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CASE STUDY

Towards an Inclusive Digital Economy for Girls and Women in the MENA Region:
A Case Study of Egypt

Rasha Hassan

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1. Abstract

This report aims to provide a comprehensive understanding of the implementation of digital economy strategies that facilitate the empowerment of women and girls within the Middle East and North Africa (MENA) region. Adopting qualitative methods, the study explores how these strategies can bolster the participation of women and girls in the digital economy. Building upon the previous examination of digital economy strategies within the MENA region, as detailed in the report "Gender and Skills in the Digital Economy in the MENA Region", the Arab Republic of Egypt is chosen as a low-income country demonstrating progress in the digital economy sector. Two specific programs are selected as case studies to shed light on how digital economy strategies contribute to the empowerment of women and girls.

To achieve these objectives, semi-structured interviews were conducted with key informants and female beneficiaries who engaged in the two government initiatives that seek to enhance their digital skills and prepare them for future labour market needs. A total of 12 semi-structured interviews were conducted across three distinct groups: program managers and coordinators, female workers, and student beneficiaries. The study demonstrates how targeted digital economy strategies can both enable and constrain the active involvement of girls and women in the region's digital workforce.

2. The Egyptian Context

Digital transformation is key to Egypt's economic growth. The Information and Communications Technology (ICT) sector, which holds a prominent position in the Middle East and Africa, contributes significantly to the economy, serving as a catalyst in Egypt's transition towards a digital economy. Egypt's Vision 2030 underscores the importance of a competitive, diversified, and balanced economy, to achieve which the country must leverage its strategic positioning and human capital. This would, in turn, contribute to improved quality of life for all Egyptians. In pursuit of this vision, several national strategies have been developed to foster and galvanise the broader macroeconomic conditions necessary to facilitate the transition to a digital economy.

The Ministry of Communication and Information Technology (MCIT) has launched two main strategies to enhance young people's skills toward the digital economy. The first strategy was the National Artificial Intelligence Strategy. Following this, a National Council for Artificial Intelligence in November 2019 was established in partnership with governmental institutions, prominent academics, and practitioners from leading businesses in the field of Artificial Intelligence (AI). The second strategy was the ICT 2030 strategy, which contributed to establishing the national project Digital Egypt comprising the key pillars of digital transformation, digital skills and jobs, and digital innovation.[1]

In light of its ICT 2030 strategy, the Egyptian government is undertaking a series of programs and initiatives: Digital Egypt Builders Initiative (DEBI), Digital Egypt Cubs Initiative, AI Capacity Building Initiative, Basic Digital Skills Development Programs, Digital Tomorrow and Practical Data Scientist Academy-Amazon Web Services. Other programs include Egypt University of Informatics, Youth Enablement for Freelancing, Egypt Future Work is Digital, Graduation Projects Support, ICT Talent Hub, Tech Ambassadors, Mahara-Tech Ambassadors, and Qodwa-Tech.[2] Qodwa-Tech, one of the programs analysed in this study, seeks to facilitate the social and economic empowerment of Egyptian women and promote their digital inclusion using ICT, especially in remote and marginalised areas.

To address the existing skills gap, the Ministry of Education and Technical Education (MoETE) initiated the Technical Education 2.0 national strategy for technical and vocational education. The primary objective of this strategy is to establish a technical education system in keeping with international standards, with a specific focus on cultivating the skill sets necessary for the future workforce. This strategic move by the MoETE involved the implementation of several comprehensive programs that targeted tailoring 70 percent of the current curriculum to the demands of the evolving work landscape. Within this framework, a total of 29 specialised programs were introduced, concentrating on key areas like ICT, cyber technology, digital gaming, renewable energy, and art technologies.[3]

In 2018, the MoETE launched a nationwide initiative in collaboration with the Egypt Knowledge Bank to enhance digital literacy among young people. Furthermore, through a strategic partnership with IBM, the MoETE introduced Pathway in Technology Early College High School (P-TECH) Egypt. This initiative equips students with the essential skills and hands-on experience required for technology-oriented careers, encompassing fields such as cybersecurity, cloud computing, digital design, data analytics, and artificial intelligence.

The MoETE has successfully launched 52 applied technology schools across 14 governorates, and aims to raise this number to 420. These schools seek to aid in the transition towards a more robust technical education system that effectively prepares graduates for the specialised knowledge and skills demanded by the labour market. Additionally, these institutions are committed to refining graduates' competencies to match the evolving demands of future jobs.[4]

In alignment with MoETE policies, the Ministry of Higher Education and Scientific Research (MoHESR) enacted Law No. 72 of 2019, which serves to establish technological universities. This legislative measure is a pivotal move in shaping the country's higher education landscape to meet the demands of evolving technological trends and industrial requirements and equipping its workforce with the expertise necessary to drive innovation and sustainable development. As a result of this law, a total of 10 universities had been established by January 2023, underscoring the nation's commitment to fostering educational institutions equipped to provide the specialised knowledge and skills necessary to navigate the contemporary technological landscape.[5]

2.1 Women empowerment and the digital economy

The Egyptian government recognises the significance of empowering women and girls economically. The National Council for Women (NCW) pioneered the launch of the National Strategy for the Empowerment of Egyptian Women 2030, making Egypt the first country in the Middle East and North Africa (MENA) region to adopt a strategy congruent with the objectives of Egypt's Vision 2030 and the 2030 Sustainable Development Goals (SDGs).[6]

Egypt aspires to bolster the capacities of women, thus amplifying their participation in the economy and forging equitable prospects for female employment across all sectors. To this end, the NCW introduced a range of programs and initiatives. Among the strategy's pivotal undertakings is the implementation of training and skills enhancement programs in various sectors.[7] Furthermore, the NCW initiated multiple programs encompassing ICT, vocational training, and entrepreneurship in collaboration with various entities. These initiatives cater to small and medium-sized enterprises and fresh graduates, aiming to build the competencies of young individuals within governmental institutions and youth associations.

