Development of technological projects with the active participation of women in El Salvador.
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Resumen—El estudio tiene como objetivo general conocer las diferentes soluciones tecnológicas desarrolladas con una fuerte participación de mujeres; a la vez conocer una breve reseña histórica sobre la contribución de algunas mujeres a las Tecnologías de la Información y la Comunicación (TIC), ya que no han sido reconocidas en su momento, si no con el paso de los años y a través de los resultados de diferentes investigaciones que se difunden a nivel mundial por la equidad de género en todas sus áreas.

El estudio también apuntó a visibilizar a las mujeres latinas en su rol como desarrolladoras de soluciones tecnológicas a nivel académico y empresarial; también conocer casos de éxito de mujeres salvadoreñas que se desempeñan en empresas del sector tecnológico de El Salvador.

Los resultados evidencian la integración de mujeres salvadoreñas en el área de las Tecnologías de la Información y la Comunicación (TIC) en la empresa privada, las áreas en las que hay mayor desempeño por parte del género femenino y una comparativa entre el número mujeres y hombres que actualmente están laborando en las empresas salvadoreñas participantes en la investigación.

Gracias al aporte del género femenino se han logrado las bases de muchas tecnologías que hoy en día se utilizan con una gran facilidad y permiten a la diversidad social el poder desarrollar actividades laborales, profesionales y personales.

Finalmente, El Salvador está siendo parte de la transformación digital en diferentes sectores: educación, gobierno, empresa, entre otros, en donde la mujer salvadoreña tiene una fuerte e importante participación.

Palabras claves— (El Salvador, Mujeres en tecnología, TI, TIC, Género)

Abstract— The general objective of the study is to know the different technological solutions developed with the active participation of women. At the same time a brief historical review of the contribution of some women to Information and Communication Technologies (ICT), whom not recognized at that time, if not over the years and through different investigations that spread throughout the world for gender equity in all its areas.

The objective of the study is also to know Latina women in their role as developers of technological solutions at the academic and business level; also know cases of Salvadoran women working in companies in the technology sector of El Salvador.

The results show the integration of Salvadoran women in the area of Information and Communication Technologies (ICT) in private companies, the areas in which there is a higher performance by the female gender and a comparison between the number of women and men working in companies participating under the research.

Thanks to the contribution of the female gender, foundations of many technologies were made; that nowadays are used with great ease and allow social diversity to develop work, professional and personal activities.

Finally, El Salvador is part of the digital transformation in different sectors: education, government, business, among others, where Salvadoran women have active and essential participation.

Index Terms— (El Salvador, women in tech, IT, ICT, gender)

I. INTRODUCTION

At the beginning of the story, women were considered inferior by nature, and they said that women never reached maturity, they always thought themselves as girls who had to obey their parents or their husbands, can you imagine having to do in your life what they order, even if it is not what you want to do?

For many centuries, women could not learn to read or write, they worked at home doing housework and had no right to vote

However, some women fought to change history, to improve our history so that today we can enjoy many of our rights, which allow us to be happier, both women and men [1].

Another area that has a relationship with women is Information and Communication Technologies (ICT) it has varied from women technologists that made outstanding support towards the development of ICT and invisibilized; to women well recognized for their valuable creations and to use the ones habitually using ICT in our professional or personal life [2].

Social and cultural conditions are part of the distance between women and scientific fields because they considered it as "men's things," and only the most tenacious and those who, due to their family environment, were close to science, did their researches, which in the vast majority of cases have remained hidden or well used by their male environment [3].

Until the end of the 20th century, the visibility and recognition of women for their contributions to technological development, as in many other areas, has been conspicuous by their absence. This situation has changed in recent years thanks

to studies, research, and literature that seeks to value and recognize the role of women [4].

At a global level by organizations, universities, companies, and governments, different strategies, campaigns, and policies carried out that motivation of integration of more women into STEM careers and, therefore, participation in the development of technological activities, which allow the growth of society in gender equity.

El Salvador through the Ministry of Education builds a public policy whose purpose is to promote an educational model with equity and gender equality.

