facilitating the adoption of digital services. Similarly, Valarezo et al. (2018) also found that men are more likely to do cross-border e-commerce than women. Utilizing data from Spain's national survey on ICT usage in households, the researchers emphasized that both PC and internet skills have positive and significant effects across all models of cross-border e-commerce.

Furthermore, Mahmood et al. (2021) found a strong positive correlation between digital information literacy (DIL) skills and online shopping behavior among women. Essentially, as women's DIL skills improved, their online shopping engagement became more frequent and substantial, resulting in a greater number of online purchases. Notably, they highlighted that even women with moderate DIL skills often hesitated to utilize advanced searching options, underscoring the importance of enhancing DIL competencies, particularly in mastering advanced search features, to empower women in modern life.

In contrast to the findings of several prior studies, a comprehensive meta-analysis conducted by Zerbini et al. (2022) yielded intriguing results. Their study indicated that, contrary to the commonly observed gender-related differences in e-commerce adoption, female consumers show more favorable attitudes toward e-commerce; however, gender per se did not exhibit a significant effect on individuals' likelihood to adopt e-commerce. Nevertheless, the researchers noted a lack of consensus in different works of literature regarding the relationship between shoppers' demographic profiles and their attitudes toward online shopping.

This study adapted the Human Capital Theory, which generally argues that individual workers have skills or abilities that they can improve or accumulate through investment in training and education (Xu & Fletcher, 2016). Further, the theory suggests that these investments contribute to an individual's productivity, capabilities, and economic potential. In the context of the study, the Human Capital Theory explains how women's investment in digital literacy and skills are a form of human capital development. Just as individuals invest in education to increase their human capital and employability, women investing in digital literacy are essentially enhancing their human capital, which directly affects their capacity to engage in e-commerce activities.

*H3: Data privacy awareness has a significant impact on e-commerce adoption among women in the Philippines during 2022.*

With the widespread adoption of e-commerce, the issue of data privacy has become increasingly prominent, as it can potentially influence individuals' decisions to engage with online platforms. This is primarily because individuals with a high degree of privacy awareness prioritize online privacy concerns and emphasize its importance within their social circles (Xu et al., 2008, as cited in Anic et al., 2019).

Utilizing the binary logistic regression model, Ariansyah et al. (2021) looked into Indonesia's barriers to e-commerce adoption; they found that harmful content exposure has a negative relationship with the adoption of e-commerce. In particular, individuals who encountered harmful content online were less inclined to engage with e-commerce platforms, especially if it involved financial transactions.

Similarly, Garin-Muñoz et al. (2019) applied the logistic regression model in their study of the adoption of different electronic services in Spain. Their study stressed the importance of internet trust, as individuals are more inclined to use an e-commerce platform only if they perceive it as safe; this highlights a direct correlation between high levels of trust in e-commerce and increased usage. On the other hand, the mentioned variable does not affect the odds of practicing eBanking and eGovernment since these platforms have already established themselves as safe and secure. This suggests confidence is no longer an issue if a trusted private or public agent provides the service.

On the contrary, a Croatian study by Anic et al. (2019) delved into the determinants and effects of online privacy concerns in e-commerce using the structural equation model. Specifically, the study found that while privacy awareness – defined as consumers' consciousness of various privacy rules and issues – holds significance in the concept of privacy, it paradoxically emerged as an insignificant factor in this study. This finding is attributed to the country's lack of online privacy awareness campaigns; this is further supported by the inverse relationship between government online privacy regulation and online privacy concerns, implying that weak government privacy regulations correspond to heightened online privacy concerns of consumers. This emphasizes the pivotal role of effective privacy regulations enforcement, since merely having laws in place does not suffice to instill consumer confidence in the system.

Similarly, a meta-analysis by Zerbini et al. (2022) observed that privacy concerns – defined in the study as the consumer's general concern about how organizations collect, store, use, and protect personal information – demonstrated a negative relationship with adoption intention, albeit statistically insignificant. In contrast to the implications of Anic et al. (2019), this study attributed this result to consumers' growing confidence in e-commerce sites and their increased sense of security in their usage. Furthermore, the study noted the importance of considering specific situations – such as the COVID-19 pandemic – wherein consumers had no choice but to use online channels.

Desimpelaere et al. (2020) and Alkis & Kose (2022) elucidate the interaction between privacy risks, privacy concerns, privacy literacy, and e-commerce adoption. Their studies explain that consumers evaluate the risks associated with sharing their data online, with greater risks leading to heightened privacy concerns. Moreover, insufficient privacy knowledge exacerbates these concerns, negatively affecting e-commerce adoption. However, awareness of privacy risks positively correlates with e-commerce adoption, suggesting that it urges consumers to take proactive measures to protect their data. Through proper privacy literacy training, individuals can use these risks and concerns to their advantage by enhancing their ability to protect personal information, thus strengthening individuals' willingness to engage in online transactions. However, Gouthier et al. (2022) noted that the sensitivity of information requested significantly influences individuals' privacy concerns, as highly

sensitive data increases risk perception. If such information is necessary, they stressed that providing an appropriate justification to alleviate possible concerns is vital.