In 2016, the inaugural Social Innovation Hub was established, which subsequently launched capacity development programs in collaboration with Microsoft Egypt in the realm of software and information technology. These programs are designed to augment the skill sets of female graduates from public universities in computer science, as well as to cultivate an understanding of the potential for entrepreneurial pursuits in the software domain.

Additionally, the Egypt-based initiative, having already impacted a million young men and women, focuses on skill enhancement and service delivery, with a particular emphasis on ICT training and employment prospects. A noteworthy effort was the Programming Hour initiative, introduced to improve women's knowledge and competencies via foundational education in computer science and programming.[8] In a parallel development, Egypt unveiled its "ICT for Women" portal, aimed at enhancing girls' and women's ICT skills for broader application in various areas of life. This portal envisions leveraging girls' inherent abilities, enabling their entry into the ICT profession, and helping them surmount the challenges they may encounter.[9] Concurrently, in collaboration with the NCW, the Ministry of Communications and Information Technology spearheaded a series of initiatives—Qodwa Tech, Heya Raeda ICT clubs, and the Women ICT Excellence Award—to encourage women's participation in the ICT economic sector.

2.2 The ICT sector in Egypt

With an impressive growth rate of approximately 16.7 percent in 2021-2022, and outpacing all other sectors in the national economy, the ICT sector is Egypt's swiftest-growing sector. By contributing 5 percent to the GDP in the same period, the ICT sector's domestic output was estimated at around EGP 150 billion, a considerable increase from EGP 128.7 billion in the previous fiscal year.[10]

While the share of ICT employment in the overall job market is still modest, it surged from 1.4 percent (304,284 jobs) in 2009 to 1.9 percent (494,612 jobs) in 2021, translating to an average yearly growth of 4.1 percent. Furthermore, professions related to ICT within industries not primarily associated with ICT exhibited a more substantial numerical increase compared to those within the core ICT sector. This is attributed to the greater workforce size in non-ICT sectors compared to the ICT domain. From a gender point of view, women's engagement in ICT roles displayed an average annual growth rate of 6.4 percent, almost twice the rate of growth observed in men's involvement in ICT jobs (3.6 percent). This rapid expansion resulted in women being more than twice as likely to work in ICT positions in 2021 as compared to 2009 (2.3 percent vs. 1.0 percent of the total female workforce).[11]

The distribution of job roles within Egypt's ICT sector differs among men and women. By 2021, close to half of the women employed in ICT positions within the private sector held jobs related to data entry, reception, and call centre operations. In contrast, this figure stood at 16 percent for men. Conversely, around one-third of men in the ICT sector were engaged in technical assistance and sales positions, while only 19 percent of women were found in these roles. Additionally, men are more inclined than women to occupy blue-collar positions such as electronic fitters, mechanics, and assemblers in the ICT sector. However, despite these variations, the proportion of men and women occupying professional roles like those of computer professionals and engineers is nearly identical, ranging from 18 percent to 20 percent.[12]

3. Methodology

This "project phase" with "study" seeks to comprehend the implementation of digital economy strategies that foster women's empowerment within the MENA region. Employing qualitative methods, it aims to explore how such strategies can enhance the involvement of women and girls in the digital economy. Building upon the preceding analysis of digital economy strategies in the MENA region elucidated in the initial report (Gender and Skills in the Digital Economy in the MENA Region), the Arab Republic of Egypt is selected as a low-income country displaying advancements in the digital economy sector. Two specific programs are chosen as case studies to illuminate how digital economy strategies can empower women and girls. Our larger objective is to gain insight into the following aspects:

- To what extent are these programs accessible, acceptable, and affordable for beneficiaries?
- What opportunities and barriers do female beneficiaries encounter after participating in the program?
- How did women and girls acquire the skills that they use on the job? And how are these skills used in their work?
- How are the programs designed to achieve the digital economy strategy's objectives?

The qualitative methods employed in the study included semi-structured interviews with key informants and female beneficiaries participating in two government initiatives designed to enhance the digital skills of women and girls. These interviews were conducted with the aim of analysing the existing programs, aligned with the Egyptian government's empowerment objectives for women by 2030 and its broader digital economy strategy. The interviews also sought to delve into the experiences of individuals who have successfully completed the training programs and are currently active within the digital economy, and gain insight into the lives of women aspiring to pursue these programs. Special focus was placed on identifying the opportunities and challenges that arise during these training strategies and experiences.

After a comprehensive review of the Egyptian programs launched by both gender-specific and non-gender-specific institutions,[13] as elaborated upon in the section on the Egyptian context, we proceeded to select two programs based on the following set of criteria:

- The program had to have a female-focused target audience.
- It had to emphasise the development of women's capacities for the digital economy.
- The program ought to foster collaborations with governmental bodies, non-governmental organisations, and the private sector.