Which contributes to eradicating attitudes and practices of sexual discrimination, through the implementation of it; as well as different countries are also carrying out campaigns and programs for the inclusion and participation of women, to promote entrepreneurship and its integration in technological careers in Higher Education [5].

Also through the universities with the support of USAID, projects such as TecnoGirls (Universidad Gerardo Barrios), Science GirlCamp (Universidad Don Bosco); in which technology-oriented courses with the objective that girls from high school discover their skills and how through technology they can provide solutions that solve problems improving the quality of life of society.

II. LITERATURE REVIEW

A. Women in Science and Technology

Beginning in the late 1980s, once the initial optimism caused by the expansion of the Internet and the incipient increase in the number of women users had passed, the detection and analysis of gender codes in the virtual space began to occupy a place of priority in the research agenda of a handful of precursor scholars in this field [6].

a) Feminism, Science and Technology

Women have not participated in the study elaborating of science in the same proportion as men throughout history is something well known [7].

The political rooting of the feminist discussion of science and technology appears in any text that presents its origin or historical development. The narrative that we find reproduced, again and again, tells us how the anxiety arises on two different and complementary fronts. On the one hand, women themselves in the world of science and technology who developed a growing awareness of their difference. A difference that is inferiority and that is revealed both in the small number (why so few? Is the question of Alice Rossi that presented as the originator of an entire branch of feminist research in the history of science).

The various barriers that have been hindering women's access to science and perpetuating their inferior "epistemic status."

The recovery for the history of the science of silenced and forgotten some women and the empirical study and reflection on the exclusion of women from science and technology is a field of work of indispensable denunciation. Complementary to these historical-sociological works, we also find pedagogical efforts to renew curricula and motivate and integrate girls and women in science and technology learning.

For some, the Western scientific-technological enterprise itself was profoundly sexist because it built on the typically masculine values of domination and control. For others, specific cases of science and technology manifested significant gender biases and contributed to scientifically provide theories about the inferiority of women or their subordinate social roles.

b) Recovery of women in the history of science and technology

An essential part of the first efforts to reconsider the role of women in science and technology is the rewriting of history to recover from oblivion women or typically female traditions that, despite having made outstanding contributions in the scientific-technological field. They have been silenced by traditional history, either due to different points of view or due to narrow conceptions of the history of science that reconstruct the discipline on the names of great characters and successful theories or practices and leave aside other activities and contributions in no way collateral to the development of science.

It is no longer just a question of reforming institutions and teaching women science and technology, but to improving science itself [8].

B. Women who have marked history in technology

a) Ada Lovelace (1815 - 1852)

The daughter of the Countess of Lovelace and Lord Byron wrote the first algorithm designed to be processed by a machine. The machine in question was the analytical machine of Charles Babbage, which never came to build. Computers not invented until a century later, which for many it makes her the first programmer in history.

b) Grace Hopper (1815 - 1852)

In the US military and during World War II and the subsequent Cold War, Hopper participated in the Harvard Mark 1 programming, programmed the first programming language compiler and gave birth to COBOL, the first programming language based on words instead of numbers.

c) Margaret Hamilton (1936)

She led the department that programmed the software for the NASA Apollo project. Her work foresaw corrected a human error, enabling the safe landing on the moon of Apollo XI. Later, she founded several technology companies, and it is to her that the coining of the term "software engineering" is attributed.

d) Danese Cooper (1959)

Known as "the diva of open source," Cooper is responsible for Sun Microsystems opening the Java code, OpenOffice.org or Oracle Grid Engine, among others. She is a board member of the Drupal Association, the Open Source Hardware Association, and Mozilla, and belongs to the Apache Software

Foundation. She has worked for companies such as PayPal, Wikimedia or Intel [9].

e) Evelyn Berezin

She is the pioneer of computing that created the first-word processor that was called "Data Secretary." Nowadays it may seem like the simplest thing in the world to write a text on a computer and correct errors in seconds or change a place phrase; But half a century ago, in offices full of typewriters, none of that was possible.

She was an American engineer who also developed the first airline seat reservation system which worked without fail for 11 years and was used by United Airlines; she worked for companies such as Underwood Corporation and Teleregister, where she developed computers designed exclusively for a task [10].

f) Erna Hoover

In the 1950s, Erna Hoover developed a computerized telephone switching system that eliminated the danger of overload in processing calls.

