THE INTERNET OF PEACE: UNPACKING THE GENDER-IOT-PEACE BUILDING NEXUS IN SUDAN AND COLOMBIA

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ABSTRACT

This research explored the linkages between gender, internet of things and peace building in conflict and in peace times. A desk review of literature and a case analysis of two countries, Sudan and Colombia, were utilised to collect data for the study. The Feminist Techno-science Framework was applied to the study, to analyse how technologies can be used to promote inclusive social justice and peace. The framework assesses how women's experiences and perspectives can inform and shape technological innovation, to draw the marginalised to the centre of peace building action. The study concluded that inclusive usage of IoT advances the Women, Peace, and Security (WPS) Agenda by providing opportunities for women's participation in peace building processes, enhancing their social, economic, political, and environmental engagement, provided that operating legal frameworks for ICT usage are gender inclusive.

KEYWORDS

Network Protocols, Wireless Network, Mobile Network, Virus, Worms & Trojon

1. INTRODUCTION

Adoption and usage of Internet of Things (IoT) in peacebuilding processes is increasingly becoming widespread globally. However, existing literature on IoT's role in peacebuilding has primarily focused on information and communication infrastructure and practices, overlooking a critical dimension, that of offering a gender-sensitive analysis of IoT platforms and practices in peacebuilding. The absence of a gender-sensitive narrative on IoT in peacebuilding is becoming increasingly conspicuous in a global context where regions and nations are experiencing growing disparities in economic and technological advancement which lead to exacerbated inequalities and unevenly distributed benefits. As the world grapples with the consequences of this technological divide on the social, economic and political fronts, it is crucial to examine the intersection of gender, IoT, and peacebuilding in order to produce evidence-based knowledge and information. This knowledge and information can be used by both policy makers and practitioners to ensure that the opportunities and benefits of IoT are equitably distributed and that the potential of IoT to promote inclusive peace is fully realized.

The prevailing global hegemonies and geographies of insecurity starkly illustrate the vast disparities between the Global North and the Global South. The economic and technological advancements in the Global North is juxtaposed against the economic challenges and limited technological progress the Global South. This disparity is perpetuated by the absence of robust, binding global policies that ensure equitable resource distribution across regions [1,2]. In Africa, a region in the Global South, these disparities have huge negative consequences along gender and class lines, often retaining a feminine face. The majority of African women, especially those

living in remote rural areas, face significant barriers in accessing IoT platforms and technologies, which in turn hinders their opportunities for social, economic, and political empowerment. This research aims to explore the intersection of gender, IoT, and peacebuilding, in a bid to contribute to the production of evidence-based knowledge that sheds light on the untapped potential of IoT in promoting gender-inclusive peacebuilding initiatives.

This study examines the role of IoTs in women's peacebuilding efforts in two distinct contexts. In Sudan, an African country plagued by perpetual conflict and turmoil since its independence in 1956 to the present day, the focus is on the broader utilization of IoTs by women in peacebuilding initiatives in conflict. In contrast, the Colombian case study zooms in on the specific use of IoTs by women outside of conflict, during the 2016 peace implementation process and its aftermath which is a critical transition period, offering a unique glimpse into the impact of IoTs on women's peacebuilding efforts during such a critical period. This study recognizes that peacebuilding can occur in both conflict-affected and post-conflict settings, hence the focus on two distinct contexts - one embroiled in ongoing conflict (Sudan) and another transitioning into post-conflict reconstruction (Colombia). It is therefore essential to delineate and examine the concepts of conflict and non-conflict spaces as a starting point. This nuanced understanding will facilitate a deeper exploration of how women's peacebuilding efforts using ICTs evolve and adapt across these different contexts.