Guided by these criteria, two specific programs were identified. The first, Qodwa-Tech, aims to

bolster the economic and social empowerment of Egyptian women through the strategic utilisation of ICT. Its fundamental objective is to propel digital transformation towards sustainable development and the advancement of the digital economy. The program has been overseen by the MCIT since 2019. The second program, initiated by the NCW, known as She Leads. Its primary focus is on providing support to girls who are enrolled in technical education schools, with the objective of enhancing their digital skills.

3.1 Characteristics of the sample of interviewees

A total of 12 semi-structured interviews were conducted across three distinct groups. Among these, four interviews were held with program managers and coordinators, and four interviews were conducted with female workers. Four interviews were carried out with student beneficiaries. The characteristics of the qualitative interview sample are summarised in Table 1.

Table 1

The Characteristics of the Qualitative interview Sample

Characteristics	Key informant	Workers (Qodwa-Tech)	Students (She Leads)
Age Group			
Less Than 18	-	-	4
18- 35	1	1	-
35- 55	3	3	-
Education			
University	4	4	-
Secondary school	-	-	4
Occupation			
Program manager	2	-	-
Program coordinator	2	-	-
Handicraft	2	-	-
Teacher	2	-	-
Programming	-	-	2
Unemployed	-	-	2
Region			
Urban	4	2	4
Rural	-	2	-

All the participants from the group comprising women workers were actively engaged in the Qodwa-Tech program, whereas the participants from the girls' group were enrolled in She Leads. Most individuals in both groups underwent comprehensive training sessions that focused on an array of soft skills encompassing teamwork, presentation skills, leadership, negotiation, communication, time management, and risk management. However, women enrolled in Qodwa-Tech received more advanced training in areas of digital marketing, graphic design, photography, and the application of artificial intelligence (AI) in marketing.

3.2 Data collection instruments

Three in-depth interview guides were developed to ensure that the questions were comprehensive. Two of these guides were tailored for beneficiaries, specifically focusing on women and girls. The third guide targeted program managers and coordinators, each representing one of the studied programs.

Each interview guide was structured into six sections. First, participants were asked about their involvement in the program and the extent to which the programs align with the state's strategies for digital economy and women empowerment. In the second section, participants were asked about various aspects of program implementation, such as beneficiary selection processes, program sustainability, accessibility, affordability, and acceptability.

The third section focused on gathering participants' opinions and views on the extent to which the program contributes to women's empowerment in the digital sphere. In the fourth section, questions pertained to the gender component within the programs. The fifth section questioned participants on their opinions and experiences of digital economy strategies and the future of work. The final section explored the contributions of the training to the participants' work trajectories and career paths.

3.3 Qualitative fieldwork and data analysis

Data collection took place from May 2023 to July 2023. Participants were recruited using the snowball methodology, and interviews were conducted either in person or via video conference, depending on feasibility and the participant's preferences. Consent, either written or oral, was obtained from each respondent based on their preference. For participants under the age of 18, written consent was obtained from their parents.

All interviews were recorded, after which they were transcribed in the original Egyptian Colloquial Arabic, with the author conducting a quality review of the transcription. The codebook was first developed using an inductive approach. The authors reviewed and then coded the transcripts using open coding, in which the codes were derived from the content of the IDIs. Codes were then grouped into families that covered the main themes of the data, and were revised and merged as needed during the initial stages of the coding process. This resulted in a list of six code families with over 60 sub-codes. Examples of the code families included "program and digital skills," which included sub-codes such as "program objectives", "program response to the national strategies", and "program partners", among others. Finally, coding was done using Dedoose.

3.4 Program overview

She Leads

The Qodwa-Tech program was launched in 2019 by MCIT and is managed and implemented by the Central Administration for Social Development at the ministry. It aims to contribute to the economic and social empowerment of Egyptian women using ICT, and to foster digital transformation. The program also enables the creation of new productive communities that rely on the preparation of qualified girls and women who support and train their peers in their local communities using ICT tools.

To achieve its objectives, Qodwa-Tech program provides various training courses to select beneficiaries including soft skills training like risk management, time management, and team leadership. The training courses also cover technical skills like digital marketing, accounting and financial management, e-commerce, artificial intelligence, and digital photography skills. In addition to training programs, Qodwa-Tech offers its beneficiaries regular mentorship and consultancies days.

> *"Initially, we were working with women in Aswan, Upper Egypt, on a project for societal development. During our work, we discovered that these women faced challenges in effectively marketing their products, despite the high quality they offered. Recognising this issue, I discussed it with my manager, and together, we decided to craft a proposal to empower women in the realm of digital marketing and e-commerce." (IDI, with Qodwa-Tech project manager)*

Thus, the Qodwa-Tech program is designed to be accessible to women across all Egyptian governorates. Access is furthered by the fact that most training courses are offered online, although more technical courses are conducted in-person in select governorates. Between 2019 and the end of 2022, a total of 3363 women benefited from the program.

In 2020, Qodwa-Tech garnered international recognition when it was chosen as one of the top five projects globally in the World Summit on the Information Society (WSIS) Awards. This recognition came under the category of "Role of Public Authorities and All Stakeholders in the Promotion of ICTs for Development."