Furthermore, Alzaidi & Agag (2022) highlight the role of the pandemic in enhancing the importance of social media in e-retail in Saudi Arabia. Their study reveals that trust and privacy concerns play essential roles in influencing online purchase intentions for e-retail services in social media. In particular, privacy concerns emerge as key drivers of customer trust in social media for online purchases. The study emphasized that the level of trust in utilizing social media for e-retailer services directly correlates with consumers' willingness to engage with such platforms. This arises from heightened privacy concerns linked with social media compared to more established electronic services, especially considering that social media's integration into online shopping is still in its early stages of advancement in developing nations. Thus, retailers should proactively enhance customer awareness concerning social media platform policies, reliability, and security. By doing so, they can instill confidence in the security of personal information and establish trust among consumers. On a similar note, Mthembu et al. (2018) highlighted that insufficient internet security poses challenges, including customer distrust in online transactions and operational issues for businesses. Overcoming these challenges necessitates online companies to implement measures that safeguard their websites from hacking.

Furthermore, this study adapted the Privacy Calculus Theory, which assumes that individuals always use a rational cost-benefit analysis when disclosing personal information (Meier & Krämer, 2022; Desimpelaere et al., 2020). Given consumers' inherent risk aversion, individuals are less inclined to disclose their data since privacy risks intensify privacy concerns (Desimpelaere et al., 2020). Research indicates that heightened privacy concerns decrease the likelihood of e-commerce adoption (Zerbini et al., 2022; Alzaidi & Agag, 2022). As such, enhancing privacy literacy can mitigate these concerns by empowering consumers with knowledge about the utilization and storage of their personal information, thereby equipping them with strategies to safeguard their data privacy. In this study, data privacy awareness falls under data literacy, wherein the researcher directly examines its influence on women's adoption of e-commerce.

## II. METHODS

The study employed a quantitative research design in examining how the current state of digital access and literacy affects the adoption of e-commerce among women in the Philippines. In this paper, the regressors are defined as digital access, given by internet availability by type of device used among women, as well as digital literacy, given by the basic level of digital skill and data privacy awareness among women. Meanwhile, the regressand is e-commerce adoption, measured by women's online engagement in selling and purchasing goods and services. Further, the researcher employed two software in sorting and analyzing the data: Microsoft Excel, to compile and sort the data needed for the regression analysis, and Gretl, as the econometric tool to run the regression.



The data used for each variable in this study were secondary data obtained from the Department of Information and Communications Technology (DICT). Specifically, the researcher retrieved the data from the 2022 Women and ICT Development Index (WIDI) Survey, the first national survey on ICT use that exclusively samples women. The survey covered every region in the Philippines and has a nationwide sample of around 63,000 eligible female respondents aged 15 years and above. It was conducted in 2022 for approximately one month, from the 31st day of January until the 26th day of February.

**Table 1. Variable Description**

Variable	Definition	Measurement and Source
E-Commerce Adoption, <i>SELL &amp; PUR</i>	The percentage of women aged 15 and above who are engaged in purchasing and selling of goods or services online.	In percent, 2022, per region, DICT
Internet Availability, <i>IntAve</i>	The average percentage of women with internet connectivity by type of device used in the last 3 months. The percentage of internet users for each type of device, including desktops, laptops, tablets, and smartphones, was averaged to provide an overall representation of women's internet connectivity.	In percent, 2022, per region, DICT
Digital Skill, <i>Skill</i>	The percentage of women proficient in basic computer or smartphone usage was determined by averaging the percentages of women engaging in various basic-level activities on these devices.	In percent, 2022, per region, DICT
Data Privacy Awareness, <i>Priv</i>	The percentage of women with awareness of cybersecurity and data privacy.	In percent, 2022, per region, DICT

The study utilized a multivariate linear regression model through Ordinary Least Squares regression in examining and quantifying the impact of the current state of digital access and literacy on e-commerce adoption among women in the Philippines. This method facilitated an in-depth analysis of how the same set of regressors influenced the regressand.

