



FINAL REPORT

Impact of Smart Devices on Women Entrepreneurs in E-Commerce

Impact of Smart Devices on Women Entrepreneurs in E-Commerce

**Submitted to
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Abbreviations and Acronyms

BDT	Bangladeshi Taka
BIDS	Bangladesh Institute of Development Studies
CHT	Chittagong Hill Tracts
CMSME	Cottage, Micro, Small, and Medium Enterprise
E-CAB	E-Commerce Association of Bangladesh
GDP	Gross Domestic Product
GOS	Gross Operating Surplus
HSC	Higher Secondary School Certificate
IT	Information Technology
LIUPCP	Livelihoods Improvement of Urban Poor Communities Project
LoGIC	Local Government Initiatives on Climate Change
MDG	Millennium Development Goals
MFS	Mobile Financial Services
NGO	Non-Government Organization
OECD	Organization for Economic Co-operation and Development
PDC	Pourashava Digital Centre
SDG	Sustainable Development Goals
SME	Small and Medium Enterprises
SSC	Secondary School Certificate
SWAPNO	Strengthening Women's Ability for Productive New Opportunities
TV	Television
UDC	Union Digital Centre
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Program
VAT	Value Added Tax

Executive Summary

The cottage, small and medium enterprises play a vital role in economic development, including production, employment generation, and equitable income distribution. However, these enterprises experience challenges in running their businesses. This scenario has even become worse during the covid-19 pandemic with disproportionately higher constraints on women entrepreneurs.

The pandemic forces small enterprises to adopt and integrate digital technology for their survival. Therefore, UNDP Bangladesh initiates various programs for women, and women entrepreneurs. While implementing various programs, UNDP Bangladesh also realized e-commerce could help overcome the adverse business situation caused by the pandemic. They also identified that smartphones would be the most convenient tool to get the highest benefits from e-commerce. As smartphones are relatively expensive for many women entrepreneurs, UNDP Bangladesh planned to provide them with smartphones to participate in online business activities. Accordingly, the development partner targets 200 women entrepreneurs and plans to facilitate training programs on relevant skills to address entrepreneurs' e-commerce-related limited knowledge.

This study examines the impact of the smartphone and training intervention on entrepreneurs' business outcomes by comparing them to a similar group of entrepreneurs. In the first phase, the baseline study examined whether the beneficiary and comparison group entrepreneurs are similar in terms of business outcomes before the intervention. In the second phase, this study examines the impact of the UNDP intervention on the business outcome and other household behaviors.

Data and Sampling Framework

The study relies on quantitative collected through structured questionnaire and qualitative data and information collected through key informant interviews and focus group discussion on socio-demographic and household characteristics, digital literacy and ownership, business characteristics and prospects before and during the pandemic, contribution to household expenditures and savings, and decision-making ability. Following the UNDP guideline, two groups of entrepreneurs were selected. Those entrepreneurs who receive the intervention are considered the beneficiary, and those who do not are the comparison group. As the study considers the entrepreneurs affiliated with only the UNDP, which has all information on entrepreneurs' backgrounds and business-related information, the UNDP selected similar entrepreneurs across the country for beneficiary and control groups.

The data is also collected in two phases. In the first round, in October 2021, the baseline data were collected from two groups of women entrepreneurs. Under the UNDP support, one group, with 200 entrepreneurs, received smartphones, and the other group, with a similar number of entrepreneurs, did not receive any smartphone from the program. The UNDP also provided training to these beneficiary groups both in-person and online from November 2021 to December 2021.

The content of the in-person training include modules on basic digital literacy, including internet browsing and essential communication through messenger or other platforms. In the online mode, they received training on intermediate and advanced features of e-commerce. At the intermediate level, the UNDP Bangladesh trained how to sign in Anondomela account, upload their products, and check the prices. On the other hand, advanced training modules incorporated marketing or promotional techniques and capacity building for the financial or business plan. In the second round, following the implementation plan with the UNDP Bangladesh, we collected data in April 2022.

Methodology

This study mainly employs mixed-method, quantitative and qualitative approaches to examine the impact of the UNDP intervention on the entrepreneurial outcome. In the quantitative approach, we exploit a quasi-natural experiment offered by the UNDP Bangladesh. We mainly use a difference in difference (DID) method to examine the effect of smartphone and training programs.

The DID estimate is expected to be positive or negative depending on the nature of outcome variables but is expected to be statistically significant, indicating that UNDP Bangladesh e-commerce intervention through smartphones and associated training effectively enhances entrepreneurial outcomes. Some outcomes, such as advertising online, would be a binary indicator. In this case, this study estimates a probit-type DID model. We report the marginal effects after estimating the probit-typed DID model for ease of interpretation. In the qualitative method, using case studies, focused group discussion, and key informant interviews, we validate the findings obtained from the quantitative approach.

Key Findings

Considering the duration between the intervention and endline survey, the outcomes are analyzed from two perspectives: short-term (immediately visible) and long-term (slow and gradual) impacts. The key findings are summarized as follows.

A. Short-term (immediately visible) impacts:

1. The intervention has significantly affected entrepreneurs in retaining their employees. One of the potential reasons is that entrepreneurs could receive direct and indirect advantages in retaining current employees than the new recruitments in connecting buyers and suppliers of raw materials.
2. The smartphone and training intervention appears to have significantly increased sales revenue, irrespective of the past benchmark. For example, compared to a benchmark before October 2021, the intervention increases average monthly sales earnings by 30%. It is also evident that entrepreneurs with more capital investment are likely to experience more sales revenue.
3. Effective inventory management is an essential business strategy to survive and thrive in a competitive environment. The estimated effects of the intervention on inventory accumulation are positive and significant, indicating that the UNDP intervention enables entrepreneurs to increase their inventories.
4. The gross operating surplus is used as a proxy of profits as no allowance for using fixed capital is accounted for because of heterogeneous and inconsistent responses to fixed costs. We find that the intervention significantly improves the operating surpluses. For example, when a benchmark is used before October 2021, this program increases the average monthly gross operating surplus by 45%. These results are robust to the possession of smartphones before intervention.
5. Because of increased internet availability and precaution against covid-19 transmission, many customers prefer online shopping over conventional in-store shopping because of its multiple benefits. The study finds that the intervention increases an entrepreneur's likelihood of adopting an online business platform by 56.50%.
6. Mobile technology and connectivity have rapidly changed conventional business communication approaches and practices, allowing prompt communication to stakeholders. The intervention increases their use of business communication by 18.60%, browsing for business by 26.70%, purchasing raw materials by 17.10%, and contacting suppliers by 22.50%.
7. As the smartphone offers multidimensional functions from communication to navigation and entertainment, the smartphone seems inevitable for everyone. The intervention increases entrepreneurs' entertainment time by 66%, and social media use by 67%, gaming by 8.80%, and family-related conversation by 21.8%. However, the intervention does not affect online education time use. One of the reasons for such findings is that using the smartphone for online educational purposes requires a more rigorous training module with follow-up programs.

B. Long-term (slow and gradual) impacts

8. The intervention does not significantly affect the item-wise percent of household expenditures of the total monthly income for most categories. However, findings imply that the intervention encourages entrepreneurs to increase their family savings.
9. The treatment effects of the intervention on skill levels for smartphone and internet use are not statistically significant. However, while these findings imply that the UNDP smartphone training program does not help immediately improve technological efficiency for women entrepreneurs, the study finds an increasing trend in the percentage of beneficiary entrepreneurs with average or above skill levels.
10. In the digitalization era, everyone has access to a mobile phone, making them easy to access markets across the local and global markets. However, none of the marginal effects are statistically significant, implying that the intervention does not immediately help entrepreneurs to increase their market areas. However, the percentage of beneficiary entrepreneurs accessing the outside market increased after the intervention.
11. The marginal effects of offline advertisement, using leaflets and family and friends, are not statistically significant. The intervention also has no significant impact on entrepreneurial attitudes to online advertisement. However, comparing the same group of entrepreneurs before the intervention, more beneficiaries used promotional activities.
12. With technological change, entrepreneurs could face different challenges from buyers and competitor sellers. For example, female entrepreneurs in the online business could face negative responses, bullying, bad reviews, and losing customers after the bad reviews from competitive firms. However, the treatment effects on these outcomes are not statistically significant, indicating that the intervention does not immediately help to address bullying experiences effectively.
13. Women empowerment represents their control over critical parts of their lives in the household, business, and economy. The findings imply that the intervention does not immediately affect women's empowerment. As empowerment is a slow and continuous process, a four-month duration may not be sufficient to explicitly gauge whether an intervention affects women empowerment.
14. Despite the heterogenous quantitative effects, case studies and focused group discussions with women entrepreneurs suggest that smartphone and training intervention has enabled them in various socioeconomic ways. For example, the intervention made them self-reliant, offered them a secured position in their families, helped them generate employment and become financially established to support their families.

Overall, the empirical findings reveal that the UNDP intervention program significantly contributes to adopting online business platforms, increasing sales earnings, making more profits, and encouraging women to save. It is also evident that the intervention significantly

affects women entrepreneurs using internet devices for more business- and non-business-related activities. As women are likely to discontinue or exit from their established businesses over financial problems, the positive impact of the UNDP intervention on savings would unleash women's entrepreneurial financial constraints. It is recommended that UNDP officials closely monitor the post-training progress and help entrepreneurs until they can resolve the issues independently. Further, follow-up training programs could incorporate online education-related modules in the post-covid era.

1. Introduction

The cottage, micro, small and medium-sized enterprises (CMSMEs) significantly contribute to economic development across countries. For example, approximately 90% of formal and informal businesses are SMEs in developing countries, accounting for more than 50% of national employment (OECD, 2017). In addition, formal SMEs could contribute 40% of the national income in emerging countries.¹ They are sometimes considered the powerhouse of an economy (Dasgupta, 2021; Khazanchi, 2005; Kruezer & Berger, 2018). These enterprises considerably generate employment and help reduce poverty (Beck, Demirguc-Kunt, & Levine, 2005; Mbuyisa & Leonard, 2017; Nosratabadi, 2020). As CMSMEs have a sizeable contribution to the economy, electronic commerce (e-commerce) allows entrepreneurs to communicate quickly with their customers and backward linkage entrepreneurs.

While women are more likely to be engaged in informal business activities than their male counterparts, e-commerce offers them prospects of achieving substantial gains towards empowerment. For example, access to information and technology allow them an avenue to establish both backward and forward linkages with the suppliers of raw materials and customers of their goods and services while staying at home. Therefore, an e-commerce platform will likely boost business opportunities, especially for women entrepreneurs.