Qodwa-Tech went on to achieve further acclaim in 2021, when it was honoured in the Equals in Tech competition organised by the International Telecommunication Union (ITU), a competition that witnessed the participation of 155 initiatives/projects from 56 countries. It secured a place among the top five projects on a global scale in the category of "Leadership in Small and Medium-sized Projects". The project was commended as being one among exceptional initiatives and projects worldwide that contribute to the establishment of a more promising digital future for girls and women. The winners were celebrated during a virtual ceremony held on 9 December, 2021, as part of the Internet Governance Forum.

Qodwa-Tech

A Technical Education Program launched in 2019, She Leads is a pioneering initiative that provides assistance, education, training, and qualification for female students pursuing technical education. The program also facilitates the implementation of projects related to their field of specialisation after graduation, all under the auspices of the Ministry of Education and Technical Education, the National Council for Women, and the Youth Foundation Leaders as a non-governmental organisation.

She Leads employs a comprehensive approach that includes soft skills training, covering presentation, teamwork, negotiation, and communication skills. In addition to the training program, She Leads also provides mentorship in technical skills that may be essential for the successful execution of projects proposed by female students. What sets the She Leads program apart is its provision of more advanced training courses, informed by insights from conducted interviews. In this program, girls can present their proposed projects, and selected candidates receive dedicated mentorship from experienced trainers. These mentors guide the students in accessing specialised online training courses aligned with their projects' goals. Furthermore, the She Leads program offers financial support to cover the costs of materials required for the projects. As a result, the graduation projects are designed with the incorporation of advanced training components related to technology implementation. Examples of such technology-focused courses include Microsoft Office applications, mobile application development, Python programming, Java programming, and other relevant subjects.

> *"Before working with female technical education students, we had observed various aspects. One striking observation was that the majority of beneficiaries from the other program were boys. They had the advantage of obtaining scholarships to travel abroad and work, especially since numerous scholarships were available for Egyptians in countries like Germany and elsewhere. The path seemed much smoother for boys. Interestingly, we noticed that there was no program specifically tailored to focus on girls in technical education, despite the fact that the top performers in this field are predominantly girls." (IDI with program coordinator at She Leads program)*

Incorporating insights from interviews with the program manager and coordinator, She Leads functions within a meticulously designed framework delineated into four distinct phases. The primary phase commences with an orientation day held at specifically chosen technical and vocational schools. This event functions as a platform for girls to present

Figure 1

The Cohorts of the She Leads Program

their project proposals, and elucidate their envisioned endeavours within their chosen fields. The following stage unfolds through an electronic evaluation mechanism wherein evaluation is conducted by a proficient panel of experts, systematically assessing the submitted projects against a predefined set of criteria.

As the program segues into the third phase, it pivots towards the designated projects. Throughout this stage, participants receive mentorship and guidance from accomplished trainers proficient in both soft and technical skillsets. The instruction offered spans an array of courses aligning with the specific project techniques, be it in handicraft, electricity, electronics, technology, or mobile application development. Once the projects are completed, the fourth and final phase—a competition—begins. This event is presided over by a committee comprising seasoned professionals who select the winning projects.

Projects that achieve success in this competition are subsequently linked with potential investors. These investors extend substantial financial and technical support, thereby contributing to the project's relevance and sustainability within the dynamic landscape of the digital economy. Furthermore, winning participants in the program are selected to assume roles as trainers and mentors for new girls who subsequently join the project.

As Figure 2 demonstrates, a total of 1600 girls applied to the program between 2020 and 2022, with only 300 progressing through the development phase. Initially targeting the governorate of Cairo, the program then expanded its scope to include one governorate from Lower Egypt (Ismalia) and two governorates from Upper Egypt (Bani-Suif and Menia). Notably, in 2023, the project's scope will expand to cover four more governorates from both Lower (Qalubia, Alexandria and Suiz) and Upper Egypt (Fayoum).

Figure 2

The Cohorts of the She Leads Program

First batch (2020)				
300 girls applied	2 vocational schools	50 girls went through development phase	13 teams conducted	5 teams won
Second batch (2021)				
500 girls applied	4 vocational schools	100 girls went through development phase	27 teams conducted	11 teams won
Third batch (2022)				
800 girls applied	6 vocational schools	150 girls went through development phase	45 teams conducted	17 teams won

Source: She Leads program coordination team

4. Results

4.1 Women's access to and participation in digital skills

4.1.1. Program accessibility

The study reveals that both programs aim to be accessible to all women and girls within their respective target communities. The Qodwa-Tech program aims to reach women across all Egyptian governorates, while She Leads focuses on girls in technical and vocational schools (TVS) in four specific governorates (Cairo, Ismailia, Bani Suweif, and Alexandria). The Qodwa-Tech program requires women to meet specific selection criteria: they must be tech-savvy, have a social media presence, possess their own project idea, and fall within the age range of 18-45 years. Some exceptions are made for deserving candidates.

On the other hand, She Leads encourages girls from all targeted schools to propose their own projects, but only a select number of groups receive the training. Figure 2 shows that although 300 girls applied in the first phase of the program, only 50 were selected. A similar pattern was observed in the second and third phases of the program.

In terms of training accessibility, the study reveals that Qodwa-Tech caters to the significant number of women residing outside Cairo by offering online sessions. On the other hand, She Leads provides in-person training directly to selected candidates.