There is a tendency to equate conflict to armed conflict in peace studies. A straightforward definition of armed conflict denotes a fully pronounced incompatibility that concerns government and/or territory, and where there is bloody violence emanating from the use of armed force between at least the government of a state and one or more opposing parties [3]. In the case of genocide, there are possibilities for such a bloody conflict to be driven by only one armed party [3]. A broader approach to an understanding of conflict however, recognizes that security and insecurity of any nature are connected to the concept of incompatible goals, thus to conflict. Intrapersonal security denotes that violence and insecurity can still prevail even when conflict between armed groups may have ceased [4]. Just as conflict is often triggered by behaviours and events at the community level, understanding and addressing the social, economic, environmental and political discrimination, marginalization and insecurity experienced by women at the community level is also crucial for the development of sustainable peace [5]. Galtung [6] advances the argument that there is no absolute peace in any context, even in contexts where a peace agreement is being implemented, hence the existence of three different definitions of violence, namely direct violence, cultural violence and structural violence. Direct violence refers to a situation of a full blown and bloody conflict between warring parties [6]. Cultural violence on the other hand refers to the harm that human beings experience as a result of norms and practices that operate in their context (Galtung, 1969), while structural violence occurs when social structures of institutions prevent people from accessing their required needs, or when a system promotes inequitable distribution of goods and services [6].

Thus, the selection of Colombia and Sudan as case studies for this research affords a strategic comparative lens to examine how women leverage IoT for peacebuilding across diverse contexts. This juxtaposition allows for a nuanced exploration of peacebuilding as a continuous process, transcending the traditional conflict-post conflict binaries. Furthermore, this study recognises that conflict and non-conflict spaces are not mutually exclusive, but rather, exist on a continuum. The study further recognises how women’s exploitation of IoT in peacebuilding processes can inform and adapt to varying levels of conflict intensity, as well as to various levels of peace. The comparative approach enables a richer understanding of the intersections between technology, gender and peacebuilding, ultimately contributing to more effective and conflict sensitive peacebuilding strategies. The comparison of how IoT platforms and technologies have enhanced peacebuilding processes in the developed world, in Colombia, with how women have used IoT

technologies in an African country, Sudan, also helped to highlight the disparities between the developed and developing world. Highlighting these disparities was an impactful way of demonstrating what the women of Africa would have achieved in their participation in peacebuilding processes if they had full access to financial resources, institutions and infrastructure that facilitate ownership and exploitation of IoT technologies, as in the developed world. Thus, the research highlighted the role of IoT platforms and technologies in enhancing peacebuilding processes, the gaps and challenges faced by African women, the best practices from both contexts, and the existing opportunities to leverage IoT technologies in Sudan, to catch up with the global trends.

The increased role of IoT technologies in facilitating peacebuilding processes globally has brought with it both opportunities and challenges for women peacebuilders and for the broader Women, Peace and Security (WPS) Agenda. IoT platforms and technologies play multifaceted and important roles in peacebuilding processes, for both practitioners and scholars of peacebuilding processes. For peacebuilding practitioners, IoT platforms and technologies help to connect them to each other, as well as to experts and organisations that can provide them with the required support. IoT platforms and technologies further support information sharing and learning strategies through various online platforms, expanding the networks and diversity of peacebuilders and publicizing their local initiatives to a wider audience through packaging their output into relevant commentary, stories and programmes over social media and other online platforms. Peacebuilding scholars have likewise produced and documented useful information, data and knowledge on lived experiences of how IoT have opened up new opportunities for participation and inclusion globally. The importance of inclusive IoT practices is seen in the opportunities and innovations that IoT technologies present for women to exploit peacebuilding processes to their advantage and that of their societies and States. Inclusion of women's needs in IoTs policies and practice has to be prioritized as a critical factor in all peacebuilding efforts [7], and also in promoting social cohesion, economic opportunities, education projects and general information and communication processes. In peace mediation processes, larger-scale opportunities that inclusive usage of IoT affords for participation in peace and political processes eliminate the need to allocate a physical seat at a table, thus challenging cultural attitudes towards spaces, which traditionally exclude women [7].

This perception does not claim that when women use IoT platforms and technologies in peacebuilding, peace is assured. Rather, it focuses on how the subjunctive affordances wrought by IoT can enable possible spheres and better politics through inclusive participation of all people in peacebuilding, and also through the reduction of conflict that comes with women's increased participation. The concept of subjunctive technologies describes conceptual or proposed technologies that aim to address social injustices but are not yet fully developed, implemented or widely adopted and accessed [8]. Subjunctive technologies can serve as a catalyst for discussion, critique and innovation, encouraging policy makers and practitioners to think critically about the role of IoT in addressing social issues. They can further help identify gaps in current technological solutions and inspire new approaches to creating a more equitable society. The aspect of subjunctivity emanates from the fact that such technologies have potential to transcend cultural, class and geographic barriers and impact on positive change, once their exploitation has been actualized. Subjunctive technologies to an extent promise to connect people across different class, cultural and geographic spaces, and support peacebuilders to move forward and find answers even in difficult situations [8]. Yet on the other hand, the manner in which subjunctive technologies are deployed can also perpetuate existing power dynamics and inequalities. During the COVD 19 lock down for example, women engaged more online than they would have done physically, transcending class and geographical boundaries. For example, women participated in various peacebuilding training initiatives organised by different organisations cross regionally. These virtual spaces collapsed class barriers when community peacebuilders who would not have