As an initial response at the onset of the pandemic in 2020, UNDP Bangladesh set up the online e-commerce platform Anondomela. During interactions with Anondomela entrepreneurs, UNDP Bangladesh also identified a need for providing some women entrepreneurs with smartphones as they could not participate in e-commerce activities because they did not have smartphones. As smartphones are relatively expensive for many women entrepreneurs, UNDP Bangladesh planned to provide them with smartphones to participate in e-commerce activities. Accordingly, the development partner targets 200 women entrepreneurs and plans to facilitate training programs on relevant skills to address entrepreneurs' e-commerce-related limited knowledge. The training session was conducted physically and online from November 2021 to December 2021, consisting of 40 batches from 40 districts. Approximately 1040 women entrepreneurs physically participated in the day-long sessions between November 30 and December 6, 2021. Afterward, 60 batches with 2476 women entrepreneurs participated in the online zoom training between December 13 and December 22, 2021. The primary objective of the training program was to prepare entrepreneurs to open their business profile, business plan, and legal documents for access

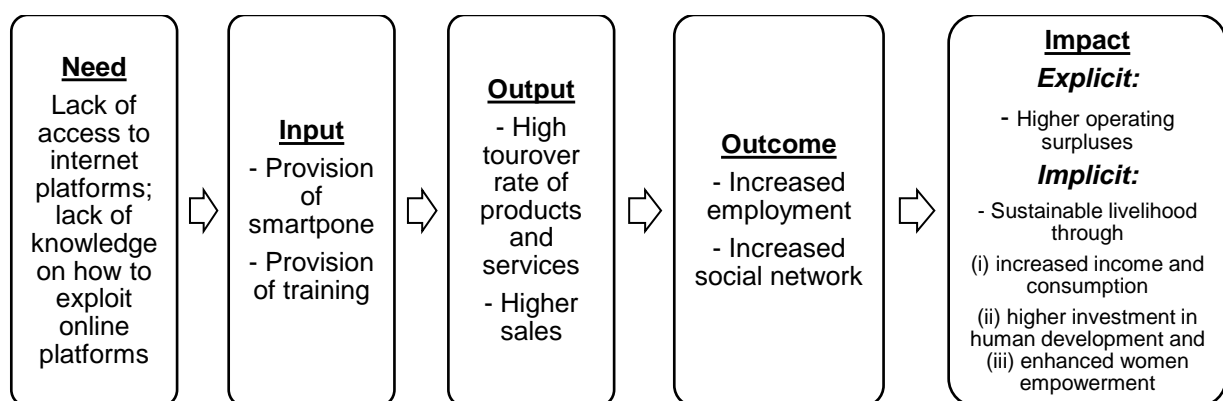
¹ <https://www.worldbank.org/en/topic/sme/finance>

to finance, banking, and other business procedures. This intervention also aimed to help rural women, especially those unfamiliar with conducting their businesses on digital or virtual platforms.

The UNDP physically trained entrepreneurs in basic digital literacy, including internet browsing and essential communication through messenger or other platforms. In the online mode, they also offered training for intermediate and advanced features of e-commerce. At the intermediate level, the UNDP trained how to sign up Anondomela account, upload their products, and check the prices. On the other hand, advanced training modules incorporated marketing or promotional techniques and capacity building for the financial or business plan. Appendix 1 summarizes the detailed training module.

This study examines the impact of the UNDP intervention on business outcomes and household behaviors. Figure 1.1 shows the causal pathway of the intervention effect on business outcomes and economic development.

Figure 1.1 Causal pathway of the package of interventions



2. Objectives of the Study

Following the terms of reference, the impact evaluation study attempts to address the issues related to the short-term (immediately visible) and long-term (slow and gradual) impacts of distribution of smartphones to the women entrepreneurs in the CMSMEs and imparting training on how smartphones can be leveraged to get maximum benefits in their business. The specific questions are listed below:

1. How do a smartphone and associated training to effectively utilize it help entrepreneurs know about e-commerce activities and their operations? How does it affect entry to and utilization of online platform for business? How does it affect access to markets for sale of products and services and sourcing raw materials?

2. How much did women entrepreneurs acquire new skills and How do they put the acquired business skills to use through e-commerce platforms? What are the changes in general business practices?
3. How do the interventions affect the promotion of products to the customers? What are the changes in delivering products/services to the customers' doorsteps? What are the changes in the payment systems (e.g., from cash to mobile banking, internet banking, agent banking, or payment through UDC)?
4. What were the business earnings/sales revenue changes after leveraging e-commerce opportunities through smartphones and associated training? How do the interventions affect the number of workers employed?
5. What are the effects of women's entrepreneurship on household spending (children's education, own and family healthcare, etc.)? What effects do access to e-commerce platforms have on women's decision-making ability?

3. Organization of the Study

Following the current scenario of women entrepreneurs and e-commerce in the introduction section, Section 2 describes the background of the UNDP intervention. Section 3 describes the research design, sampling, and nature of the beneficiary and comparison groups. Section 4 discusses the estimated effects of the smartphone plus training intervention both from the short-term and long-term perspectives. The short-term impacts focus on employment, inventory management, operating surplus, adoption of the online platform, and use of smartphones for both business and non-business activities. In contrast, the long-term impacts focus on the propensity of increased household expenditures, entrepreneurial technological skills, market access, promotional activities, problem-solving skills in online business, and women empowerment. Finally, Section 5 summarizes and concludes the findings.

1. Policy Background

In Bangladesh, CMSMEs are the lifeline of the economy; these enterprises create employment for 7.8 million people directly and provide a livelihood for 31.2 million and contribute around 25% of the total GDP. Although the contribution of the CMSMEs is significant to the national economy, many CMSME entrepreneurs face various challenges viz. financial instability (Morgan & Pontines, 2018), insufficient financial ability (Yazdanfar & Öhman, 2020), managerial inexperience (Antoncic et al., 2015; Omerzel & Antončič, 2008), lack of innovation (Adomako & Nguyen, 2020; Chien et al., 2021; Thurik & Wennekers, 2004; Zhang, & Zhang, 2012), regulatory license and taxes (Levy, 1993; Doh & Kim, 2014; Ndiaye et al., 2018),

competitive environment (Bekele & Worku, 2008; Urban & Naidoo, 2012), increased production cost (Urban & Naidoo 2012; Wang et al., 2020), to mention a few. Women entrepreneurs face these limitations even at a grander scale and consequently resort to informal e-commerce activities.

As a find of affirmative action, UNDP Bangladesh in collaboration with the government of Bangladesh, undertook various activities to enhance women's economic empowerment. Some of these initiatives include Strengthening Women's Ability for Productive New Opportunities (SWAPNO), Local Government Initiative on Climate Change (LoGIC), A2i, CHT, Livelihoods Improvement of Urban Poor Communities Project (LIUPCP), HRP and Transgender (TG) with funding from the European Union (EU), and Swedish International Development Cooperation Agency (SIDA). These initiatives are expected to facilitate attaining gender parity on several socioeconomic indicators through various income-generating programs.

UNDP Bangladesh experienced two major issues during project implementations. First, many of these entrepreneurs do not have smartphones that would otherwise enable them to exploit the full potential of the platform. Second, even if several of the entrepreneurs that participated in the programs have smartphones, they are besieged with several constraints ranging from digital literacy to financial to social to legal barriers to running the enterprises, let alone thriving efficiently. Against these backdrops, UNDP Bangladesh addressed the twin hurdles by facilitating women entrepreneurs' take-off in SMEs. First, as smartphones are relatively expensive for many women entrepreneurs, UNDP Bangladesh provided smartphones to 200 randomly selected entrepreneurs to participate in e-commerce activities. Besides, UNDP Bangladesh also imparted training programs on relevant skills to address entrepreneurs' e-commerce-related limited knowledge.

2. Methodology and Data

4. Empirical Model

This study mainly employs mixed-method, quantitative and qualitative approaches to examine the impact of the UNDP intervention on entrepreneurial outcomes. In the quantitative approach, we exploit a quasi-natural experiment offered by UNDP Bangladesh. We mainly use a difference in difference (DID) method to examine the effect of smartphones and training programs. The DID is a popular method for impact evaluation (Abadie, 2005; Fredriksson and Oliveira, 2019; Imbens and Wooldridge, 2008; Liu et al., 2021; Zhu et al., 2020). The DID estimates systematically control the differences in outcomes between the treatment and comparison groups under the parallel trend assumption. The DID also eliminates the potential

bias caused by omitted variables (Wan et al., 2019) and is used in solving endogeneity problems (Meyer, 1995). In this study, the variations mainly come from UNDP smartphone intervention to compare the difference in business outcomes between beneficiaries and the comparison group before and after the training program. The basic DID model is as follows:

$$y_{it} = \alpha_0 + \alpha_1 post_i + \alpha_2 treat_i + \delta treat_i * post_i + X'_{it}\beta + d_i + e_{it}, \quad (1)$$

where y_{it} is the outcome indicator for entrepreneur i in t period; $treat_i$ a binary indicator with 1 for receiving UNDP smartphone and 0 otherwise; $post_i$ is the binary indicator with 1 after smartphone intervention, and 0 otherwise; X'_{it} is the vector for control variables, such as financial capital, digital literacy, and experience in the same business. The d_i denotes the district fixed effects, controlling for the time-invariant characteristics, such as geographic factors. For example, the outcome variable is the gross operating surpluses. The coefficient of interest, δ , is the DID estimator, representing the impacts of smartphones on business outcomes. The DID estimate is expected to be positive or negative depending on the nature of outcome variables but is expected to be statistically significant, indicating that e-commerce intervention through smartphones effectively enhances entrepreneurial outcomes. Some outcomes, such as advertising online, would be a binary indicator. In this case, this study estimates a probit-type DID model. As estimates from the probit model have little economic meaning, this study reports the marginal effects after estimating the probit-typed DID model.

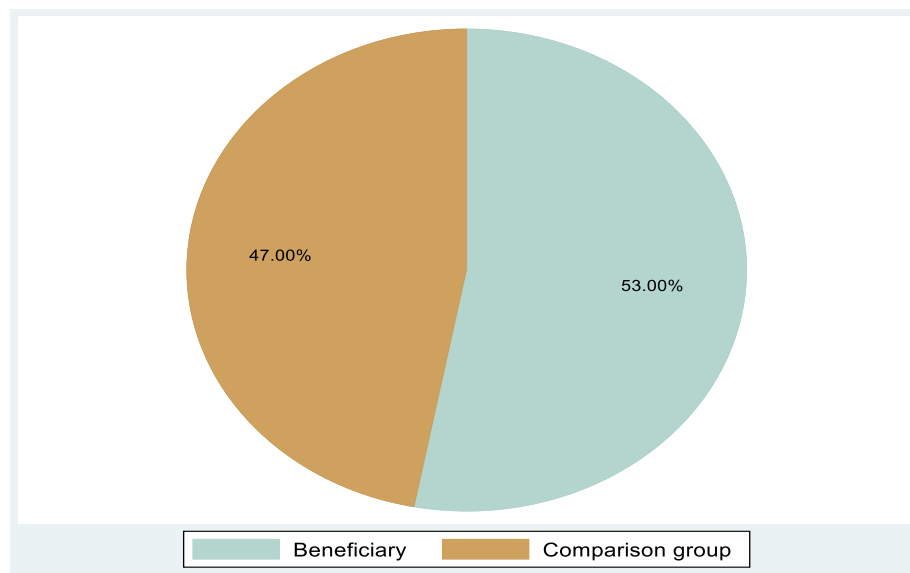
In the qualitative method, using case studies, focused group discussion, and key informant interviews (KIIs), we validate the findings obtained from the quantitative approach.

5. Data and Variables

The study relies on in-depth questionnaire survey data on digital literacy and ownership, business characteristics and prospects before and during the pandemic, along with socio-demographic and household characteristics, contribution to household expenditures and savings, and decision-making ability. In the first round, in October 2021, the baseline data were collected from the women entrepreneurs. As mentioned earlier, one group with 200 entrepreneurs received smartphones under UNDP Bangladesh support, and the other group, with a similar number of entrepreneurs, did not receive any smartphones from the program. The participants from the comparison group were selected with a simple random sampling technique proportionally to the number of women entrepreneurs involved with UNDP projects. Then, with active support and cooperation from UNDP Bangladesh, these two groups are chosen. It is essential to know how these two groups have similar features to confirm the

intervention outcomes. Before providing smartphones and associated training, it is expected that there are hardly any differences based on observable characteristics. Eventually, following the UNDP-purposive sampling guideline, 181 are beneficiary entrepreneurs who received smartphones and training, and 160 with similar features are perceived as the comparison group. Following the research plan with UNDP Bangladesh, we collected the second round of data in April 2022. Figure 2.1 shows that approximately 53% of the total entrepreneurs considered in the study belong to the beneficiary group.