The limited access offered by the Qodwa-Tech and She Leads programs are areas of concern. Although Qodwa-Tech seeks to reach women from all Egyptian governorates, it is imperative to acknowledge the disparities in infrastructure and resources between urban and rural regions. Women in remote or underprivileged areas might encounter significant obstacles in accessing the program owing to limited internet connectivity, technological resources, and educational opportunities. Consequently, the program may inadvertently exclude a considerable number of women who could greatly benefit from it. One of the program beneficiaries from a rural area highlighted this issue, stating that limited internet connectivity proved a challenge as the training was conducted virtually and not in person. This significantly affected her ability to access interactive training sessions and fully participate in the program.

She Leads poses similar access-related challenges—by focusing solely on winning projects, it excludes girls who did not get through the initial phase of selection. This approach inadvertently denies girls equal access to these opportunities, potentially perpetuating existing educational disparities, an issue highlighted by one of the study's participants. While her team sought to create a robot to assist children with ADHD, they were not selected in the first phase of the competition, and therefore could not avail of She Leads' training.

> *"All the benefits and training were provided to the projects that received excellence awards, leaving the rest without any support. My team and I were hopeful to find a sponsor for our idea, but unfortunately, we didn't win in the final round of the competition. This was discouraging for us, and as a result, most of us decided not to continue due to the disappointment we experienced. We had plans to further develop the project, but without financial support, we couldn't pursue a real project." (IDI with TVS student)*

4.1.2 Program affordability

Findings from the study reveal that all trainings were offered free of charge. Women and girls who were interviewed reported obtaining the training without having to incur any costs. This was a considerable advantage considering the high expenses associated with similar training programs.

> *"The training was excellent, particularly because it was completely free of charge. The trainers provided comprehensive explanations and patiently addressed all our inquiries. Unlike certain paid training programs, they didn't rush us, and there was a great deal of flexibility." (IDI with female worker)*

4.1.3 Program acceptability (quality)

Participants in both programs expressed high satisfaction with the training quality, emphasising its usefulness for their careers. Some beneficiaries of Qodwa-Tech specifically mentioned how they benefited from it, highlighting their journey from no knowledge of digital marketing to proficiency in using diverse platforms and advertising tools. The data further underscores the program's positive impact on women's businesses, which saw substantial increase in sales and notable growth in online presence.

> *"Prior to Qodwa-Tech, I had no knowledge of marketing or electronic advertising. However, after completing the course, I gained valuable insights into connecting platforms and creating advertisements, and now I understand when to optimise or modify them. The Ads tools were unfamiliar to me before, but now I am proficient in utilising them to target customers effectively. As a result, my page has witnessed a substantial growth in followers, along with notable improvements in its overall presentation and professionalism. Most importantly, my sales have surged by 30 percent since completing Qodwa-Tech courses." (IDI with female worker)*

Similar results were observed among She Leads participants, with some girls expressing how the program contributed to their career development, even while they were still studying. Some of them created a LinkedIn account and even embarked on their own entrepreneurial journey as web developer freelancers.

> *"The program organises open innovation days with other companies so that we can attend and benefit from the insights shared by the speakers. For example, in the last event, Google addressed entrepreneurship and sustainability. Programs like these enhance my knowledge and complement my studies, motivating me to undergo more training and explore new perspectives. All of this has positively influenced my education. Moreover, it has enabled me to work as a freelancer through my LinkedIn account." (IDI with TVS student)*

While many participants acknowledged the quality and effectiveness of the training programs, some pointed to their failure in equipping them with certain specific skills they required for their respective

markets. A respondent enrolled in the She Leads program spoke of the need to learn programming languages to enhance her project, which sought to develop an educational robot for children with ADHD. Similarly, a participant in Qodwa-Tech highlighted the importance of learning website design as a digital marketing tool rather than relying solely on social media marketing.

Respondents also noted the absence of post-program follow-up. A respondent pointed out that in the face of rapid technological advancements, it was crucial that they learnt to keep up with new software and updates related to digital skills, as well as those related to communication and negotiation. Additionally, some participants observed the existence of alternative training initiatives that focused on specialised digital skills. These specific skillsets generated considerable interest among participants, as they aimed to bolster their competencies for both entrepreneurial endeavours and personal ventures.

> "*The program was not sufficiently beneficial for me, especially in the field of programming. We were trained on very basic applications, but I was looking forward to receiving training on advanced programs. Unfortunately, this option was not available. Additionally, the majority of the training time was focused on entrepreneurship, which took much more time than the technical aspects. I had hoped for a slightly longer training duration, but we were surprised to learn that our project needed to be ready for the competition, which required us to expedite our preparations for the final competition." (IDI with TVS student)*

4.2 Opportunities and barriers to women and girls' participation in the digital economy

This section elaborates on both opportunities and challenges afforded by the digital economy to women and girls. While this dynamic, rapidly evolving landscape offers avenues for which women and girls can leverage the knowledge gained from the studied programs and platforms, it also erects barriers to women's involvement. By conducting a comprehensive evaluation of both the avenues and obstacles, this section highlights the interplay between gender dynamics, technological advancements and economic progress in the digital realm.