afforded travel budgets to attend in space training in other countries were able to attend such trainings online with women from different worlds and classes [9, 10]. On the other hand, only a few elite women, and women residing in urban areas could exploit these technologies, while women living in rural areas could not.

In Africa for example, current statistics on women's access to technology are alarming, revealing a significant gender gap. The persistence of patriarchal economic systems, where women have limited ownership of resources, coupled with the high cost of technologies, has effectively made technology adoption a male-dominated domain. This exacerbates existing social and economic inequalities, further marginalizing women and hindering their opportunities for social, economic, and political empowerment. Data assembled by the United Nations Economic Commission for Africa (2023) revealed that only 17.8% of Africans have internet access in their homes, and merely 10.7% have home-based computers [11]. Data from the ITU further showed that 11.2% more African men than women have access to digital technologies [12]. Threats that exacerbate digital gender inequalities in Africa thus include poverty, inadequate and lack of education, and digital illiteracy. Online gender based violations like cyberbullying and various other forms of digitized discrimination further discourage some women in their use of digital platforms like social media [13].

1.1. Research Objectives, Research Questions and Interview Questions

Study objectives were i) to explore the potential of IoT technologies in enhancing women's participation and leadership in peacebuilding processes in conflict affected areas with limited connectivity; ii) to identify the challenges and benefits of using IoT in peacebuilding, particularly in conflict affected areas with limited connectivity and iii) to develop recommendations for leveraging IoT technologies to support women's peacebuilding initiatives. The study asked three key broad research questions, which were derived from the research objectives thus i) How can IoT be leveraged to enhance women's participation and leadership in peacebuilding processes in conflict affected areas with limited connectivity? ii) What are the potential benefits and challenges of using IoT enabled tools to support women's peacebuilding initiatives and how can these be addressed to ensure inclusive and sustainable peace? iii) In what ways can IoT technologies be sued to amplify women's voices and experiences in peacebuilding, and how can these contribute to more gender-inclusive and effective peace processes in contexts where women's participation is limited or marginalised? The research differentiated between research questions and desk review questions, as shall be discussed in the subsequent methodology section.

1.2. Importance of the Research

This study significantly contributes to the WPS Agenda by shedding light on the critical role of IoT technologies in peacebuilding processes, thereby enhancing the agenda's political relevance and impact. By exploring the intersection of gender, IoT and peacebuilding, the study provides a nuanced understanding of how technology can be leveraged to promote sustainable peace and gender equality, ultimately strengthening the WPS Agenda's political value and influence. The WPS Agenda is only 6 years short of entering the third decade since adoption of the United Nations Security Council Resolution (UNSCR1325) in 2000. In line with the emerging conflict trends, it is crucial to ensure the WPS Agenda's fit-for-purpose state to address new and emerging security issues, such as cyber threats and their gendered implications. Secondly, the study challenges the pervasive stereotype that women are incapable of leveraging IoT platforms and technologies for peacebuilding. In reality, many women peacebuilders successfully utilize technology to promote peace in their communities. Yet their initiatives are often overlooked or hindered by restrictive forces. By identifying and examining the obstacles that impede women's

peacebuilding efforts through IoT, this research aims to debunk the myth that women are the problem, instead revealing how gendered social, economic and political factors pose significant barriers to their success.