Figure 2.1 Distribution between beneficiary and comparison group enterprises



Source: BIDS Women Entrepreneur Panel Survey, 2021 and 2022.

Data were collected through a structured questionnaire survey containing information on both groups of enterprises, factors affecting their business ventures, and the directions of change in their businesses. In addition, the questionnaire also includes information on the individual education, training, entrepreneurial qualifications of the women entrepreneurs, and their need to facilitate their business activities. Finally, the questionnaire contains information on women empowerment indicators, such as business confidence, improved decision-making power, time abundance, status in the family, and reduced gender-based violence. The distribution of sample enterprises is determined through various flagship projects of UNDP. As the multiple projects of UNDP are spread out throughout the country, trying to reach out to the most

deprived, marginalized, and remotely placed people, the sample encompasses enterprises in 41 of the 64 districts.

Figure B.1 in Appendix 2 shows the locations of beneficiary and comparison groups of enterprises across 41 districts. Approximately 12.17% of the total beneficiary entrepreneurs are located in Dhaka, followed by Kurigram (9.53%) and Chattogram (6.35%). In contrast, Faridpur (14.77%) has the highest percentage of the comparison group enterprises, followed by Kushtia (10.23%) and Sirajganj (6.25%). Most of the 351 surveyed enterprises (61.93%) were situated in Faridpur, Kushtia, Sirajganj, Bandarban, Khulna, Rangpur, Jashore, Chandpur, Chattogram, and Kurigram. Most of the beneficiary enterprises (62.43%) are situated in Dhaka, Kurigram, Chattogram, Bandarban, Satkhira, Rangamati, Khagrachari, Khulna, Jamalpur, and Rajshahi. Most of the comparison group enterprises (69.91%) are in Dhaka, Kurigram, Satkhira, Chandpur, Rangamati, Khagrachari, Bandarban, Jamalpur, Chattogram, and Faridpur.

As noted earlier, impact evaluation of any intervention depends on ensuring that two comparable groups are selected that do not differ much in their basic characteristics. This assumption confirms that the enterprises would follow the same trends in their business outcomes before the intervention. Statistically insignificant differences between the beneficiary and comparable groups imply that these groups are likely to be similar.

Following the literature, we consider three broad product categories and their combined groups. The agriculture category includes agricultural products, including fruits and vegetables; the industry incorporates industrial products like soaps and shampoo; and the service-related products are tailoring clothes and cooking foods. The enterprises selling a combined category, like industrial and services, mostly trade service- and industrial-related commodities.

The sample enterprises mainly sell agricultural and industrial goods and services in the local markets. It is also evident that most enterprises are involved in service-related businesses. This percentage of enterprises that solely offer services is approximately 50% for the comparison and 40% for the beneficiary enterprises. About 25% of the comparison enterprises and 34% of the beneficiary enterprises have manufacturing and service-related businesses. The remaining enterprises are engaged in singular or multiple business concerns. Table 2.1 shows the percentage of enterprises with their respective sector-wise product details. In most cases, the differences in percentage distributions between the beneficiary and comparison enterprises are insignificant, except for enterprises with a combination of manufactured and

services-related products. These results imply that the two enterprise groups are likely to be similar in their types of products.

Table 2.1 Sector-wise distribution of enterprises

Sectors	Beneficiary	Comparison Group	Difference
Agriculture	8.50 (2.00)	8.60 (2.20)	0.01 (3.00)
Industrial	9.00 (2.10)	7.30 (2.10)	-1.70 (3.00)
Services	40.20 (3.60)	49.70 (3.90)	9.50* (5.30)
Agriculture and industrial	1.10 (0.70)	0.00 (0.00)	-1.10 (0.80)
Agriculture and service	6.40 (0.018)	9.20 (0.023)	2.90 (2.90)
Industrial and service	34.40 (3.50)	25.20 (3.40)	-9.00* (4.90)
Agriculture, industrial, and service	0.50 (0.50)	0.00 (0.00)	-0.50 (0.50)

Source: BIDS Women Entrepreneur Panel Survey, 2021 and 2022.

Note: Figures in the parentheses are the standard errors. Figures with *, **, and *** represent 10%, 5%, and 1% significance levels respectively.

To investigate in-depth product types, we find that most enterprises sell clothing and household accessories. Many traditional dresses like saree, thami (tribal clothing), scarf, salwar-kameez, kurti, punjabi, lungi, and specialized designed clothing (lingerie, boutique, block printed products, and hand-painted clothes) are available in these enterprises. Bed spreads, cushion covers, pillow covers, sofa covers, and drapes are also sold in these enterprises. A larger number of enterprises also sell grocery products, including rice, pulses, flour, soaps and shampoo; personal grooming products and services (beauty parlor); tailoring services; and processed foods, including both traditional food items like pickles, jam, pitha, cakes, and non-traditional foods like Indian biriyani, Chinese, and Italian foods. In addition, many of the enterprises produce and sell vegetables, fruits, fish, and meat grown/reared on their farms. A few of the enterprises also have dealership ventures that offer mobile financial services, such as bKash transaction shops, mobile balance recharge, fertilizer, handicraft, and event management-related activities. Some of the not-so-common practices among some enterprises are making and selling paper bags, shoes, bags, and cosmetics items, to mention a few.

Findings from the baseline study revealed that the enterprises in the beneficiary and comparison groups mostly have similar characteristics.² For example, most beneficiary and comparison enterprises seemed to sell mainly agricultural and manufactured goods and

² The detailed findings are available in the baseline study report.

services. Most entrepreneurs sell their products in the local markets. It was also evident that most enterprises were involved in service-related businesses. In most cases, the differences in percentage distributions between beneficiary and comparison enterprises were insignificant, indicating that the two groups were likely to be similar.

3. Impact Analyses on the Outcomes

As UNDP Bangladesh distributed smartphones and related training to the randomly selected group of women entrepreneurs, the program could have some direct and indirect impacts. While some impacts are likely to be discernible immediately on business outcomes, others may be staggered. For example, changes in sales earnings, profits, and the number of employees are likely to have immediate and evident impacts. But some outcomes could require a relatively long time to accrue. For example, addressing challenges – online bullying and online sales – would be a slow and gradual process. Therefore, these skill-involved outcomes could not be immediately evident from the intervention. This section describes the impacts in two subsections: immediately visible and staggered impacts.

6. Short-term (immediately visible) impacts

3.1.1. Employment

Usually, women entrepreneurs independently start their businesses with limited capital. The rapidly growing technological change may generate opportunities for more employment. On the other hand, this revolution could even reduce employment, especially when entrepreneurs are virtually connected to the buyers of goods and services and suppliers of raw materials. In the latter, the entrepreneurs can retrench employees that run errands. Table 6.4 shows the estimated effects of the intervention on the total number of current employees. The dependent variable is the number of current employees, including part-time and full-time. The covariates are the technological access, efficiency levels, gross operating surplus, and district fixed effects. As the UNDP intervention alone does not affect employment status, we rely on the estimated effects with covariates and other fixed effects. Although the estimated impact of the UNDP intervention on the current employment is statistically significant at 10% without controlling the covariates, the effect withers when the covariates are controlled. Therefore, the UNDP intervention does not significantly change the current employment opportunities.

Table 3.1 Impact on the current employment

	(1)	(2)
Smartphone and training	-1.509*	-0.565

	(0.851)	(0.548)
Covariates	No	Yes
District Fixed Effects	No	Yes
<i>N</i>	682	682

Note. The dependent variable is the total number of employees. Figures in the parentheses are the standard errors. Figures with *, **, and *** represent 10%, 5%, and 1% significance levels respectively.

As the small businesses were hit hard by the covid-19 pandemic, it may adversely affect employment as employees are more vulnerable to cost-cutting measures. Additionally, as lockdown causes many CMSMEs enterprises to shut down or run with limited capacity, employees in these sectors will likely lose their jobs. To examine the effect on employee turnover, we consider the total number of employees newly recruited and the number of employees who were retrenched or left the enterprises before the past and after the three months of the intervention. We also control for covariates and district-specific fixed effects.

Table 3.2 shows the estimated effects on the newly recruited employees in the last three months as well as the number of employees retrenched or left the enterprise. The estimated impact on recruitment is insignificant, while it is significant for the number of employees retrenched or left. The negative and statistically significant estimated effect implies that the intervention reduced the number of retrenched employees. Or in other words, the treatment effect implies that the entrepreneurs did not retrench their employees after the intervention. One of the potential reasons is that entrepreneurs could receive direct and indirect advantages in retaining employees than the new recruitments. For example, employees' personal experiences might significantly influence how they connect with their buyers of products and services and suppliers of raw materials. In contrast, it may take a longer time for newly recruited employees to become familiar with the business and customers, which could negatively impact the customer experience.

Table 3.2 Impact on employee turnover

	(1)	(2)	(3)	(4)
	Recruitment		Retrenched/Left	
Smartphone and training	0.006 (0.046)	0.005 (0.058)	-0.061* (0.035)	-0.081* (0.044)
Covariates		Yes		Yes
District Fixed Effects	No	Yes	No	Yes
<i>N</i>	682	682	682	682

Note. The dependent variable is the total number of employees. Figures in the parentheses are the standard errors. Figures with *, **, *** represent 10%, 5%, and 1% significance levels respectively.

3.1.2. Inventory management and sales proceeds

Effective inventory management is a crucial business strategy to survive and thrive in a competitive environment. However, as most entrepreneurs run small businesses and might not have enough training, it is uncertain whether inventory management is executed as planned. One of the probable reasons is that sometimes enterprises could have unsold products in a month, but they could have counted as inventory. Therefore, this study considers the inventory as the percentage of unsold products to the total amount of monthly sales. Using the DID approach, Table 3.3 shows the estimated effects of the intervention on the inventory are positive, indicating that the intervention encourages entrepreneurs to increase their share of inventories. As it is uncertain if the inventory is planned or unplanned, making an argument about whether it is good or bad is beyond the scope of the study. If the inventory is strategic, then positive impacts are good, while unplanned inventory is not desired.

Table 3.3 Impact on the inventory management

	(1)	(2)
Smartphone and training	8.674***	5.903***
	(1.770)	(1.757)
Covariates	No	Yes
District Fixed Effects	No	Yes
<i>N</i>	682	682

Note. The dependent variable is the percentage of unsold items to the total sales amount. The control variables include the total amount of raw materials and profits. Figures in the parentheses are the standard errors. Figures with *, **, and *** represent 10%, 5%, and 1% significance levels respectively.

Although enterprises produce or sell various products, good businesses run on a solid foundation of revenue streams. As the products sold or made by the entrepreneurs are heterogeneous, it is difficult to identify the primary commodity among the sampled enterprises. This study, therefore, considers the monthly sales earnings after adjusting the inventory. Table 3.4 shows the estimated effect of the intervention on the total sales revenue. In this case, we consider the log form of the monthly sales as the dependent variables, while the covariates are the raw materials, educational status, and internet skills. As sales could be affected by the regional areas, we control for the district fixed effects to capture the local effects.