4.2.1 Opportunities for women and girls' digital inclusion

4.2.1.1 Governmental endeavours towards women and girls' digital inclusion

Recognising the centrality of digital skills to both economic growth and societal advancement, the Egyptian government has dedicated itself to enhancing digital inclusion for women and girls. The government's proactive stance in promoting digital literacy and accessibility among women and girls is evident in its comprehensive initiatives and policies aimed at bridging the digital gender gap. These efforts are exemplified by national strategies like Qodwa-Tech and She Leads, which specifically target women and girls. Furthermore, the strategic recognition of the ICT sector's potential in the National Structural Reform Programme and Egypt's Vision 2030 underscores the state's determination to leverage digital technologies for economic progress. By cultivating an environment that fosters digital education, skills refinement, and equitable technological access, the Egyptian government endeavours to enable women and girls to harness the potential of the digital economy and contribute to the nation's growth.

Interviews reveal that both programs seek to fulfil Egypt's Vision 2030 objectives. The program coordinator and manager of She Leads noted that the program aligns with the Women Empowerment Strategy 2030 launched by the National Council for Women. Qodwa-Tech is a continuation of previous initiatives designed to enhance women's skills.

> *"The Young Leaders Foundation emerged and put forth a project proposal to the council, a venture that has been in the works for almost five years now. They presented this concept to us, and we were the first government they approached, driven by the objective of executing the Women 2030 strategy. From the very outset, the head of the National Council for Women referred the matter to the youth committee. I personally took the lead in collaborating with the Young Leaders Foundation, engaging in discussions and thorough examinations to explore how we could effectively empower girls in the realm of technical education." (IDI with She Leads project manager)*

4.2.1.2 COVID-19

The ICT sector in Egypt played a key role in sustaining the economy during the COVID-19 pandemic. Companies and institutions managed to implement technology-based applications and solutions to enable businesses to continue and allowing people to explore a range of digitally-based experiences—customers could now shop from their homes, employees could work remotely, and learners could study from anywhere.[14]

Several women and girls reaped the benefits of these applications by acquiring digital skills at no financial cost, which they subsequently leveraged to market their products online. This diverse array of products encompasses a range of activities including online tutoring, the sale of handmade products, and engagement in programming.

Most respondents in the study believe that that the pandemic played a pivotal role in expanding employment opportunities for women and girls, enabling them to learn and work in an online environment. For instance, the program coordinator of Qodwa-Tech recollected encountering numerous challenges in reaching the intended beneficiaries, particularly those in upper Egypt and informal settlements. However, as lockdown measures were implemented during the pandemic, the program strategically disseminated its training sessions across various social media platforms, thereby enabling women from diverse governorates to access and actively participate in these educational opportunities.

Similarly, a significant share of the respondents said that the pandemic ushered in substantial educational avenues, facilitating access to advanced programs offered via government and international online platforms like Coursera and Udemy. Furthermore, some women pointed out that the inclination towards online shopping and remote learning led to the emergence of a vast job market particularly

conducive to married women and those with family responsibilities. This work mode offers flexible hours and obviates the need to work outside the home.

> *"The coronavirus, thanks to God, had its benefits. The world changed, and people who had rigid perspectives started to understand that there is online work. The coronavirus opened up many job opportunities for people. We hadn't offered anything other than that, and there is nothing else. So, we're in need of something else. We've started with something called 'online.' At first, people refused, for example, to give a lesson to someone online. They wanted it in person and didn't know what online was. They thought whether the online world is good or not. We wanted it in person, but after the coronavirus, people tried it and found that the world is good." (IDI with female worker)*

4.2.1.3 Work flexibility

Flexible working conditions afford women and girls the opportunity to be engaged in the digital economy—women in the workforce can effectively balance their childcare responsibilities with work commitments. This holds true for students as well, who can engage in work while pursuing their studies. Furthermore, the option of working from home offers women a secure environment, shielding them from the physical harassment and bullying they may experience in workspaces or learning environments. Numerous participants in the study reported experiencing a noticeable improvement in their work-life balance once they acquired the skills to work remotely.

> *"I am originally a computer engineer, and I was actually working as an IT manager before marriage. However, after getting married, it became challenging for me to work due to household and childcare responsibilities. It's not feasible for me to work in a full-time position as it would be quite difficult. But now in my own handicraft project, I have something unique where I can work at a time that suits me, and all the returns come directly to me, not to anyone else. I feel that this project is the best option for me given my current circumstances." (IDI with working woman)*

4.2.1.4 Skill acquisition and utilisation among women and girls

Harnessing skills is a critical pathway to unlock the vast potential that women and girls possess within the realm of the digital economy. The study demonstrates that both women and girls have capitalised on the chance to apply the knowledge gained through their training courses, enabling them to secure meaningful employment that they can balance with their day-to-day obligations. Respondents shed light on instances where newly acquired skills have not only bolstered their professional capacities but have also nurtured a fresh sense of self-reliance and self-assuredness. The ability to integrate learned digital skills into practical job roles has also afforded women and girls the opportunity to mould their career trajectories in ways that accommodate their ongoing educational pursuits and familial commitments. This underscores the transformational potential of targeted training initiatives in cultivating an inclusive and adaptable digital workforce, where the synergy between learning and real-world application becomes the bedrock of gender-equitable economic advancement.