Her work is said to have revolutionized modern communication, and it earned her one of the first software patents ever awarded to a woman.

g) Sophie Wilson

Known as the mother of the smartphone and tablet, Wilson developed some of the world's first commercially successful personal computers and created the original ARM computer processor, which later became one of the most successful IP cores.

By 2012, her design found inside most of the world's laptop computers and smartphones.

h) Radia Joy Perlman

Known by many as "The Mother of the Internet," network engineer Radia Perlman helped make ethernet technology a household name.

She developed SPANNING TREE PROTOCOLS, which enabled the scalability of network traffic using Ethernet [11].

i) Susan Wojcicki

Currently, executive director of Google, she was the first woman to work for Google and the employee number 16; led the development of AdSense, the service for companies to advertise on the Internet and other products such as Adwords, Google Analytics, Google Doodles, Google Images, and Google Books.

Wojcicki has campaigned to promote the inclusion of more girls in the digital world.

"Coding is like writing," she says, insisting on the need to reduce the gender gap in the sector [12].

j) Hedwig Eva Maria Kiesler (Hedy Lamarr)

She is the precursor of Wi-Fi and Bluetooth; The fact that she was one of the most seductive girls on the big screen in Hollywood, to the point of being considered, "the most beautiful woman in Europe " helped to invent the technology on which modern wifi based. While working with avant-garde composer George Antheil, Lamarr patented an early version of spread spectrum communication, which is part of the foundation of wireless technologies such as Bluetooth and Wi-Fi. She and Antheil came up with the idea of helping create an unbreakable code for submarines during the time of World War II, but the broad application of their invention not recognized until later.

k) Betty Snyder Holberton, Jean Jennings Bartik, Kathleen McNulty Mauchly Antonelli, Marlyn Wescoff Meltzer, Ruth Lichterman Teitelbaum y Frances Bilas Spence.

Known as Top Secret Rosies, programmers of the first computer ENIAC, which would serve to perform these calculations on a large scale: 5,000 sums and 300 multiplications in 1 second.

A team of six women, exceptionally brilliant in their work, were selected to participate in the development and programming of the machine [13].

l) Carol Shaw

She first video game designer in the history of the successful video game console Atari 2600; he also developed two more video games called 3D Tic-Tac-Toe and Video Checkers; she thought and created the gender game "shooter" based on a fighter plane that flies over a river and ends with the enemies. The video game baptized with the name of River Raid.

River Raid became a cult game to the point of counting, at present, with video game fans who continue to play through emulators of Atari consoles. After being released the game River Raid, Carol Shaw focused on developing a new video game called Happy Trails belonging to the gender of puzzles [14].

m) Carla Meninsky

She pioneers in the development of video games, she entered the world of personal computing by learning Fortran and Pascal programming languages; Meninsky worked in Atari.

Atari liked his vision of animation through computers, arriving at that company at a delicate moment.

Her first videogame for Atari called Dodge 'Em, a video game that she defined as "a car shock labyrinth game."

Then came what was, possibly, the most famous video game that contributed to Meninsky, Warlords [15].

C. Technological solutions developed by women in El Salvador

a) Augmented Reality Game for Cihuatan archaeological center, El Salvador

Ruth Rivas, a student of System Engineering and Computer Networks at Universidad Gerardo Barrios, is currently taking a specialization in SCRUM.

In 2018, Cihuahack held. A series of events that help to put into practice the skills of students in the area of ICT.

Cihuahack is an initiative developed by the United States Embassy in El Salvador and Korinver, among others.

Ruth participated with his team of fellow men and made the prototype video game in augmented reality which at the end of the competition won the first place nationally for the development of Sol de Cihuatan (Cihuatan's Sun), the videogame introduces Cihuatan and its history excitingly and entertainingly.

b) Integration of Academic Registration System and virtual classes (Moodle 3.0)

Stephani Gómez graduated from the System Engineering and Computer Networks at the Universidad Gerardo Barrios.