Table 3.4 Impact on the total sales proceeds

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Base 2019		Base 2020		Base before October 2021		Base considering all three years	
Smartphone and training	0.220***	0.227**	0.540***	0.543***	0.166***	0.300***	0.562***	0.644***
	(0.083)	(0.109)	(0.070)	(0.094)	(0.059)	(0.079)	(0.063)	(0.085)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes

District Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
<i>N</i>	682	682	682	682	682	682	682	682

Note. The dependent variable is the log of the total monthly monetary sales amount. The control variables include the total amount of raw materials, internet use skills, and educational status. Figures in the parentheses are the standard errors. Figures with *, **, and *** represent 10%, 5%, and 1% significance levels respectively.

Table 3.4 shows that the estimated treatment effect is positive and statistically significant. As we consider monthly sales proceeds and have information for the three years before the intervention, we consider each as the benchmark and compare it to the post-intervention separately. The dependent variable is the log form of the monthly sales proceeds. In each case, the intervention significantly improves the amount of sales revenue. For example, considering all three years' monthly sales as a benchmark, a significant estimate of 0.562 indicates that the UNDP intervention increases sales proceeds by 56.20%, while it is 64.40% after controlling the covariates and district fixed effects.

As will be found later, no significant impacts of the UNDP intervention on mobile phone and internet use skills could be established. A corollary question is, what other potential factors contribute to such positive effects on the sales earnings? Using Equation 1, we extend the previous estimation model with more covariates. Table 3.5 shows the estimated impacts of potential factors on sales earnings. The results show that the UNDP intervention significantly increases the monetary values of the total sales proceeds along with capital assets and raw materials, and entrepreneurial mobile phone skills. These findings suggest that entrepreneurs with more capital investment are likely to experience more sales proceeds. Although the UNDP intervention does not significantly affect the entrepreneurs' mobile phone use efficiency, this skill nonetheless significantly impacts sales proceeds. As the post-intervention survey was conducted within only four months, it may need a longer time to ascertain whether the UNDP intervention significantly affects entrepreneurial skills for mobile phone use.

Table 3.5 Proximate determinants of sales proceeds

	(1)	(2)
Smartphone and training	0.5146*** (0.0695)	0.4630*** (0.0694)
New business opening	-0.0366** (0.0165)	-0.0121 (0.0188)
Sole ownership	-0.2640 (0.2353)	-0.1222 (0.2261)
Mobile phone skills	0.5979** (0.2528)	0.3296 (0.2598)
Raw materials	0.7086*** (0.0211)	0.7025*** (0.0238)
Current asset value	0.0451 (0.0291)	0.0355 (0.0282)

Education	0.0131 (0.0168)	-0.0011 (0.0184)
Internet speed	0.0648** (0.0316)	0.0887*** (0.0317)
E-mail use	-0.1327 (0.1407)	-0.2192 (0.1475)
Online platform use	-0.0279 (0.1083)	0.1168 (0.1103)
District Fixed Effects	No	Yes
<i>N</i>	682	682

Note. The dependent variable is the log of total monthly sales proceeds. The capital assets and raw materials values are also used in log form. Figures in the parentheses are the standard errors. Figures with *, **, and *** represent 10%, 5%, and 1% significance levels respectively.

3.1.3. Gross operating surpluses

Given that cost-related data and actual capital depreciation-related information are unreliable or available, we use the enterprise's gross operating surplus (GOS) as a proxy for profits. The GOS is defined as the difference between the sales proceeds and the cost of raw materials, services, overheads, and compensation of employees. The resultant difference is gross as no allowance for using fixed capital is accounted for. The reason for such an assumption is the heterogeneous and inconsistent responses to fixed costs. However, we control for the current market values of the firm, which could capture the fixed capital.

Table 3.6 shows the effect of the intervention on the gross operating surpluses. As we consider the monthly gross operating surplus for the three years before the intervention, we assume each year as the benchmark and then compare it to the post-intervention separately. The dependent variable is the log of the monthly GOS. Columns 1 and 2 show the estimated effect of the smartphone intervention on the GOS, considering the monthly GOS in 2019 as a comparison year. The estimated effect in column 2 is 0.512 is positive and statistically significant, indicating that the smartphone intervention increases the GOS by 51.20%. Considering all three years of 2019, 2020, and 2021, the estimated effect, 0.454, is also positive and significant, meaning that the intervention significantly improves the operating surpluses. The potential factors of such findings are increased sales proceeds, capital investment, and mobile phone efficiency, as reported in Table 3.5.

Table 3.6 Impact on the gross operating surpluses

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Base year 2019		Base year 2020		Base year is before October 2021		Base year is all three years	
Smartphone and training Covariates	0.423*** (0.101)	0.512*** (0.120)	0.672*** (0.088)	0.759*** (0.102)	0.468*** (0.075)	0.454*** (0.085)	0.468*** (0.075)	0.454*** (0.085)
District Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes

<i>N</i>	682	682	682	682	682	682	682	682
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Note. The dependent variable is the log of the total monthly monetary sales amount. The control variables include the total amount of raw materials, market values of the current firm, internet use skills, and educational status. Figures in the parentheses are the standard errors. The *, **, *** represent 10%, 5%, and 1% significance levels, respectively.

UNDP Bangladesh considered a selected group of women entrepreneurs who do not have a smartphone as the beneficiary group to provide the smartphone and related training. The UNDP Bangladesh also randomly selected another group of entrepreneurs as a comparison group with characteristics similar to the beneficiary group. However, the baseline surveys revealed that approximately 40.21% of beneficiary enterprises use smartphones, while 44.27% of the comparison enterprises already had smartphones before the intervention. Therefore, to check whether the previously reported treatment effects are robust, we exclude the entrepreneurs who reported having a smartphone during the baseline survey. Table 3.7 shows that the treatment effects on sales proceeds and gross operating surpluses are positive and significant, indicating the treatment effects of the intervention are consistent with the findings reported while considering the total sample size.

Table 3.7 Robustness check

	(1)	(2)	(3)	(4)
	<i>Sales proceeds</i>		<i>Gross operating surplus</i>	
Smartphone and training	0.8132*** (0.1122)	0.6921*** (0.1112)	0.5468*** (0.1148)	0.5468*** (0.1148)
Covariates	Yes	Yes	Yes	Yes
District Fixed Effects	NO	Yes	No	Yes
N	398	398	398	398

Note. The dependent variable is the log of total monthly sales and gross operating surplus. The control variables include the total value of raw materials, market values of the current firm, internet use skills, and educational status. Figures in the parentheses are the standard errors. Figures with *, **, and *** represent 10%, 5%, and 1% significance levels respectively.

3.1.4. Adoption of an online platform

Nowadays, shoppers prefer online shopping over in-person shopping because of its multiple benefits. For example, buyers can conduct extensive research online before contacting a salesperson or going to the store. In addition, internet technology makes conducting business much easier and faster. An online store would increase profits by selling across towns, far away areas, and even borders, removing all geographical limitations. Online shopping can save buyers and retailers time knowing specifications and other product-related information. Therefore, entrepreneurs are likely to adopt online product sales. Table 3.8 shows the marginal effect of the intervention on the likelihood of online selling. Both estimates with and without covariates are positive and statistically significant. For example, a significant impact

of 0.565 indicates that the intervention increases the likelihood of adopting online sales by 56.50%.

Table 3.8 Impact (marginal effect) of adopting an online platform

	(1)	(2)
Smartphone and training	0.635** (0.319)	0.565** (0.265)
Covariates	No	Yes
District Fixed Effects	No	Yes
<i>N</i>	682	682

Note. The estimates are the marginal effects after estimating the probit-typed DID model. Figures in the parentheses are the standard errors and the number of observations. The *, **, *** represent 10%, 5%, and 1% significance levels, respectively.

3.1.5. Smartphone usage for business activities

Business communication has significantly evolved over the last few years, making it more efficient by quickly integrating technological tools. In addition, mobile technology and connectivity have been rapidly changing conventional business communication approaches and practices, allowing prompt communication to stakeholders. This technology significantly affects how entrepreneurs connect and reach out to customers using mobile Apps. The mobile technology allows interactive communication and instantaneously resolves doubts, inquiries, and requests from the respective stakeholders. It also enables teleconferences and online meetings so that stakeholders from different locations can actively participate as if they were physically present. These multifaceted opportunities facilitate better business collaboration and help improve productivity.

We consider business activities, including business communication, mobile services, business-related browsing, purchasing online raw materials, and communicating with suppliers. Business communication includes correspondence with phone calls, messages, video calls, and teleconferences. Table 3.9 shows the estimated effect of the intervention on time spent on business activities. In each case, we consider the dependent variable as the log form of the total number of minutes weekly spent on each activity. The covariate incorporates business sales and entrepreneurs' technology efficiency levels.

Table 3.9 Impact on internet use for business activities

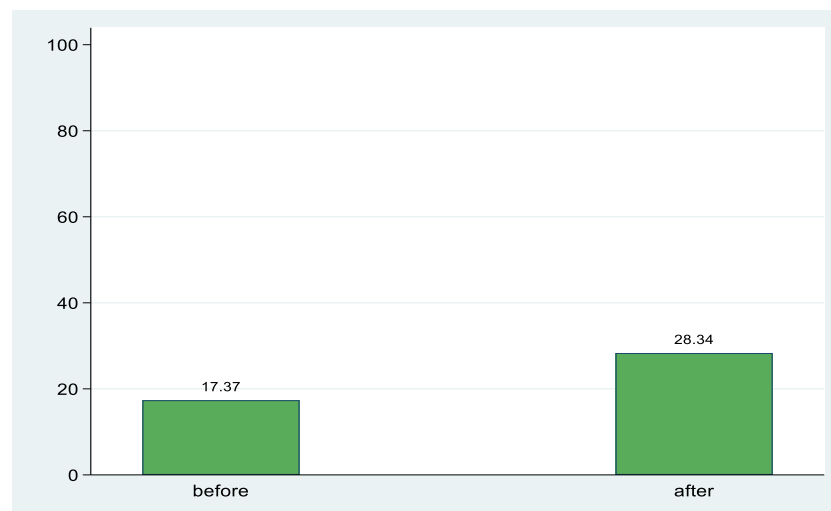
	(1)	(2)	(3)	(4)	(5)
	Business Communication	Mobile Financial Services	Business-related browsing	Procuring raw materials	Communicating with suppliers of raw materials
Smartphone and training	0.186*** (0.041)	-0.004 (0.009)	0.267*** (0.049)	0.171*** (0.034)	0.225*** (0.038)
Covariates	Yes	Yes	Yes	Yes	Yes

District FE	Yes	Yes	Yes	Yes	Yes
N	682	682	682	682	682

Note. The dependent variable is the log of minutes used for business-related activities. The covariates include business sales and entrepreneurs' technology efficiency levels. Figures in the parentheses are the standard errors. Figures with *, **, and *** represent 10%, 5%, and 1% significance levels respectively.