In analyzing the relationship among the variables of the study, the author presented an econometric model expressed as follows:

$$ECOM_{PUR} = \beta_0 + \beta_1 IntAve + \beta_2 Skill + \beta_3 Priv + \varepsilon$$

$$ECOM_{SELL} = \beta_0 + \beta_1 IntAve + \beta_2 Skill - \beta_3 Priv + \varepsilon$$

Where:

ECOM = The rate of e-commerce adoption among women by region (purchasing and selling) (%)

IntAve = Women with internet connectivity per region (%)

Skill = Digital skill of women at the basic level per region (%)

Priv = Awareness of cybersecurity and data privacy among women per region (%)

$\epsilon$  = Error term

### III. RESULTS AND DISCUSSION

#### A. Results

**Table 2. Purchasing Model Regression Estimates**

Variable	Coefficient	P-value
Constant	-1.86253	0.8830
IntAve	0.095393	0.9131
Skill	0.011748	0.9626
Priv	0.844661	0.0248**
R-squared	0.691558	
F	0.001244	

*Notes: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$*

In the purchasing model, both internet availability and digital skills exhibited p-values exceeding the 0.05 significance threshold, indicating that these variables were insignificant in this model. Conversely, data privacy awareness emerged as a significant variable, with a p-value of 0.0248. This suggests that a 1% increase in data privacy awareness among women corresponds to a 0.84% increase in online purchases of goods and services.

Moreover, the Multivariate Linear Regression analysis for the online purchasing model produced an R-squared value of 0.691558. This finding suggests that approximately 69.16% of the variability in women purchasing goods and services online can be elucidated by the collective impact of internet availability, digital skills, and data privacy awareness. This simply implies that a substantial portion of the observed changes in women's e-commerce adoption, in terms of purchasing online, can be attributed to the specified regressors.

Furthermore, the model demonstrated statistical significance, as evidenced by the F-statistic value of 0.009538 for the purchasing model. This implies that the overall regression model is

statistically significant, indicating that at least one of the regressors has impacted the regressand in this model.

**Table 3. Selling Model Regression Estimates**

Variable	Coefficient	P-value
Constant	-0.864931	0.6658
IntAve	0.270004	0.0673
Skill	0.122427	0.0076***
Priv	-0.0620493	0.2587
R-squared	0.573065	
F	0.009538	

*Notes: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$*

In the selling model, while internet availability remained insignificant with a p-value of 0.0673, digital skills demonstrated significance, with a p-value of 0.0076. This suggests that a 1% increase in women with basic-level digital skills is associated with a 0.12% increase in e-commerce adoption. However, data privacy awareness was deemed insignificant in this model, recording a p-value of 0.2587.

Moreover, the Multivariate Linear Regression analysis for the online selling model produced an R-squared value of 0.573065. This finding suggests that approximately 57.31% of the variability in women selling goods and services online can be explained by internet availability, digital skills, and data privacy awareness. This simply implies that a substantial portion of the observed changes in women's e-commerce adoption, in terms of selling online, can be attributed to the specified regressors.

Furthermore, the model demonstrated statistical significance, as evidenced by the F-statistic value of 0.009538 for the selling model. This implies that the overall regression model is statistically significant, indicating that at least one of the regressors has impacted the regressand in this model.

## ***B. Discussion***

### ***The impact of digital access and literacy on e-commerce adoption among women (purchasing)***

In the purchasing model, the regressors—internet availability, digital skills, and data privacy awareness—consistently exhibited the expected positive sign. However, despite the positive relationship, internet availability was deemed statistically insignificant with a p-value of 0.9131. The insignificance of internet availability may be attributed to the reality that, although many women have access to ICT devices and the internet, not all have the privilege of unlimited access (Agren & Barbutiu, 2018). This limitation emphasizes that access to the internet is often constrained possibly due to factors like device sharing within households

(Agren & Barbutiu, 2018) and limited time availability (Bala & Singhal, 2018). In particular, women's access to the internet is often hindered by time constraints arising from their role in household and caregiving responsibilities. These restrictions persist regardless of employment status, which ultimately limit women's ability to fully engage in e-commerce activities (Bala & Singhal, 2018). Ayob (2021) further cements these findings as societies with strong individualism and low masculinity exhibit higher e-commerce adoption among its citizens. Additionally, the challenges faced by women are compounded by broader issues in developing countries like the Philippines, such as unstable and poor-quality internet networks, slow connections, and high costs of internet access. These factors constitute substantial barriers that hinder the integration of e-commerce in developing nations (Hendricks & Mwapele, 2023). The latest report from the World Bank highlights that the Philippines lags behind other ASEAN nations in internet connectivity, particularly in terms of affordability, speed, and access (Kanehira et al., 2024). Basically, the challenges of access to devices and the internet in the Philippines exacerbate gender disparities, hindering women's integration into e-commerce and reflecting broader regional disparities within ASEAN nations.

Despite the positive sign, digital skills was statistically insignificant for women purchasing goods and services online. The insignificance of basic-level digital skills in the study may stem from the barriers women face in accessing ICT and the internet; these constraints significantly diminish their ability to develop and utilize their digital competencies effectively (Agren & Barbutiu, 2018; Bala & Singhal, 2018; Long et al., 2023). Hence, they have less confidence in engaging in online shopping, particularly when it comes to search options (Mahmood et al., 2021).