In 2017, She carried out the Integration of the Academic Registry System and Virtual Classes Platform (Moodle 3.0), for the E-Learning unit of the same university, as a project of social hours, her advisor was Professor and researcher Gisela Espinoza from Facultad de Ciencia y Tecnología.

The Integration of the Academic Registry System and the Virtual Classes Platform (Moodle 3.0) consisted of incorporating both systems by completing a single process that is the registration of students in the academic record system; Once is made, the student's data automatically was written in the Moodle Database.

Currently, Stephani is developing a web platform called Encomienda Fácil; which is a platform where people who need sending documents and packages can find courier companies, to be able to send them abroad.

c) Platform for the dissemination of scientific articles

Gisela Espinoza and Marlene Navarro, both System Engineers and Computer Networks, professors and researchers of the Facultad de Ciencia y Tecnología of the Universidad Gerardo Barrios, developed the platform called DBAcademica as a solution for the popularization of science.

The platform allows an Editor to be in charge of reviewing and approving scientific articles; it has access as an author, who writes the articles and finally subscriber; who can read, share and print the content of the materials.

DBAcademica is 100% free and is available to the academic community for those who want to be part of the project. Link: www.dbacademica.com

d) Corporations websites and online shops

Paola Mancía is currently an employee of Applaudo Studios; the company dedicated to the development and design of software, located in El Salvador.

Paola works as a developer; she has worked for national and international customers; some of the projects carried out are the website for www.grupocointel.com.

She is currently participating, along with other women from the same company, in the development of P2 Development, a website for business consultancy regarding the retention of employees. Link: www.p2development.com and BoBoxes, is a website for the sale of unboxing experience. Link: www.myboboxes.com

e) Sports platforms

Lea Escobar, Graphic Designer who works with the company Applaudo Studios.

She has currently developed a platform called ATAVUS: which is aimed at football and rugby coaches in the United States to become certified and improve the way they teach children and young people. Link to the platform: www.atavus.com

f) Billing Platform

Laura Escobar, Graphic Designer, working for the company Applaudo Studios.

Laura participated in the billing platform project for Miami Heat, was responsible for the design of the User Interface and User Experience - UI / UX.

g) Apps and websites

Evelin Carolina Menendez, Computer Science Engineer, works for the company Applaudo Studios.

Evelin, development Zoola an Ads generating app, Parque Arauco, a geolocation app for Malls.

She is currently participating in the development of LifeMile/Avianca.com Web Site and Air transport and Benchmark Analytics which is a platform aimed at US law enforcement agencies so they can manage their internal management processes more reliably and effectively of reports, personnel training and growth statistics of the police agency.

h) Apps y API.

Carmen Altuve, Computer Science Engineer, currently works at Korinver company, dedicated to software development, located in El Salvador.

Carmen has developed DAS-System, is a system for the reception and control in the repair of vehicles. It allows the registration of vehicles, registration of processes for repair and standardization, an update of the repair process.

Another project Carmen is developing: API _ VCS, is an API that allows communication between a chatbox and users to make queries about the calculation of bonuses; Allog, is a platform that helps to keep track of projects, planning, and control.

i) Tools for administrative processes of a company

Claudia Iraheta, Computer Science Engineer, works for the company The Office Gurus, dedicated to the development of technological solutions, located in El Salvador.

Claudia is developing; TOG Admin Tool which contains modules for the management of different administrative processes of the employees of the company, currently in the process of development.

j) Sport App

Gabriela Irene Torres, Computer Science Engineer, is an entrepreneur and owner of the company known as Roots Inc.

Roots is a company dedicated to the development of computer solutions; currently, working for national and international clients.

Gabriela currently works with IT project manager and has

developed Jogo App, which is a mobile app for the reservation of integrated soccer fields with a management information system for the owners of the courts, which aims to promote sports through technology. Link: www.jogoapp.com

D. Latinas developing technological solutions for Salvadoran companies

a) Venezuela

María Gabriela Monascal Capdevielle, Venezuelan, is Computer Science Engineering, works for the company Applaudo Studios, dedicated to the development and design of software.

María has developed ShareFest, a mobile application for organizing events.