Table 3.9 also shows that the treatment effect is positive and statistically significant at 1% for each case, except for the mobile financial service. For example, the UNDP intervention increases the time spent on business communication by 18.60%, browsing for business by 26.70%, purchasing raw materials by 17.10%, and contacting suppliers by 22.50%. Our estimate implies that the UNDP intervention does not significantly impact their mobile financial services. However, Figure 3.1 shows that the percentage of the beneficiary entrepreneurs who use the MFS increases before and after the intervention. In contrast, the impact analysis shows the causal effect by comparing outcome differences between before and after intervention with the comparison group. Another potential reason for the insignificant impact of smartphones is the entrepreneurs' financial instability. As many entrepreneurs seem to have gone through rough patches in financial aspects, having a bank account or financial account may seem like a far-fetched idea for them. In case study -1, we describe the condition of such a beneficiary where the beneficiary is still recovering from an unstable financial familial situation.

Figure 3.1 Trends in adopting the mobile financial services



Source: BIDS Women Entrepreneur Panel Survey, 2021 and 2022.

Case Study-1: Smartphone and Madhu's Turnaround in Life

Life in a remote Hill Tracks is harder than it is in the plains. Issues like poverty and underdevelopment play a vital role in people's lives there. Among many adverse situations and conditions, people in the Hill Tracks survive through sheer determination and self-will. "Madhu" is part of such a community. Her father was a "jhum" cultivator supporting a family with three children. This livelihood strategy did not give him enough opportunity to provide with institutional education for his three children. When it became too much of a crisis for their family, Madhu had to drop out of school and get married earlier than usual. There was also financial crisis in the family and she decided to run a cloth store with a few of her local friends. However, she also had to close down soon due to lack of capital in 2017. With undaunted spirit, she again somehow collected some funds and opened her own tailoring and clothing store in 2018. Things were going well and sales were increasing day by day. Then there was the covid-19 pandemic. With plummeted on-store sales, she then decided to open a Facebook page for selling traditional clothing and clothing apparel business. Though it has been a bumpy ride, her business started to go well with the online business. With her hard-earned money, she has helped her previously unemployed husband to open a photocopy and printing shop while also sending her kids to school. With the smartphone and related training from UNDP, she is now better equipped to handle her online business and support her family and herself too.

3.1.6. Non-business use of smartphone

Since its inception, the smartphone has become a ubiquitous gadget in everyday life as it offers multidimensional functions from communication to navigation and entertainment, etc. Using the only mobile device, beyond business- and family-related conversation, an individual can take pictures, read books, listen to music, watch movies or videos, play games, create documents, receive medical prescriptions, and many more. As a result, users spend more time on their phones, increasing their usage time.

As the UNDP intervention provides the phone for the beneficiary entrepreneurs, this device is likely to offer another avenue to use for non-business activities like entertainment, social media use, and online education. Table 3.10 shows the estimated effects of the intervention on internet use for non-business activities. The dependent variables each are a log of the use time measured in total minutes for each activity in a week. In each case, the treatment effect of the intervention is positive and significant, indicating increased use time, except for online education. For example, the intervention increases entertainment time by 66%, social media use by 67%, gaming by 8.80%, and family-related conversation by 21.8%. However, the intervention does not appear to affect online education time use. One of the potential reasons is that most entrepreneurs live in rural areas and their children are less likely to engage in online education than their urban counterparts.

Table 3.10 Impact on internet use for non-business activities

	(1)	(2)	(3)	(4)	(5)
	Entertainment	Social media use	Communication for family purposes	Online education	Gaming
Smartphone and training covariates	0.663*** (0.076)	0.669*** (0.072)	0.218*** (0.037)	-0.036 (0.041)	0.088*** (0.027)
District Fixed Effects	Yes	Yes	Yes	Yes	Yes
N	682	682	682	682	682

Note. The dependent variable is the log of minutes used for each activity. The covariates include business sales, educational status, and entrepreneurs' technology efficiency levels. Figures in the parentheses are the standard errors. Figures with *, **, *** represent 10%, 5%, and 1% significance levels respectively.

7. Long-term (slow and gradual) impacts

3.1.7. Propensity in Household expenditures

Usually, women's entrepreneurship contributes to the socioeconomic transformation of the family and society as it can solve many financial and non-financial problems, particularly in developing countries. For example, a successful women entrepreneur could earn more money, so the total family income increases, given other constant components. Therefore, the family would have more purchasing power for food and non-food expenditures.

Money is fungible. Once earned in a particular household, it is usually spent on family purposes. An increase in a family member's income implies an increase in the total family income. As a composite unit within the family, the increased income does not necessarily recognize a specific item expenditure. The potential reason is that family expenditure is also a composite component. For example, suppose that the father's income pays the house rent as an essential expense, and the food costs could be paid from the mother's income. In this case, one cannot argue that the father only contributes to the house rent or that the mother contributes to the food expenditure. As food and house rent are the essential components of the household, they complement each other. Therefore, describing the total family expenditures from the entire family income would be more meaningful and representative.

For the analytical purpose, we looked into a few items of expenditures that women entrepreneurs are likely to spend from part of their operating surpluses. We assume that the item-wise expenses as the percentage distribution of the family expenses from the total family income. Therefore, the dependent variable is the percent compared to the whole household business and non-business income. Table 3.11 shows no treatment effects for necessary items are statistically significant at any level except for savings.

Table 3.11 Impact on the share of household expenditures

	(1)	(2)	(3)	(4)	(5)
	Food	Clothing and cosmetics	Savings	Medicare and education	All other expenses
Smartphone and training	1.906 (1.560)	0.623 (0.526)	0.571* (0.318)	1.079 (1.866)	0.238 (0.335)
Covariate	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes
N	682	682	682	682	6826

Note. The dependent variable is the item-wise percent of the total monthly expenditures compared to the total income. *All other expenses* item represents household expenditures on utility, wages and salaries for family requirements, house rent, family loan payments, household furniture, home maintenance, social and religious event-related cost, recreation- and leisure-related expenses, taxes, and other miscellaneous expenses. Figures in the parentheses are the standard errors. Figures with *, **, and *** represent 10%, 5%, and 1% significance levels respectively.

Our estimates indicate that the intervention significantly encourages entrepreneurs to save. This positive effect is consistent with the literature that women have more savings tendencies than their male counterparts. Studies, such as Anderson & Komba (2017) and Handy et al. (2007), argue that women are likely to discontinue their established businesses because of insufficient funds and are more likely to exit their businesses over financial problems.³ Therefore, the positive impact of the intervention on savings would unleash their financial constraints.

3.1.8. Entrepreneurial technological efficiency

Digitalization offers opportunities for small businesses to overcome their size-related barriers. For example, a high-speed internet connection helps entrepreneurs adopt a modified approach to their business functions. In addition, e-commerce promotes the sales of goods or services and procurement of raw materials through networks explicitly designed to receive or place business orders. Consequently, entrepreneurs with sound technical knowledge could utilize their highest potential in the post-pandemic era. Therefore, entrepreneurs must have the digital and traditional business knowledge to succeed in business operations. Also, most entrepreneurs increasingly rely on digital media tools to pursue entrepreneurial prospects. Therefore, the entrepreneurial efficiency level is critical in achieving their business objectives.

Table 3.12 shows the marginal effects of smartphone intervention on entrepreneurial skills levels, including mobile phone and internet use skills. The dependent variable is a binary

³ <https://blogs.worldbank.org/developmenttalk/helping-poor-women-grow-their-businesses-mobile-savings-training-and-something-more>

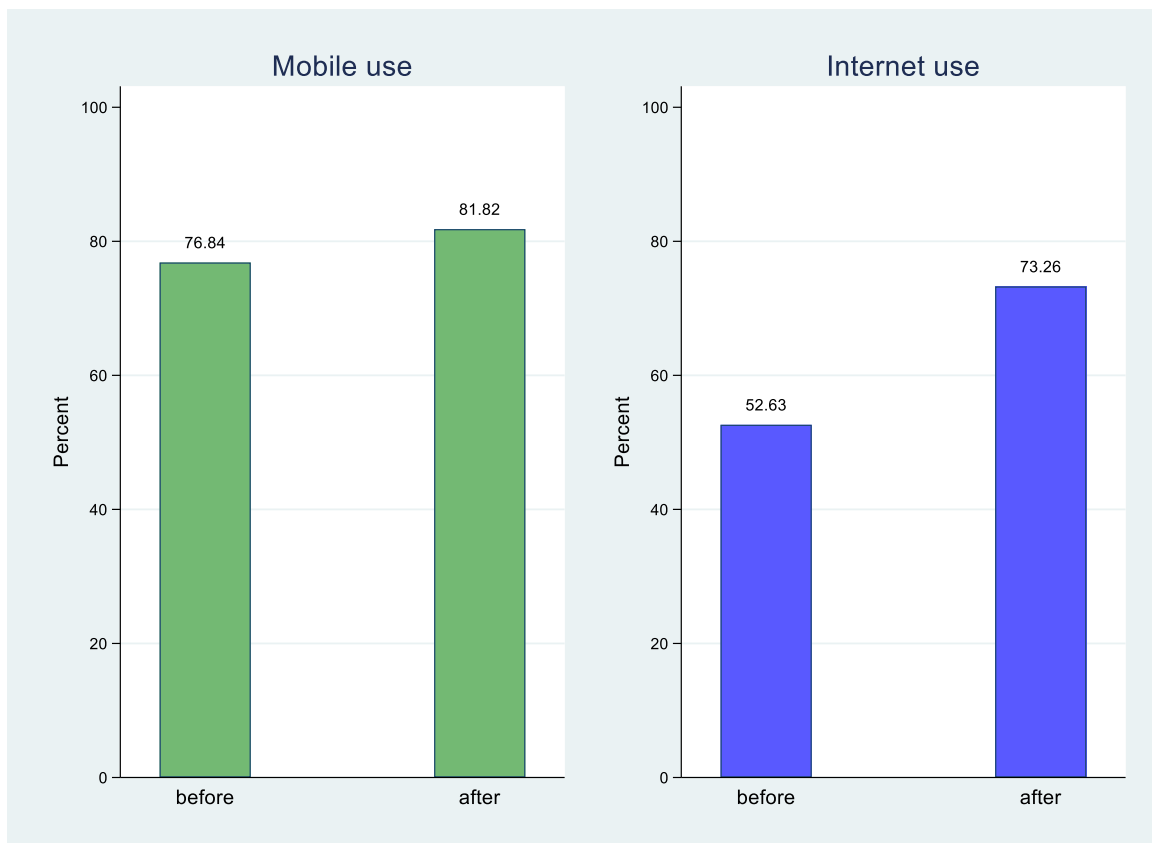
indicator of whether entrepreneurial skills are at an average level or above. Columns 1 and 2 show the estimated marginal effect of the treatment on mobile phone skill levels with and without controlling for covariates. No estimated marginal effects are statistically significant at any level. Similarly, columns 3 and 4 show that the treatment effects of the smartphone on skill levels for internet use are not statistically significant. These insignificant effects show that the smartphone plus training intervention does not immediately improve the technological efficiency of women entrepreneurs. Studies like Olsson & Bernhard (2020) and Sun et al. (2021) argue that small entrepreneurs could require a longer time to comprehensively learn the techniques used in e-commerce. However, Figure 3.2 shows an increasing trend in the percentage of beneficiary entrepreneurs with average or above skill levels.

Table 3.12 Impact (Marginal effect) on technology use skills

	(1)	(2)	(3)	(4)
	<i>Mobile use skills</i>		<i>Internet use skills</i>	
Smartphone and training	0.079 (0.108)	0.069 (0.175)	0.018 (0.103)	-0.034 (0.113)
Covariates	No	Yes	No	Yes
N	682	682	682	682

Note. The dependent variable is a binary indicator for individuals with average or above efficiency level. The covariates include the family members' entrepreneurial educational status, ownership status, and technological skills. Figures in the parentheses are the standard errors. Figures with *, **, and *** represent 10%, 5%, and 1% significance levels respectively.