> *"I was directly applying to my work what I was learning in the training. For instance, I learned how to create sponsored advertisements in Qodwa-Tech training and applied such knowledge when I needed to market my work… At first, I didn't know what 'reach' meant, like how to reach a specific number of people. Also, I didn't understand the differences between the various types of advertisements, meaning there are ads for reaching people and ads for building customer loyalty. Now I understand all these differences. I didn't know how to measure the results of a campaign, when to stop it, and when to determine its impact and outcomes. Now I know." (IDI with Working woman)*

In addition to putting into practice the digital skills acquired from the training programs, some participants noted that both initiatives shared the objective to provide leadership role models for women and girls within the digital economy. Accomplished women and girls have been carefully chosen to serve as role models for those who aspire to participate in these programs down the line. These exceptional models have also undergone Training of Trainers (TOT), which offers guidance, mentorship, and technical training.

4.2.2 Barriers to women and girls' digital inclusion

4.2.2.1 Internet accessibility

Barriers to digital inclusion remain a pressing concern for women and girls. Despite advancements in technology infrastructure, there is a significant gender gap in accessing the internet, hindering equitable participation in the digital sphere. According to 2023 MCIT data, the proportion of male internet users is 79.3 percent, while the proportion of female internet users is lower, at 65 percent. This issue intersects with geographical disparities—women in rural areas often enjoy limited internet infrastructure and connectivity, exacerbating the divide. As a result, women and girls encounter difficulties in accessing educational resources, online job opportunities, and essential services for involving themselves in the digital economy. Targeted efforts are necessary to bridge the digital gender gap and ensure widespread and affordable internet access, empowering women and girls to fully participate in Egypt's digital landscape.

> *"Because I'm in the village, we don't have many resources. For example, if I need to repair my laptop, I have to travel a long distance just to fix it. Sometimes, I even have to cancel my work to go to the city for repairs. And when it comes to infrastructure, of course, there are difficulties. In the city, things are better than here. I don't know why they aren't interested in rural areas, maybe because there's not much use. But this is the reality: we face more challenges here compared to the city." (IDI with working woman)*

4.2.2.2 Social barriers (Social norms)

The study's findings reveal the significant role social norms play in excluding women and girls from participating in programs and entering the labour market, a fact echoed by almost all participants of the study, including program managers and beneficiaries. Program managers and coordinators mentioned that although many women and girls initially applied to the programs, some dropped out later due to family pressure.

This challenge was particularly evident in rural areas of Egypt. Qodwa-Tech participants reported facing stigma related to online marketing and concerns about cyber harassment, because of which their families prevented them from joining the program despite their willingness and ability to participate. She Leads program coordinators encountered a similar challenge, where girls who had applied with their projects were prevented from participating by their parents due to fears of bullying and harassment. Overall, social norms and perceived safety concerns in both rural and urban settings were identified as significant barriers to women's participation in these valuable programs.

> *"When some women apply and are accepted into the program, they later inform us that their husbands object to the scholarship because it involves training on Zoom and he doesn't want her to deal with social media at all. So, I encounter multiple cases where the women say, 'No, my husband doesn't want me to open a Facebook account or post anything on it, no work-related stuff or anything else.'" (IDI with female worker)*

An additional challenge to participation, qualitative data shows, is that female workers face online harassment and bullying. Women in the study reported experiencing severe types of cyber harassment, including cyber stalking and online sexual harassment. Additionally, some customers engage in fraud and deception, exacerbating the difficulties women face in use of online spaces.

> *"One of the challenges we face, especially for female entrepreneurs working with handmade products, is receiving inappropriate comments and compliments from strangers when marketing our products online. Some individuals may even request in-person meetings at specific locations to receive the products, but later turn out to be fraudulent. Furthermore, after reaching an agreement with a buyer and sending the product, they might claim discrepancies from the pictures and attempt to negotiate for a significantly lower price." (IDI with female worker)*

4.2.2.3 Financial barriers

The research findings shed light on the various financial challenges encountered by women engaging in the digital economy. The two discussed below are particularly significant.

Product marketing: Female workers reported that marketing their products often entails substantial costs, particularly when investing in online advertisements. These advertising expenses can surpass the fundamental production cost of their goods. Furthermore, when attempting to expand their market reach to other governorates within Egypt or to international markets, shipping costs tend to be higher that the product's base cost. This hinders effective promotion of their products and limits profits.

Along with the expenses associated with marketing products locally or regionally, some women highlighted specific challenges they encounter while promoting their products through exhibitions organised by government institutions or civil society organisations that support women in their endeavours. The participation costs in these exhibitions are significantly high compared to the basic product costs, which hinders their ability to afford such essential events.

E-commerce taxes: The study reveals that the implementation of the Electronic Tax Law, even applicable to small businesses, constitutes a major impediment to women's work in the digital economy. Upon advertising their products online, women are immediately required to procure a tax card and fulfill tax obligations on their merchandise. As a result, product prices escalate, directly impacting their profitability. Failure to issue a tax invoice may have legal repercussions for women entrepreneurs. Additionally, some women mentioned the challenges inherent in participating in government-organised annual exhibitions aimed at empowering women—participation mandates the possession of a tax card.

> *"The electronic tax is the most concerning aspect for women. When a woman is just starting her business and hasn't made any profits yet, she is asked to issue a tax invoice. At that moment, fear sets in, and she might say, 'I'm not even making enough to pay taxes.'" (IDI with program manager at Qodwa-Tech)*

> *"As women working on handicrafts and marketing our products online from home, we don't have offices or a designated workplace where they can request electronic invoices from us. Furthermore, considering our earnings, is it even feasible for us to pay taxes?! All of this is demotivating and instills fear in us, making it challenging to continue our work." (IDI with female worker)*

4.2.2.4 Bridging the gap between demand and supply

Some of the working women and participating students in the study mentioned having launched their own projects after attending the digital training programs. However, they found the absence of an official sponsor or employer to assist them in completing their projects to be a major obstacle to their involvement into the digital job market.