She is currently participating, along with other women from the same company, in the development of P2 Development, a website for business consultancy regarding the retention of employees. Link: www.p2development.com and BoBoxes, is a website for the sale of unboxing experience. Link: www.myboboxes.com

b) Mexico

Mariana, a Mexican, has a Degree in Computing Science, currently works for the company Applaudo Studios.

Mariana participates along with other women from the same company in the development of Benchmark Analytics, is a platform aimed at US law enforcement agencies so that they can more reliably and effectively manage their internal reporting processes, training personnel and growth statistics of the police agency.

E. The challenge of attracting more women to the technology sector

Women day by day is overcoming challenges of all kinds, social, personal or technical among others where they test their strength, will and desire to succeed.

Reducing the gender gap and keeping women in technological jobs for the future is the social and business challenge that must addressed. It is noticed by several professionals in a very masculinized sector.

«The digital transformation we are experiencing in companies requires female talent. Women have highly demanded skills in the technological sector: the ability to adapt, work in multitasking mode, leadership, know how to manage limited resources ", says Cristina Amoribieta, from Libelium. «We must value these skills and that companies do not require us to renounce family life but offer measures of flexibility and conciliation» [16].

F. Success cases of Salvadoran women in the ICT

a) Women seek to make their mark on technology

A group of Salvadoran women software programmers ensures that Computer Science is the perfect career in these times and that it should taken as a challenge worth fulfilling.

El Salvador, a group of women working at Applaudo Studios, a company dedicated to software development, has become the new female face of a work environment that has considered for men.

Carolina Menéndez, QA analyst or quality analyst, Applaudo Studios, says that she began to venture into the topic of technologies because she has always liked video games. She started as a programmer. She graduated as Computer Science Engineering in Universidad de Santa Ana.

"When I was in college I asked for a job in a factory, as a typer, there were only men, and someone told me that the head of the company only liked to hire men because women are susceptible, but I decided to 'apply' for the job, and they gave it to me", said Menéndez.

Susana Espinoza, who is also a quality analyst at Applaudo Studios, studied Degree in Computer Science and said she became interested in computing since she was 12 years old. She says that she always liked to write, but loved it, even more, when she could see what he wrote on the computer.

"I think that computing is the perfect career because every day new things are coming out and, in the workplace, they are always going to need someone in computing," Espinoza added.

Also, Paola Mancía, web developer of Applaudo Studios, narrates that in her the interest in web pages since studying at school was awakened.

Mancía maintains that she will seek to continue growing in the field of ICT. "In the next three years I would like to launch my business ideas, and I would like to see further development of the technology industry in El Salvador [17].

b) Computer Specialist:" I love ethical 'hacking' because it is like being a detective "

Gabriela Torres is the CEO of Informatic Solutions at Roots Inc., which she co-founded with a group of young people. She is also one of the few certified young women in Ethical Hacking in El Salvador, which is an area that works, among other things, to prevent computer crimes.

Gabriela decided to study Computer Science Engineering to be able to program the systems of companies [18].

III. RESULTS

The results based on two interviews from which one was oriented to the company to know the general and specific details regarding the number of employees; and the other one towards women developers of technological solutions to understand information on their educational background, professional trajectory and different projects in which they have participated.

The companies participating in the study were three, all of them Salvadoran origin located in the capital of El Salvador and belonging to the technology sector; they were the only ones who agreed to participate in the study.

The women participating in the study were twelve, from Latin roots being the majority Salvadoran and developers of different profiles: students, employees, entrepreneurs, and FreeLancer. Like the companies are those who agreed to participate in the study.

Following, the results obtained from the questions made to companies and women presented graphically.

A. Companies

Comparison between men and women working in technology companies.

Fig. 1 shows that the percentage of men and women per participating company is an undeniable fact that men are greater in quantity.