Figure 3.2 Distribution of beneficiary entrepreneurs with technology use skills



Source: BIDS Women Entrepreneur Panel Survey, 2021 and 2022.

The baseline study found that approximately 80% of the treatment group already had an average or above efficiency level of mobile usage before the intervention. As they have prior knowledge, the marginal effect of the smartphone and training on technical efficiency is unlikely to be significant. One of the key informants argues that the lack of follow-up practices could be another reason for the limited effect of the training intervention. In addition, the country-wide digitalization programs could have trickledown effects on their efficiency in smartphone or internet use skills, which might have muted the treatment effect of the intervention. In addition, interventions from other projects and training could also make some entrepreneurs privy to technical business-related knowledge (as supported by “Tuni”- an *Alice* from case study-2) and prove the assumption of the marginal or little effect of interventions.

Case Study-2: Tuni's Indomitable Quest for Solvency

“Tuni” lost her husband after just five years of her marriage. Soon after the tragedy, she had to come back and live with her farming parents with her two children. At first, she joined the other workers on earthwork in road maintenance through UNDP’s SWAPNO project. Meanwhile, she got the chance to get business-related training through the same project. With her training and accumulated funds from the project, she set up her own grocery shop. With the development of her business, she earned some credibility and could avail of a loan from a microfinance institution. She arranged for a bigger space and with a refrigerator and various other products, she business started to take off. In 2021, she received a smartphone from UNDP and participated to the training program. Now, she is planning to move to online business with her new technological know-how and knowledge. Her dream is to build a house of her own and educate her two children and hopes that she would never have to be hapless like her past ordeal.

3.1.9. Market access

In the digitalization era, everyone has access to a mobile phone, making it easy to access the local and global markets. For example, small businesses can use mobile marketing strategies to reach out to more customers or retailers. This opportunity enables them to compare raw materials prices while even staying home. In addition, they can attract customers outside the locality by applying many promotional activities.

Table 3.13 shows the marginal effects of the intervention on accessing the outside market and promotional activities. For this study, the outside market is defined as the customers or markets located outside the own upazila of the entrepreneur. Column 1 shows the estimated effects with covariates. Again, the marginal impact is statistically insignificant, implying that the intervention does not help entrepreneurs to expand their market areas. One potential reason for such a finding is that expanding the product market may require a longer time. In addition, knowing smartphones and using them to access the outside market would require more time (Thar et al., 2021). However, Figure 3.3 shows that the percentage of beneficiary entrepreneurs accessing the outside market slightly increases after the intervention.

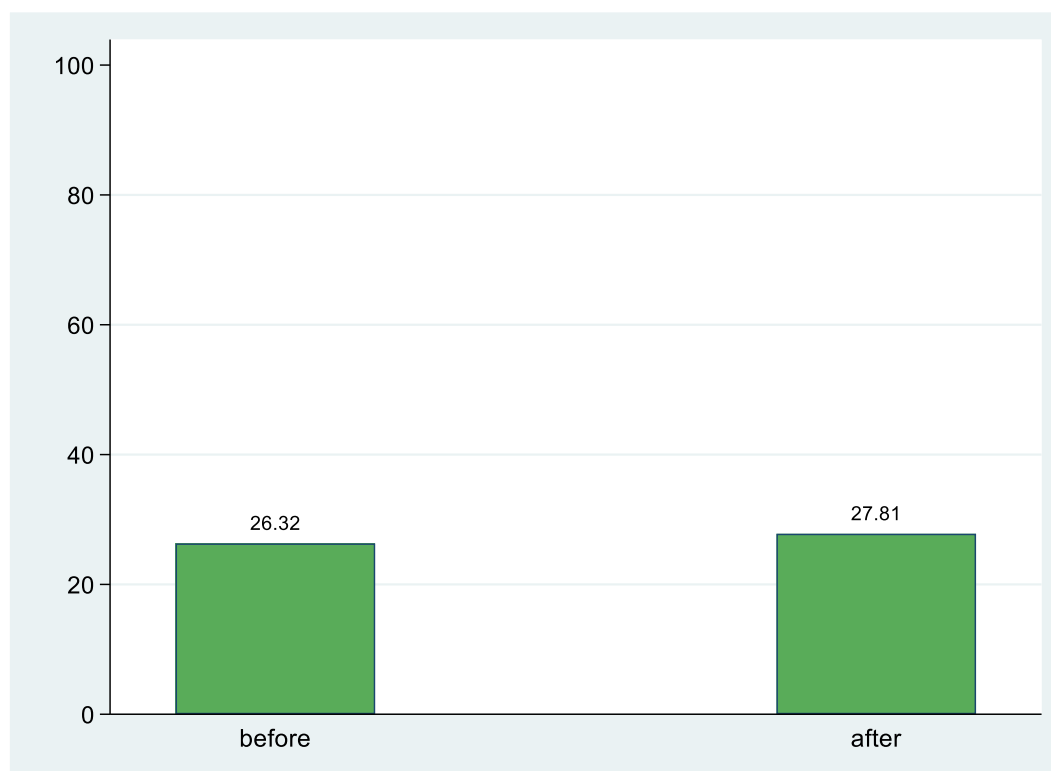
Table 3.13 Impact (marginal effect) on accessing the outside market and advertising

	(1)	(2)
	Market access	Advertisement
Smartphone and training	0.065 (0.183)	0.620 (123.660)

Covariates	Yes	Yes
<i>N</i>	682	682

Note: The dependent variable is a binary indicator for selling outside the local market. The entrepreneur's upazila is considered as the local market. The covariates include profits and technological skill levels. Figures in the parentheses are the standard errors. Figures with *, **, and *** represent 10%, 5%, and 1% significance levels respectively.

Figure 3.3 Distribution of beneficiary entrepreneurs accessing the outside market



Source: BIDS Women Entrepreneur Panel Survey, 2021 and 2022.

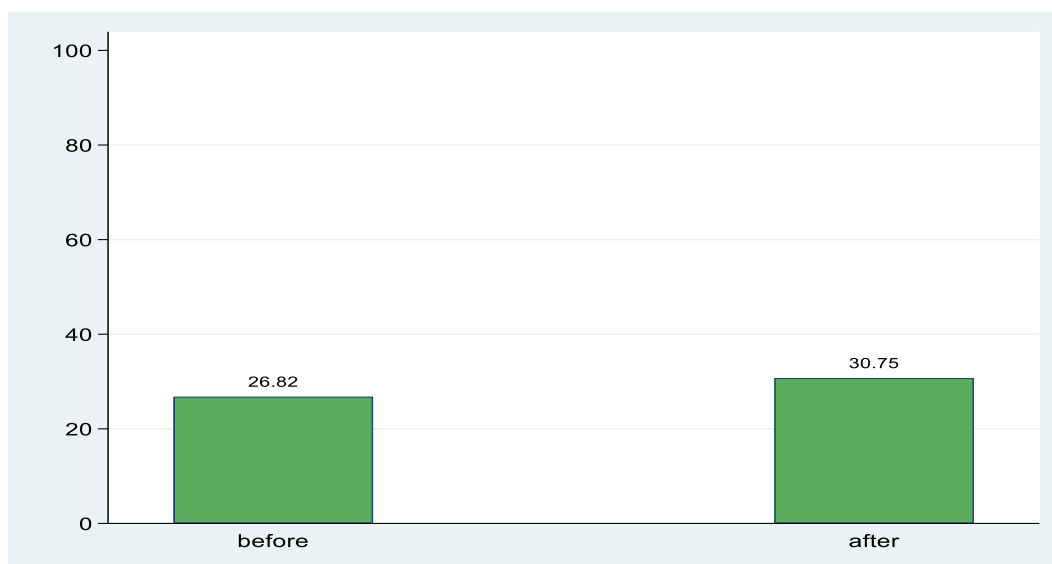
3.1.10. Promotional activities

The enterprises mainly target the local market, own sub-district, and district markets for selling a wide range of products. Unlike the conventional in-person mode, business activities can be executed anywhere in the digital era. This opportunity allows transactions can be done outside the store. Using smartphones, entrepreneurs can communicate by sending and receiving messages, making and receiving calls, checking and recording voicemails, and many others. In addition, customers can also make decisions by matching the picture with their desired products. In addition, they use various advertising tools to grow their client base and boost sales proceeds. For example, they use digital advertisement platforms, including Facebook and YouTube, or choose more traditional advertising media, including leaflets, newspapers, radio, and local TV. Investing strategically in advertisement can result in a high return on investment as it could bring higher brand values to enterprises.

Table 3.12 shows the marginal effects of the intervention on the likelihood of advertisement. The dependent variable is a binary indicator of whether entrepreneurs advertise for their stores or products. The covariates are the number of family members, the highest educational status of the family, and their efficiency levels for technological uses. After controlling the covariates, Column 2 of Table 3.13 shows that the estimated effects are still insignificant. These findings imply that smartphone intervention does not significantly impact entrepreneurial attitudes toward an advertisement. Studies, such as Campbell & Grimm (2019) and Liu-Thompkins (2019), find that advertising and promotional activities, especially for online platforms, are challenging, and entrepreneurs need rigorous training to use these business techniques effectively.

However, Figure 3.4 shows the percentage of beneficiary entrepreneurs advertising their products before and after the intervention. Comparing the same group of entrepreneurs before the intervention, more beneficiaries use promotional activities. Through case studies of different women entrepreneurs, we find that the entrepreneurs regard this opportunity of furthering their client base through technological access as a positive sign to broaden their businesses and hope to achieve a greater number of customers through this intervention (Case Studies - 3 & 4).

Figure 3.4 Trends in the advertisement before and after the intervention



Source: BIDS Women Entrepreneur Panel Survey, 2021 and 2022.

Case Study- 3: Shum’s Forward March Continues...

With a disabled husband, “Shumi” had to rely on meager earnings and efforts to run her family of three. As a small family, her husband being disabled meant that he could not work well or at a regular basis. The UNDP gave her some opportunities to start a business venture of her own. She was really enthusiastic and hardworking and succeeded to grow her business. She borrowed funds for the business and was able to repay them soon too. The financial assistance and her motivation to be self-reliant made her successful. When the pandemic hit, she decided to go forward and carry out her business online. Now with the UNDP-provided smartphone, she can go for online business and hopes to encourage others to be confident and grow like her.

Case Study- 4: Meena’s Dream Has Come True!

As a deserted woman, “Meena’s” story was similar to Shumi’s. She lost all hope when her husband abandoned her for someone else and left her to fend for herself and her baby daughter. While working as an earth worker in a UNDP assisted project, she got the chance to earn some money. She used the fund to start her tailoring venture. Now, she is earning well and has educated and married off her daughter too. She is now the proud owner her own house and hopes to start online business with a UNDP-provided smartphone.

3.1.11. Problem-solving skills during online business

The journey from start to success in a small business is always uneven, with many pitfalls and obstacles. Many women entrepreneurs face various other problems even after starting their businesses besides the hindrance from family and society. Entrepreneurs could also face different challenges from buyers and competing sellers because of technological change. For example, in online business, entrepreneurs face negative responses, bullying, bad reviews, and losing customers after the bad review from competing enterprises. Some retailers also charge a higher price for raw materials. In addition, they face difficulties in online uploading or storing business information on computers and mobile phones.