Finally, the research was conceptualized within the rubric of how IoT enhance women-led knowledge accumulation and knowledge appropriation processes, thus, it links IOT, gender and peacebuilding to the concept of peace education. Peace education in this research referees to an array of activities, including but not limited to pedagogic processes. Thus any process, event or practice that aims to transform conditions of conflict into conditions of peace, in the process leaving a train of evidence on learnings and best practices that can be copied, adapted and replicated in other contexts. Besides just promoting and establishing a culture of peace and positive conflict transformation, peace education promotes both the theoretical and practical aspects of knowledge and skills that have to be grounded and practiced to control, manage and transform conflicts [14]. A culture of peace in turn mends and sustains existing good relations, while preventing re-occurrence of conflicts [14]. Whenever women do peacebuilding work, they by default create safe spaces for learning, sharing and passing knowledge on to the next generation. They also undertake advocacy initiatives, first to create awareness and knowledge of peace activism, and also to influence laws and policies on inclusive peace processes. This therefore places their activism under the banner of peace education. Digital empowerment and digital rights of women in peace processes are essential prerequisites for the WPS Agenda in Africa.

1.3. Legal and Policy Frameworks for Women's Digital Inclusion

The goals of UNSCR 1325 for protection of women as they fully participate in peacebuilding processes at all levels will not be attained without universal digital inclusion. Meaningful participation in peacebuilding is not possible if there are gaps in technological access and usage between women and men, and among urban and rural, rich and poor women. Notably, none of the United Nations Security Council (UNSC) resolutions on WPS address the critical issue of digital inclusion, nor do they mention the internet, technology, online and cyber domains. This omission is understandable, given that the conflict landscape at the time of their adoption did not fully account for the emergence of cyber threats. However, with the rapid pace of globalization and technological advancements, the urgency to confront these threats has become apparent. The evolving nature of conflicts, now extending into the digital realm necessitates an updated approach to WPS that incorporates the intersection of technology, gender and peacebuilding.

In general, the issue of cyber security in the UN agenda can be traced back to 1998, following a motion for a resolution on ICTs and national security to the United Nations General Assembly's (UNGA) First Committee by the Russian Federation [15]. Debate was met with misunderstandings, disagreements and misinterpretations of the key concepts of information security and the role that the First Committee was supposed play in this agenda. In 2003, the First Committee established the Group of Government Experts (GGE), to explore and address among others, the use of ICTs in the context of international security and disarmament [16]. To date, five GGEs have been established to enable the discussion of issues such as the applicability of international law in cyberspace, international cooperation, and existing and potential threats. Since 2004 to date, 6 GGEs have been adopted, three of which produced reports in 2010, 2013 and 2015. Although these GGEs were adopted in 2004, four years after adoption of UNSCR 1325 on WPS, none of these have made any reference to gender or to women and girls, and neither did they make any inferences about the potential harms or abuses of rights emerging from the design and utilization of ICTs. The World Summit on the information Society (WSIS) outcome documents (2003 -2005) recognize the importance of digital inclusion, and provide a framework for action.

Since 2016, the Security Council demonstrated an increased focus and commitment to the agenda of cyber threats in relation to international peace and security, through the Arria-formula (informal) meetings of the Council since 2016 [17]. Likewise the UN Sustainable Development Goals (SDGs), specifically SDG 9 (Industry, innovation and infrastructure) and SDG 17 (Partnerships for the Goals) buttress the importance of digital inclusion. Within the UN SDG Vision 2030, digital inclusion does not only have practical socio-economic benefits, it can also serve to enrich the lives of individuals and communities as a whole. The International Telecommunication Union (ITU) Connect 2030 (2020) Agenda's goal is also to ensure that all countries have access to affordable and reliable ICTs. At the regional level, the African Union's Digital Transformation Strategy for Africa (2020 - 2030) seeks to promote digital inclusion and economic development across Africa [18]. The European Union's Digital Agenda for Europe (2020) seeks to ensure that all Europeans have access to high speed internet and digital skills. The Organisation of American States Inter-American Digital Agenda promotes digital inclusion and economic development in the Americas [19]. For example, the Security Council open debate on international peace and security in cyberspace held during Estonia's presidency in June 2021 acknowledged the gendered impacts of ICT threats and the need for women and men to participate in the digital arena decision-making processes [20].