The participating companies were: Roots Inc, Applaudo Studios and Korinver, all founded by Salvadoran entrepreneurs.
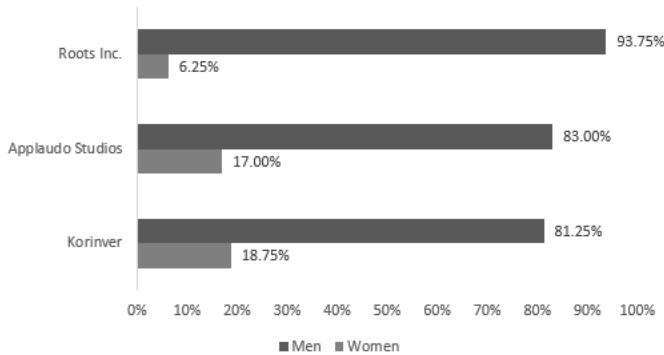

Fig. 1 Representation on the comparison between men and women working in technology companies of El Salvador

Number of Latina women working in technology companies in El Salvador.

Fig. 2 displays that the company Applaudo Studios has the most significant number of women in total seventeen all working in different areas according to the specialty of each of them, which allows the development of technological solutions aimed at any sector that request it.

Currently, the company has worked nationally and internationally with the development of applications for mobile phones, desktop, and others.
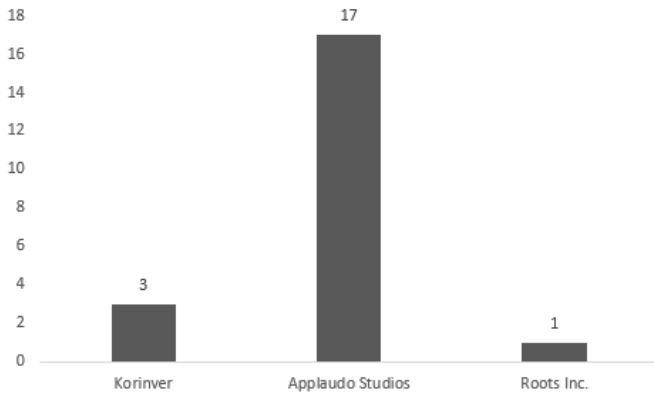
Fig. 2 Representation on the number of women working in private companies that develop technology in El Salvador.

B. Women developers of technological solutions

Women who have participated in the development of technological solutions.

Fig. 3 exposes that 100% of women interviewed have participated in the development of technological solutions at an academic and business level.
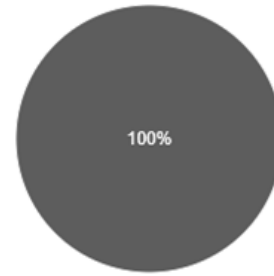

Fig. 4 Representation of women who have participated in the development of technological solutions in companies in El Salvador

Women profile who work with technological solutions.

Fig. 4 illustrates the highest percentage is 75% which represents nine women participating are developers employed; 8.33% represents one woman, for the profiles of a student, an entrepreneur, and a FreeLancer.
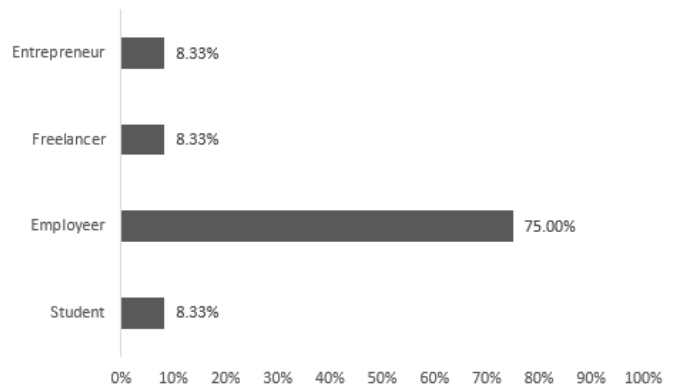

Fig. 3 Representation on the profile of women who develop technological solutions in companies in El Salvador

Women who develop technological solutions.

Fig. 5 shows the different educational fields in ICT from women participating in the study.