With easy access to the internet and the growing popularity of social networks, information has become more accessible, and communication has become much more manageable. Unfortunately, these opportunities could offer a more accessible space for cyberbullying and online harassment, especially against women. The smartphone intervention trains women entrepreneurs to address such unexpected incidences. Table 3.14 shows the marginal effect of the intervention on the likelihood of experiencing bullying from buyers and competing

sellers. While statistically insignificant estimates indicate that the intervention does not help reduce bullying experience, Figure 3.5 shows that the percentage of the beneficiary entrepreneurs experiencing bullying decreases after the intervention. Further, within the same group comparison before and after the intervention, Figure 3.5 indicates that some entrepreneurs have learned how to prevent bullying experiences. Studies, such as Durst & Henschel (2021) and Gilboa et al. (2019), also pointed out that entrepreneurs need to learn effective communication techniques to enhance customers' trust even facing unexpected experiences during online business.

Table 3.14 Impact (marginal effect) on the likelihood of facing bullying

	(1)	(2)	(3)	(4)
	From buyers		From competing sellers	
Smartphone and training	-0.144 (0.125)	0.007 (0.138)	0.092 (0.115)	0.174 (0.127)
Covariates	No	Yes	No	Yes
Observations	682	682	682	682

Note. The dependent variable is a binary indicator of whether entrepreneurs face online bullying or bad reviews. The covariates include internet literacy and speed and the entrepreneur's educational status. Figures in the parentheses are the standard errors. Figures with *, **, and *** represent 10%, 5%, and 1% significance levels respectively.

Figure 3.5 Distribution of beneficiary entrepreneurs facing online bullying



Source: BIDS Women Entrepreneur Panel Survey, 2021 and 2022.

Communication through digital media takes a special place these days. This electronic correspondence has become even more apparent in conducting meaningful transactions and leading successful business entities. In doing so, business transactions and documentation processes must be performed effectively. Therefore, entrepreneurs must be aware only of how to conduct successful communication through uploading products or storing documents and ensure that it happens in a safe and secure environment. Table 3.15 shows the marginal effects of the intervention on the likelihood of experiencing challenges in uploading products or storing information. In this case, the dependent variable is the binary indicator of whether the entrepreneur faces challenges. The covariates are internet efficiency skills, educational status, and internet speeds. These difficulties for SMEs are intensely associated with the lack of awareness and digital literacy regarding technological implementation (Chuang et al., 2007; Cragg et al., 2000; Zheng et al., 2004). Therefore, it is highly likely that firms require a longer time to acquire higher technological experience and perceive the change within the organization to apply it successfully.

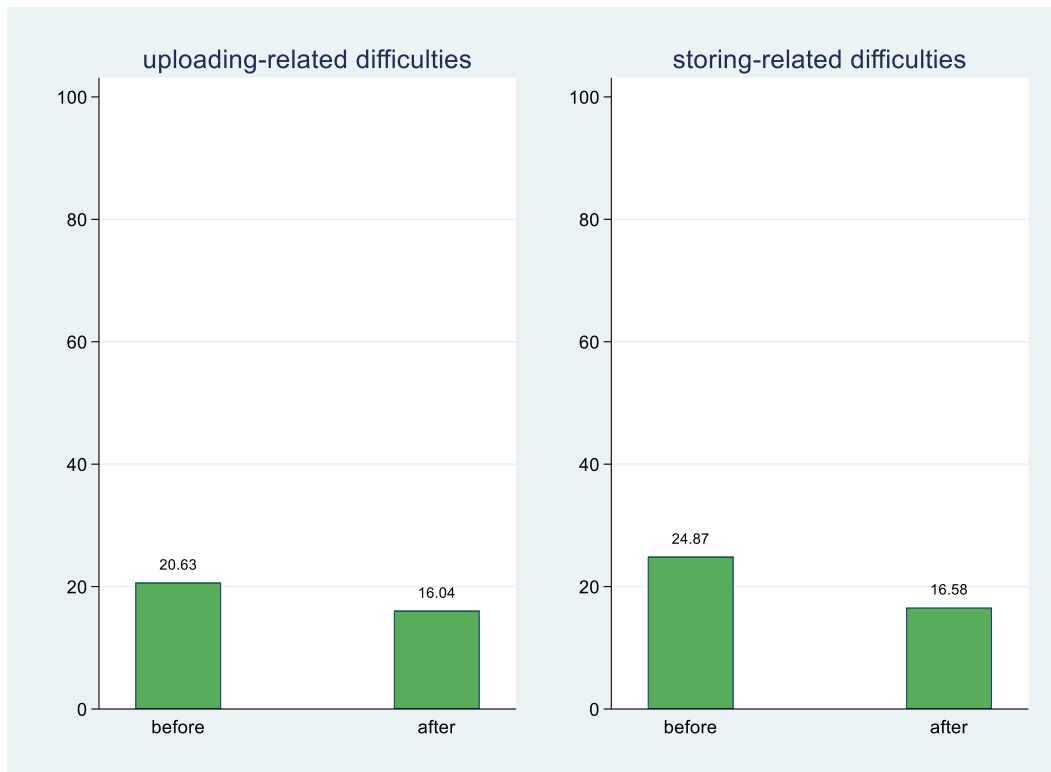
Table 3.15 Impact (marginal effect) on facing online challenges

	(1)	(2)
	Uploading products	Storing information
Smartphone and training	-0.048	-0.096
	(0.170)	(0.151)
Covariates	Yes	Yes
Observations	682	682

Note. The dependent variable is a binary indicator of whether entrepreneurs face difficulties uploading online products or storing business information. The covariates are internet literacy and speed and the entrepreneur's educational status. Figures in the parentheses are the standard errors. Figures with *, **, and *** represent 10%, 5%, and 1% significance levels respectively.

However, Figure 4.6 shows that the percentage of beneficiary entrepreneurs experiencing difficulties in storing or uploading products online decreases after the intervention. For example, approximately 21% faced issues related to uploading online products, which was reduced to 16% after the intervention. This trend represents that some beneficiary entrepreneurs have learned to upload online products after the intervention.

Figure 3.6 Beneficiary entrepreneurs facing difficulties in uploading or storing information



Source: BIDS Women Entrepreneur Panel Survey, 2021 and 2022.

3.1.12. Women’s economic and social empowerment

Women empowerment represents women’s control over critical parts of their lives in the household, business, and the economy. The women empowerment index developed in this study allows an understanding of female autonomy and decision-making capability. In addition, the index aims to increase awareness of the connections across empowerment, food security, and other basic human rights. On the other hand, the women empowerment index can be used to monitor the government’s progress towards sustainable development goals (SDGs). Therefore, this study constructs an index to present the level of empowerment of entrepreneurs. This index considers three broad categories: business, household, and personal autonomous decision-making capabilities. The index ranges between 0 and 100, with a higher index value implying higher empowerment and vice versa.

Women’s decision-making approach is assumed to depend on three broad categories: family-related, business-related, and financial management-related capabilities. Women have a significant role in making family decisions, such as marriage, family planning, health care, education, purchasing home appliances or own belongings, and whether they solve family issues independently. However, this complex decision is always made jointly through a discussion with other family members. Other choices, such as family planning, children’s

education and health care, and solving family issues, are mostly handled jointly with their husbands and other family members.

Business-related decision-making index includes abilities in their business management, employee recruitment, commodity price setting, capital collection, transactions with bank or microfinance, taxes payment, business expenditure, and communication with the retailers. Financial management is a critical element of running a business as a whole. However, many entrepreneurs who started running a business independently could not actively engage in financial matters. The potential reason is that some might not have enough knowledge to record their business transactions and analyze financial statements. Others might be highly involved in other business-related activities: purchasing raw materials and managing people. Therefore, they could make poor decisions to identify key metrics for their entrepreneurial performance in most cases.

Table 3.16 shows the estimated effects of the intervention on the women empowerment index for three broad categories and the overall index. The dependent variable is the log form of the empowerment index. The covariates include educational status and gross operating surplus. As women empowerment might be affected by region, we control for the district-specific fixed effects. Table 3.16 shows that none of the estimated effects are significant, meaning that the intervention does not affect women's empowerment. However, these findings are obtained from the second-round survey conducted within only four months of the invention. As empowerment is a slow and continuous process, a four-month duration may not be sufficient to explicitly argue whether an intervention affects women's empowerment.

However, some case studies could find interesting and intriguing scenarios of woman's entrepreneurship. For example, in case study 5, "Rabeya, a special need woman, succeeded after getting adequate support from UNDP and is now employing other women while becoming more self-reliant. This finding indicates that some or few could be benefitted from a particular intervention and support system despite the insignificant average causal impact.

Table 3.16 Impact on women empowerment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	business-decision-making		personal autonomy		household decision-making		Overall empowerment index	
Smartphone and training	0.008	-0.001	-0.012	0.002	-0.004	0.027	-0.004	0.027
	(0.023)	(0.023)	(0.023)	(0.021)	(0.030)	(0.030)	(0.030)	(0.030)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes
District FE	No	Yes	No	Yes	No	Yes	No	Yes
N	682	682	682	682	682	682	682	682

Note. The dependent variable is the log form of the empowerment index. The covariates include educational status and gross operating surplus. As women empowerment might be affected by region, we control for the district-specific fixed effects. Figures in the parentheses are the standard errors. Figures with *, **, and *** represent 10%, 5%, and 1% significance levels respectively.

Case Study-5: Rabeya's Success Against Odds

When she was only 11 months old, "Rabeya's" parents understood that she was a special needs child. Her working father and homemaker mother did not understand what to do and were not enlightened to educate her. But her elder brother was adamant and with his support she started getting her formal education at a general school. After she passed her SSC and HSC with sheer determination, she got admitted into a college and finished her post-graduation. During her second-year honors education, she started a clothing business but could not achieve much progress. In this time, she went through some rough patches and lost her father to illness. Her elder brother was still confident and encouraged her to move forward. In 2020, she got to know about UNDP's Women and E-commerce (WE) group through Facebook.

With training and cooperation from the mentors of the group, she started her online clothing business. Her products soon were being sent to abroad. People from Switzerland, Germany, Europe and America started to buy products from her. With her growing business, she now employs 35 women and has got many recognitions as a women entrepreneur herself. She hopes to set up a show room soon and also wishes that other special needs people would see her achievements and become more enthusiastic about themselves too.

4. Summary and Conclusions

Cottage, small and medium enterprises play a vital role in economic development, including production, employment generation, and equitable income distribution. However, small enterprises experience challenges in running their businesses. This scenario has become worse during the pandemic, especially for women. The pandemic forces small enterprises to adopt and integrate digital technology for their survival. Therefore, UNDP Bangladesh initiates various projects to mitigate the suffering of women entrepreneurs.

While implementing various projects, UNDP Bangladesh also realized e-commerce could help overcome the pandemic, and smartphones would be the most convenient tool to exploit the platform. As smartphones are relatively expensive for many women entrepreneurs, UNDP Bangladesh planned to provide them with smartphones to participate in e-commerce activities. Accordingly, the development partner targets 200 women entrepreneurs and plans to facilitate training programs on relevant skills to address entrepreneurs' e-commerce-related limited knowledge. This study examines the impact of the smartphone plus training intervention on entrepreneurs' business outcomes by comparing them to a similar group of entrepreneurs. In the first phase, the baseline study examines whether the beneficiary and comparison group entrepreneurs are similar to depict if they are likely to have the same business outcomes after the intervention. In the second phase, using the DID methodology, this study examines the impact of the UNDP intervention on business outcomes and other household behaviors.