The 2021 GGE specifically made mention to the need to minimize the gender digital gap between women and followed by adoption of UNSC resolution 73/27 which set up the Open Ended Working Group (OEWG), open for participation to all Member [21]. The three OEWG meetings in 2019, 2020 and 2021 highlighted the gender gap in access to and use of internet, and the impact thereof (OEWG, 2020), further calling for gender equality and the meaningful participation of women to be at the centre of international peace and security in cyberspace [22]. The OEWG's final report adopted in March 2021 accentuated the importance of bridging the gender digital gap as the starting point for ensuring women's leadership and participation in decision-making processes [23]. As far back as 2011 to date, many countries globally began to name and legislate against various harms threatened by the cyber domain, cybercrime and cyber gender-based crime through national action plans (NAPs), policies and country strategies.

1.4. Definition of Terms

In general, IoT refers to the network of physical devices, objects, and sensors that are embedded with software, sensors, and connectivity, allowing them to collect, share, and exchange data with other devices and systems over the internet. These devices, ranging from everyday objects like smart home appliances and computers to industrial machines and wearables are 'smartly' interconnected, in a manner that enables them to interact with the physical world and create a web of intelligent, automated, and data-driven interactions. The research focuses on the aspect of inclusive IoT processes of IoT inclusion. For purposes of this research, IoT inclusion is defined at two levels, first in the context of gender equality and social inclusion (GESI), and second in the context of the United Nations Secretary General's (UNSG) call for inclusion of all parties to the conflict, including all citizens, to have access to IOT. In the context of GESI, digital inclusion refers to the equal access, participation, and empowerment of women and girls in the digital sphere. This includes equal access to digital technologies, internet and mobile devices, opportunities for digital literacy and skills development, representation and participation in digital content creation and decision-making processes and freedom from online gender-based violence and harassment. The UNSG's call for equitable access to and utilization of digital IoT, information, and communication services by all individuals and communities affected by conflict includes refugees, internally Displaced Persons (IDPs), vulnerable populations (e.g., women, children, elderly) and marginalized groups (e.g., ethnic minorities, people with disabilities). IoT inclusion ensures that these individuals can access vital information and services, connect with

family and community networks, participate in peacebuilding and reconstruction efforts and exercise their rights and agency in the face of conflict.

1.5. Theoretical Framework and Literature Review

A suitable theoretical framework with a unique lens for examining the gendered dimensions of IoT and peacebuilding, as well as the intersection of IoT, women and peacebuilding was the Feminist Techno-science Framework. This theoretical framework aligns with feminist epistemology in that it examines and questions the intersectionality of gender, technology and power; it analyses how technologies can be used and designed to promote inclusive social justice and peace and it assesses how women's experiences and perspectives can inform and shape technological innovation and draws the marginalised to the centre of peacebuilding action. Embedded in this theoretical framework is the concept of decolonizing IoT technology usage to promote inclusivity. Decolonizing IoT technology usage is a continuous process that embraces the perspectives and lived experiences of communities, such as in the context of this research, women in conflict and outside conflict. Feminist Techno-science, in the context of IoT inclusion, assesses absences in the dominant narrative of technologies, particularly in relation to the experiences and knowledge production of women. The epistemological value of this framework is that it aims to unearth and engage critical perspectives that could help enhance the intersections of gender, peacebuilding and technology use for transformative value to society in an inclusive manner [24]. Comparing women's experiences in Colombia and Sudan under the framework of Feminist Techno-science further embraces the notion of intersectionality [25] which unpacks the various ways in which race, class and gender define the economic and social condition of women in relation to their positioning on the global map. As such, an assumption of this research was that the women of Colombia, by virtue of coming from Europe, a developed region, experience better access to IoTs than the Sudanese women who come from Africa.

1.6. Limitations of the Study

Although the study provides valuable insights into the intersection of IoT access and gender, its limitation may emanate from the reason that it relies on comparative analysis between only three countries, Colombia, Sudan and South Africa. A more comprehensive approach might call for a larger sample size and diverse contexts to strengthen the generalizability of findings. Furthermore, the study's focus on economic regional positioning as a primary factor influencing IoT access might overlook other crucial variables which could also impact on women's access to and utilization of IoT technologies.

2. LITERATURE REVIEW

This section presents the literature review that was undertaken for this study through a desk review of available literature on the subject under review, as well as through an analysis of the case studies of Sudan and Colombia.

2.1. Desk Review

Dharmapuri & Shoemaker [26] provided policy insights on gender and digital inclusion, noting the surge in online gender based exclusion and mistreatment as an indicator of looing violence, instability, war and societal collapse, as well as a pointer to larger cracks in the digital ecosystem itself. These researchers have argued that gender equality and inclusivity should be made central to technology and policy discussions both in conflict and peaceful contexts.