> *"After completing our project, my classmates at school and I stopped because we didn't have anyone to sponsor the project. Our project involves creating a robot for children with autism. This robot serves as an educational toy for the child through an educational software embedded in it. However, once the program was finished, we didn't win the prize unfortunately. As a result, there is currently no sponsor who could adopt our idea." (IDI with female student)*

4.2.2.5 Lack of integration among strategies

This subsection examines the degree to which national strategies effectively fulfill their objectives in advancing the digital economy and enhancing the competencies of women for their active involvement in the domain. Participants engaged in this study range from project managers to coordinators from both Qodwa Tech and She Leads programs. Direct questions were posed to them about the alignment of these initiatives with the National Strategy for Women Empowerment 2030 and the ICT 2030 Strategy.

Respondents underscored the genesis of the programs within the Egyptian governmental context, both rooted in the recognition of the importance of empowering women and young girls by bolstering their capacities to align with Egypt's future workforce landscape. The preliminary analysis of this study reveals that the empowerment of women is a marked point of emphasis across the spectrum of Egyptian national strategies. Nevertheless, as expounded upon in previous sections, women and girls across

different educational, socioeconomic, and societal strata continue to face challenges in attaining digital competencies in a just and consistent manner.

A critical drawback comes into focus upon a comprehensive review of both the National Strategy for Women's Empowerment, launched in 2015, and the National ICT Strategy, initiated in 2017—the absence of integration between these national frameworks. The incorporation of the Women's Empowerment Strategy within the ICT strategy is conspicuously absent. Furthermore, there is no reference to collaborative efforts with the National Council for Women aimed at unifying roles to achieve the intended objectives. This inconsistency was also revealed when a program coordinator highlighted the challenges encountered in encouraging women to participate in the program's nascent stages despite the significant outreach potential of the National Council for Women.

Given these findings, it is imperative that policymakers establish robust collaborations, in keeping with the objectives of the national strategies, to champion the development of digital competencies. Effective partnerships could serve as a route to fostering a more comprehensive and precisely targeted approach to skill cultivation and training provisioning. Such an approach, in alignment with workforce capabilities and qualifications, can significantly enhance the responsiveness to the demands of the labour market.

5. Conclusion and Recommendations

The study's comprehensive exploration of women's access to and participation in digital skills programs in Egypt reveals both opportunities and barriers. It is evident that the Qodwa-Tech and She Leads programs have been successful instruments in the implementation of digital economy national strategies, thereby fostering women and girls' empowerment. The study also highlights the programs' accessibility, affordability, quality, and potential for career advancement. However, certain challenges hinder the full realisation of their potential.

5.1 Recommendations

5.1.1 The integration between strategies and policies:

To effectively address the challenges posed by the digital gender gap and promote women's active participation in the digital economy, it is crucial that integration between various strategies and policies be prioritised. This integration should encompass both gender-responsive policies and digital inclusion initiatives, ensuring that they are aligned and mutually reinforcing. To achieve this, policymakers should adopt mechanisms for cross-sector collaboration and coordination. This entails bringing together stakeholders from different sectors, including gender equality, technology, education, and economic development, to collectively design and implement integrated strategies. By fostering synergies between policies that target gender equality and those that aim to enhance digital skills and access, governments can adopt a more holistic approach to addressing the barriers faced by women and girls in the digital realm.

In addition, the integration between strategies and policies should extend to budget allocations in ways that adequate financial resources are allocated for the implementation of integrated initiatives. This includes investing in gender-responsive digital education, expanding internet connectivity, and addressing online safety concerns.

5.1.2 Enhancing access to digital skills via the education and training framework

To realise an inclusive society equipped with digital skills, it is necessary that access to such skills be expanded within the framework of education and training. In addition to existing governmental efforts, the region requires an approach that encompasses the integration of digital skills education and training in formal education curricula: basic levels, university levels, vocational training programs and lifelong learning initiatives. This will ensure that individuals are equipped at all stages of their lives with the digital skills required to excel in a world increasingly reliant on technology. Integrating digital skills at all levels and in all programs will ensure inclusivity and a more equitable society—by reducing the digital divide stemming from social and economic disparities, all students, regardless of background, can now enjoy equal access to fundamental digital skills.

5.1.3 Mitigating social barriers:

Awareness campaigns are key to challenging stereotypes and misconceptions surrounding women's engagement in digital fields. Moreover, involving families in dialogue about the benefits of digital skills can help alleviate concerns and encourage greater participation.

5.1.4 Providing financial support:

The provision of financial support to cover marketing costs can help women entrepreneurs enhance their business' viability and support growth. Streamlining tax regulations and providing guidance on taxation for small-scale digital businesses can also help alleviate financial burdens.

In conclusion, while the Qodwa-Tech and She Leads programs have made significant strides in advancing the status of women and girls in the digital economy, some challenges are yet to be addressed to achieve a more inclusive society that allows for equitable participation. By adopting the recommendations outlined above, Egypt can harness the full potential of its female workforce, driving economic growth and social progress in the digital era.

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