The names of the careers varied by the university where each of them has studied, but the majority are STEM-based; A very curious fact in the graph is the 8.33% that represents one woman who holds a Degree in International Commerce; currently, she is working in the area of technology solutions development.
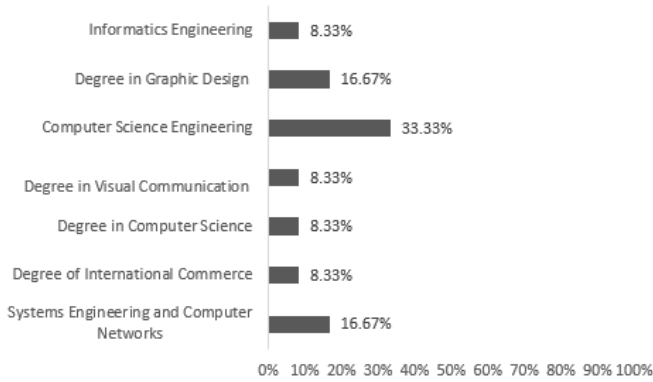
Fig. 6 Representation of the university careers of women developers of technological solutions

Fig. 5 Representation of the performance areas of women developers of technological solutions

Women nationalities who are working in technology companies in El Salvador.

Fig. 6 demonstrates that the highest percentage is 83.33% representing ten women participating in the study are Salvadoran nationality; 8.33% represents one woman who holds a Mexican nationality while another 8.33% is from a Venezuelan.

Fig. 7 Representation of the different nationalities of women developers of technological solutions.

Performance areas of women developers of technological solutions.

Fig. 7 visualizes the different areas of performance from women participating in the study.

The most demanded areas 20.83% are web design and programming; 16.67% Databases, 12.50% graphic design; 8.33% software engineering and project management; the areas of least demand with 4.17% are Networks, UI / UX and QA.
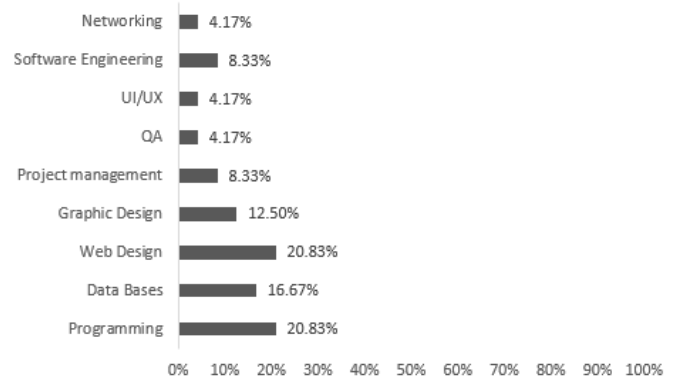
IV. CONCLUSIONS

El Salvador has companies dedicated to the development of technological projects founded by Salvadoran entrepreneurs; even more important Salvadoran women are founders of some of the companies that belong to the technology sector; Despite this, male gender predominates in the number of employees.

Currently, women from Latin America work in Salvadoran companies as developers of technological solutions.

The use and development of ICTs by women participating in the study, encourage other women to join, creating support networks and search for new sources of employment and opportunities that allow personal, professional and work growth.

At the same time contribute to the digital transformation of society and demonstrate through skills and competencies, that there is no gender gap to be a developer of new technologies.

El Salvador must continue working on initiatives such as TecnoGirl, Science Girl Camp, which are focused on courses about technology for female high school students, that up to now, universities, organizations, and government have made; at the same time, promote new ideas from existing ones that favor the goal of integrating women into the development of new technologies, performing in one or several areas of preference from an early age.

We must empower young women and girls, offer them training in digital skills and entrepreneurship, organize events where they have references; since women "We are not consumer princesses, we are creative queens." "Some women have invented things like the algorithm, the Wi-Fi, the eBook... however, they do not have visibility. In school nor on the internet they tell us about them, and girls do not have references, she added. According to Aranda, as children, toy catalogs show children as "creators" and girls as "consumers." and when a woman wants to start, she finds herself with the prejudices of investors, who do not trust and do not finance their Projects [19].

The study, in general, opens up new spaces to continue the

research for the future.

For the case that the majority of employees working in the private companies are men, for which the considered objective is: to know the causes how come the company has a low number of women entering to work; In addition, the number of women profiles that request IT-oriented positions and how many are accepted to perform a position in the technological sector, taking into account the number of women who currently graduate from STEM university courses in El Salvador.