Considering the duration between the intervention and endline survey, the outcomes are analyzed from two perspectives: short-term (immediately visible) and long-term (slow and gradual) impacts. The key findings are summarized as follows.

A. Short-term (immediately visible) impacts:

8. The intervention has significantly affected entrepreneurs in retaining their employees. One of the potential reasons is that entrepreneurs could receive direct and indirect advantages in retaining current employees than the new recruitments in connecting buyers and suppliers of raw materials.
9. The smartphone and training intervention appears to have significantly increased sales revenue, irrespective of the past benchmark. For example, compared to a benchmark before October 2021, the intervention increases average monthly sales earnings by 30%. It is also evident that entrepreneurs with more capital investment are likely to experience more sales revenue.
10. Effective inventory management is an essential business strategy to survive and thrive in a competitive environment. The estimated effects of the intervention on inventory accumulation are positive and significant, indicating that the UNDP intervention enables entrepreneurs to increase their inventories.
11. The gross operating surplus is used as a proxy of profits as no allowance for using fixed capital is accounted for because of heterogeneous and inconsistent responses to fixed costs. We find that the intervention significantly improves the operating surpluses. For example, when a benchmark is used before October 2021, this program increases the average monthly gross operating surplus by 45%. These results are robust to the possession of smartphones before intervention.
12. Because of increased internet availability and precaution against covid-19 transmission, many customers prefer online shopping over conventional in-store shopping because of its multiple benefits. The study finds that the intervention increases an entrepreneur's likelihood of adopting an online business platform by 56.50%.
13. Mobile technology and connectivity have rapidly changed conventional business communication approaches and practices, allowing prompt communication to stakeholders. The intervention increases their use of business communication by 18.60%, browsing for business by 26.70%, purchasing raw materials by 17.10%, and contacting suppliers by 22.50%.
14. As the smartphone offers multidimensional functions from communication to navigation and entertainment, the smartphone seems inevitable for everyone. The intervention increases entrepreneurs' entertainment time by 66%, and social media use by 67%, gaming by 8.80%, and family-related conversation by 21.8%. However, the intervention does not affect online education time use. One of the reasons for such

findings is that using the smartphone for online educational purposes requires a more rigorous training module with follow-up programs.

C. Long-term (slow and gradual) impacts

15. The intervention does not significantly affect the item-wise percent of household expenditures of the total monthly income for most categories. However, findings imply that the intervention encourages entrepreneurs to increase their family savings.
16. The treatment effects of the intervention on skill levels for smartphone and internet use are not statistically significant. However, while these findings imply that the UNDP smartphone training program does not help immediately improve technological efficiency for women entrepreneurs, the study finds an increasing trend in the percentage of beneficiary entrepreneurs with average or above skill levels.
17. In the digitalization era, everyone has access to a mobile phone, making them easy to access markets across the local and global markets. However, none of the marginal effects are statistically significant, implying that the intervention does not immediately help entrepreneurs to increase their market areas. However, the percentage of beneficiary entrepreneurs accessing the outside market increased after the intervention.
18. The marginal effects of offline advertisement, using leaflets and family and friends, are not statistically significant. The intervention also has no significant impact on entrepreneurial attitudes to online advertisement. However, comparing the same group of entrepreneurs before the intervention, more beneficiaries used promotional activities.
19. With technological change, entrepreneurs could face different challenges from buyers and competitor sellers. For example, female entrepreneurs in the online business could face negative responses, bullying, bad reviews, and losing customers after the bad reviews from competitive firms. However, the treatment effects on these outcomes are not statistically significant, indicating that the intervention does not immediately help to address bullying experiences effectively.
20. Women empowerment represents their control over critical parts of their lives in the household, business, and economy. The findings imply that the intervention does not immediately affect women's empowerment. As empowerment is a slow and continuous process, a four-month duration may not be sufficient to explicitly gauge whether an intervention affects women empowerment.
21. Despite the heterogenous quantitative effects, case studies and focused group discussions with women entrepreneurs suggest that smartphone and training intervention has enabled them in various socioeconomic ways. For example, the intervention made them self-reliant, offered them a secured position in their families, helped them generate employment and become financially established to support their families.

Overall, the empirical findings reveal that the UNDP intervention program significantly contributes to adopting online business platforms, increasing sales earnings, making more profits, and encouraging women to save. It is also evident that the intervention significantly affects women entrepreneurs using internet devices for more business- and non-business-related activities. As women are likely to discontinue or exit from their established businesses over financial problems, the positive impact of the UNDP intervention on savings would unleash women's entrepreneurial financial constraints. It is recommended that UNDP officials closely monitor the post-training progress and help entrepreneurs until they can resolve the issues independently. As the intervention has no significant effect on using smartphones for educational purposes, follow-up training programs could incorporate online education-related modules in the post-covid era.

Although this study finds significant impacts of the intervention on women entrepreneurs, the results should be treated with caution. First, a four-month time span for the post-intervention survey may not be sufficient for assessing impacts on some outcomes, like facing challenges during online business and accessing the outside market. Second, entrepreneurs' efficiency in using smartphones and internet devices could be affected by other factors like country-wide digitalization or the skills of their friends and families. This study does not capture such effects. Finally, as women empowerment is a slow and gradual process, it may require a longer time to confidently estimate the impact of this intervention on women empowerment.

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Appendix: 1

Table A. 1: UNDP Training Details

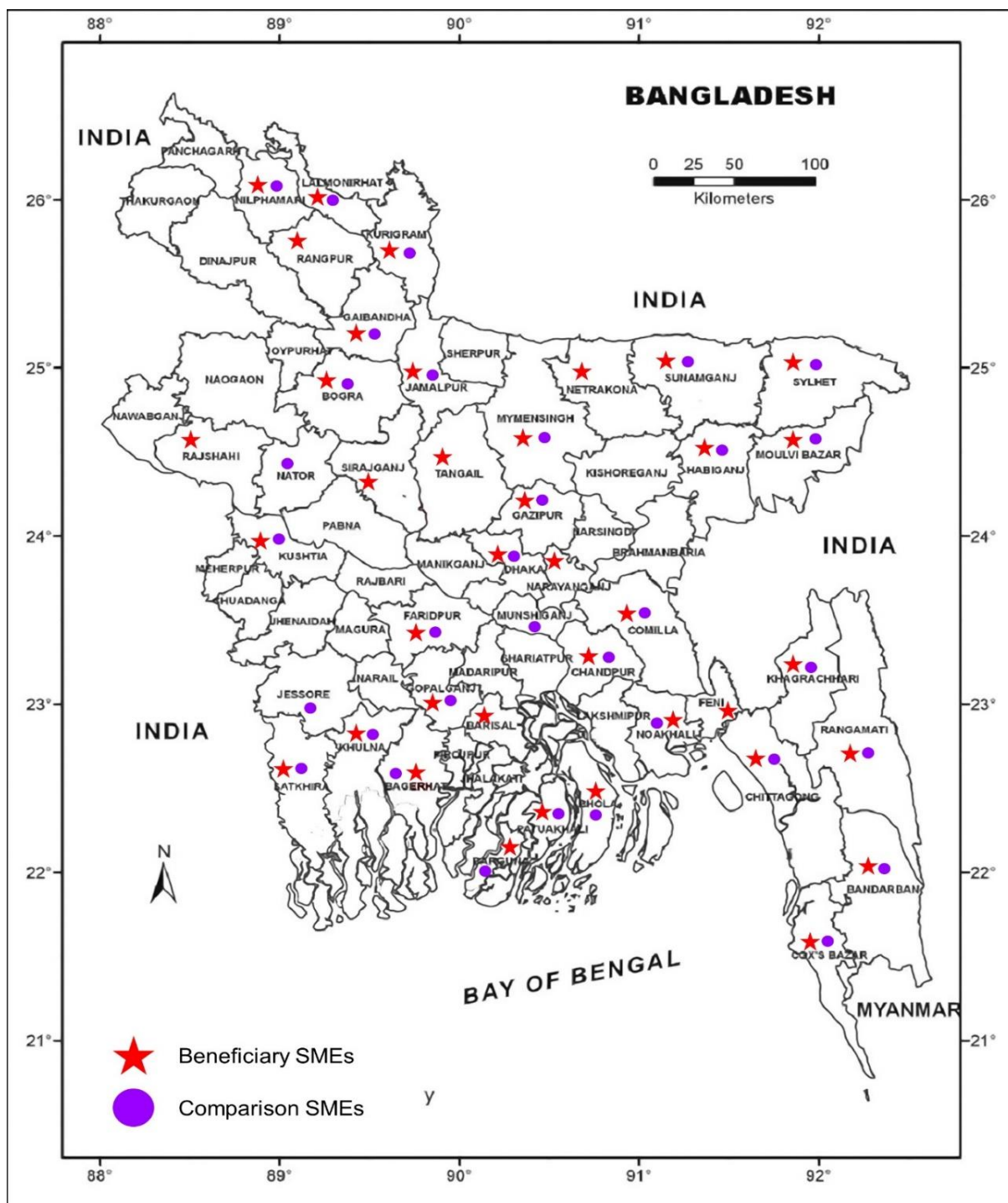
Training	Module (Targets)	Training Mode	Batches & Duration	Participants	Learnings from the Training
Capacity building training: Basic digital literacy training for women entrepreneurs	1.1. How to use the internet (Browsing, basics of the internet) 1.2. Basic language training (How to type in <i>bangla</i> & communicate) 1.3. Communications over the internet (Using different communications tools like messenger, WhatsApp, etc. related to online trade) 1.4. How to trade on the internet (Fundamentals of e-Commerce)	Offline/ in-person day-long training	40 batches in 40 different districts Duration: 30 November'21 to 06 December'21	1040	Basic knowledge of internet browsing, basics of typing and communication in Bangla, communications over the internet (using different communications tools like messenger, WhatsApp, etc. related to online trade), and fundamentals of e-Commerce
Intermediate training on Anodomela app	2.1. How to sign up, create a profile, upload products, manage orders, and publish or store 2.2. Basics of logistics, how to prepare packages, 2.3. Photography and pricing, basics of financial literacy	Online through Zoom platform	30 batches Duration: 13 December'21 to 22 December'21	1312	How they can sign up to the Anodomela app and create a profile, how they can upload products, manage orders, publish and store, basics of logistics, packages preparation, product photography and pricing, and basics of financial literacy
Advanced training on the Anodomela platform and online trading	3.1. Advanced training on online marketing	Online through Zoom platform	20 batches Duration: 26 December'21	582	Advanced online marketing techniques and advanced features for arranging campaigns, promotions, chargeback, bundling, etc.

	3.2. Advanced features training (e.g., Campaign, promotions, chargeback, bundling, etc.)				
Capacity building training on financial literacy and business development	4.1. Training on advanced financial literacy 4.2. Business development plan creation, risk mitigation, savings, financial management, credentials preparation, documentation preparation for credentials and financing	Online through Zoom platform	10 batches Duration: 27 December'21	582	Advanced financial literacy, business development plan creation, risk mitigation, savings, financial management, credentials preparation, documentation preparation for credentials, and financing

Source: UNDP (2022)

Appendix: 2

Figure B.1: District-wise location of the sample enterprises



Source: BIDS Women Entrepreneur Panel Survey, 2021 and 2022.