Furthermore, among the three regressors, only data privacy awareness is statistically significant in this model. This aligns with the insights from studies by Mthembu et al. (2018) and Alzaidi & Agag (2022), in which it was highlighted that trust and privacy concerns have a significant influence on online purchase intentions, emphasizing that feeling secure before engaging in e-commerce is like a prerequisite for customers. Applying the Privacy Calculus Theory, individuals tend to be discerning when it comes to their personal information. As such, heightened privacy concerns stemming from privacy risks often make individuals cautious about engaging in online transactions. As individuals increasingly become more aware of privacy rules and issues, they can use it to their advantage by coming up with potential solutions or remedies in avoiding privacy breaches while still reaping the benefits of e-commerce (Desimpelaere et al., 2020; Alkis & Kose, 2022).

### ***The impact of digital access and literacy on e-commerce adoption among women (selling)***

In the selling model, which focuses on women selling goods and services online, only digital skills among the three examined variables showed a significant positive effect. Firstly, internet availability is insignificant in this model, which can be attributed to factors like limited internet accessibility throughout the country (Hossain et al., 2023; Youssef & Damani, 2023). While internet connectivity holds the potential to empower women entrepreneurs and enhance the quality and performance of their businesses, its implementation in developing countries is still in its early stages; this results in the



prevalence of inadequate high-speed, reliable, and affordable internet services, hindering them in fully embracing e-commerce (Mthembu et al., 2018; Omiunu, 2019; Hendricks & Mwapele, 2023; Hossain et al., 2023; Youssef & Damani, 2023).

In contrast to the previous model, the findings reveal that even basic-level digital skills significantly influence women's online adoption of selling goods and services. The difference in results between selling and purchasing behaviors suggests that these two aspects of online commerce may have distinct digital skill requirements in both level and type. This finding corroborates existing studies highlighting that a deficiency in proficiency hampers organizations' capacity to fully harness the potential benefits of e-commerce (Hendricks & Mwapele, 2023). Entrepreneurs must possess the skills and knowledge, especially digital and information literacy, to effectively utilize digital technology for business growth (Omiunu, 2019). From the perspective of the Human Capital Theory, digital literacy equips women with valuable skills, enhancing their human capital and empowering them to participate more actively in the digital economy. This emphasizes the critical role of skills in unlocking the full potential of e-commerce, particularly for those engaged in the entrepreneurial side of e-commerce.

Lastly, while data privacy awareness shows a negative sign, the result is statistically insignificant. One possible explanation for this insignificance is the high prevalence of data privacy awareness, with more than half of the women population reported to be aware. This aligns with the findings of Zerbin et al. (2022), indicating that, despite privacy concerns having a negative relationship with adoption intention, their influence may not be statistically significant due to the increasing confidence people develop in e-commerce. The varying significance of data privacy awareness might be attributed to role-based perspectives, with sellers prioritizing broader aspects of online business operations while consumers prioritize privacy during transactions. As highlighted in the previous model, a sense of security is crucial for customers engaging in e-commerce, emphasizing its role as a prerequisite for e-commerce engagement.

#### IV. CONCLUSION

The primary aim of this study is to examine how digital access and literacy influence Filipino women's adoption of e-commerce, assessing whether their current levels of access and literacy are sufficient to facilitate this adoption. The researcher employed the multivariate linear regression analysis via OLS to meet the study's objectives.

OLS estimates indicate that internet availability was insignificant in both the purchasing and selling models. This implies that the negligible impact of internet availability may stem from the poor and unaffordable internet access, combined with women's extensive household and caregiving responsibilities. Furthermore, digital skills were found to be statistically insignificant in influencing women's purchasing behaviors online, likely due to barriers in accessing ICT. Conversely, these skills significantly enhance women's ability to sell online, highlighting the varying roles of digital competencies in different e-commerce activities. Lastly, more than half of the women in the country possess data privacy awareness, equipping them with the knowledge to manage their personal information securely. This

awareness significantly impacts their purchasing behaviors, as they place high importance on privacy when transacting online. However, for the selling model, this awareness is less critical and statistically insignificant, indicating that while sellers recognize its importance, it is not their primary focus.

Ultimately, limited internet access exacerbates the digital gender gap by limiting women's access to crucial online opportunities necessary for full participation in the digital economy. These results imply the critical need for improved internet infrastructure in the country, as it not only expands internet accessibility for women but also becomes a pivotal factor in cultivating their digital literacy. With these inputs and capabilities in place, women would have more economic opportunities and become more inclined to adopt e-commerce.

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