REFERENCES

[1] Gobierno de España, Ministerio de Igualdad,"Un recorrido por la historia de las mujeres", http://coeducando.educacion.navarra.es/wp-content/uploads/2011/10/Recorrido_por_la_historia_de_las_mujeres.pdf, 2013

[2] Mentxu Ramilo Araujo, "Las Tecnologías de la Información y la Comunicación a nuestro servicio", http://www.emakunde.euskadi.eus/contenidos/informacion/sen_revista/es_emakunde/adjuntos/revista_papel_86_es.pdf, 2012

[3] Francisca Puertas Maroto, "El papel de las mujeres en la ciencia y tecnología", http://www.iessanfernando.com/wp-content/uploads/2017/03/Mujeres-en-ciencia-y-tecnolog%C3%ADa.pdf, 2017

[4] Mentxu Ramilo Araujo, "La historia de las TIC y el papel de las mujeres", http://emakunde.blog.euskadi.eus/2012/10/las-tecnologias-de-la-informacion-y-la-comunicacion-a-nuestro-servicio/, 2012

[5] Unidad de Genero del MINED, "Política de Género" https://www.mined.gob.sv/index.php/programas-educativos/unidad-de-genero, 2016

[6] Gloria Bonder, "Las nuevas tecnologías de información y las mujeres", https://repositorio.cepal.org/bitstream/handle/11362/5894/1/S026404_es.pdf, 2002

[7] Eulalia Perez Sedeño, "La mujer en el sistema de ciencias y tecnologia", cuadernos de Iberoamerica, ISBN: 84-7666-131-2, Madrid

[8] González García y Eulalia Pérez Sedeño, "Ciencia, Tecnología y Género", https://www.oei.es/historico/revistactsi/numero2/varios2.htm, 2002

[9] BBVA Innovation Center, "La lucha por impulsar el emprendimiento femenino", https://www.bbva.com/wp-content/uploads/2016/10/ebook-cibbv-mujeres_y_tecnologia-es.pdf, 2016

[10] BBC News Mundo, "Evelyn Berezin, la pionera de la computación que creó el primer procesador de texto", https://www.bbc.com/mundo/noticias-46567517, 2018

[11] Katherine Moreno, "Forgotten women in tech history", https://www.domo.com/blog/forgotten-women-in-tech-history/, 2016

[12] BBC Mundo, "Quién es Susan Wojcicki, la "sexta mujer más poderosa del mundo" (y por qué gracias a su garaje existe Google)", https://www.bbc.com/mundo/noticias-44202186, 2018.

[13] Rocio P. Benavente, "Ocho mujeres que marcaron el camino de la informática tal y como la conocemos", https://www.elconfidencial.com/tecnologia/2015-03-08/ocho-mujeres-que-marcaron-el-camino-de-la-informatica-tal-y-como-la-conocemos_723948/, 2015

[14] Manuel Llaca, "Carol Shaw, La primera diseñadora de videojuegos de la historia", https://parceladigital.com/2017/12/18/carol-shaw-la-primera-disenadora-de-videojuegos-de-la-historia/, 2017

[15] Manuel Llaca, "Carla Meninsky, pionera en el desarrollo de videojuegos", https://parceladigital.com/2018/10/02/carla-meninsky/, 2018

[16] M. Llorente. "Con el reto de atraer más mujeres a las TIC", https://www.heraldo.es/noticias/economia/2019/01/28/con-reto-atraer-mas-mujeres-las-tic-1289638-309.html#, 2019

[17] Edwin Teos, "Mujeres buscan dejar su huella en la tecnología", https://www.laprensagrafica.com/economia/Mujeres-buscan-dejar-su-huella-en-la-tecnologia-20190307-0619.html, 2019

[18] Edwin Teos, "Especialista en Informática: "Me encanta el 'hackeo' ético porque es como ser detective"", https://www.laprensagrafica.com/economia/Especialista-en-o-Me-encanta-el-hackeo-etico-porque-es-como-ser-detective-20190317-0402.html, 2019

[19] Cámara-WTech, "'El reto de atraer a más mujeres a la tecnología' cierra el ciclo #Cámara-WTech", https://www.camarazaragoza.com/actualidad/el-reto-de-atraer-a-mas-mujeres-a-la-tecnologia-cierra-el-ciclo-camara-wtech/, 2019.