The UNOAU [27] policy brief presented arguments that digital inclusion for peacebuilding purposes has both opportunities and challenges, especially for women of Africa who are still facing huge barriers and setbacks in the usage of such technologies. Economic constraints and limited technological advancements hinder women's access to and ownership of Internet of Things (IoT) technologies. The situation is further exacerbated by inadequate electricity and internet access. Moreover, limited digital literacy and online safety awareness render women and girls vulnerable to cyberbullying and online exploitation, often leaving them as victims of these abuses.

A research commissioned by the UN Secretary General [28] found that digital inclusion affords larger-scale opportunities that for women's participation in peace and political processes by challenging cultural attitudes which traditionally exclude women from certain spaces such as peace negotiating tables, which are envisaged as male domains. Digital inclusion in this case allows women the opportunity to engage with these peace processes from afar, gathering and transmitting crucial evidence for aiding these peace negotiations. The same research found that despite its demonstrated value, digital inclusion for women has not been prioritised, causing it to decline significantly. The economic effects of digital technologies have reached over 50% of the developing world's population in the last few decades. However, many women, especially those from poor communities, indigenous and ethnic minorities, remain disconnected from an increasingly interconnected world. As this widening digital gender gap amplifies socio-economic inequalities, bridging the digital divide provides unparalleled opportunities for development. However, there is still a need to develop more systematic strategies that combine gender mainstreaming and digital inclusion into peacebuilding efforts.

Tetteh [29], opined that digitalization and new technologies play a critical role in economic development, promoting access to basic services and peacebuilding efforts in Africa, with 88.4 percent of the continent under mobile cellular coverage. However, Tetteh does not provide sex-disaggregated information, obscuring the disparities in women's access to technology compared to men, and perpetuating the exclusionary nature of technology and development practice on the continent. Furthermore, Tetteh highlights the IoT technologies as facilitators of gender-based cyberbullying, online harassment, hate speech, and disinformation, particularly in contexts such as online advocacy, election campaigns, and conflict settings, where these technologies can be exploited to perpetuate harm and exacerbate existing power imbalances. Continent wise, women's rights advocates, aspiring politicians, female public figures and innocent women alike are disproportionately targeted for online hostility like gender-based reputation and privacy attacks. By harnessing context-specific knowledge and awareness to promote women's active participation and increased usage of IoT for peacebuilding, the full potential of digital technologies as catalysts for promoting the rights and empowerment of women and girls can be unlocked.

An article by Forkwa [30] revealed that the emphasis on the opportunities presented by IoT technologies as empowering tools for peacebuilding overlooks the inherent security risks. This oversight raises critical questions about the effectiveness of existing cyber legislation, policies and national actions in ensuring women's security, particularly at the local level, where the impact of these technologies is most keenly felt. Forkwa's view overlooks the intersectional nature of women's security in the IoT dispensation by neglecting to consider how socio-economic and cultural factors compound vulnerabilities. Furthermore, the article's focus on legislation and policies, without adequately exploring the need for more nuanced and adaptive frameworks to address the constantly evolving landscape of IoT threats.

A study by UN Women Asia & The Pacific [31] revealed alarming levels of women's participation in cyber security policy processes and decision-making. The study further

highlighted that current cyber-security measures are inadequate. The study also uncovered a positive trend that digital platforms and technologies have become innovative channels for women and marginalised groups to engage in peacebuilding processes. These groups have historically faced barriers in accessing and utilising traditional public platforms and decision-making spaces. The study emphasized the importance of analysing and sharing gender-specific perspectives on peace processes and media in technological peace processes. This can be achieved by promoting peaceful and inclusive narratives that counter dominant discourses, ultimately fostering more gender-inclusive decision making. The digital world, touted as a great equalizer, often fails to provide a safe and inclusive space for women and diverse sectors to participate fully. Online harassment, a pervasive issue, disproportionately affects women and marginalised groups, leading to self-censorship and exclusion from digital discourse. To address this, a comprehensive study that goes beyond mere access to digital technologies by cantering intersectionality as the basis for policy and legislation is needed. By acknowledging that online gender-based harassment is often caused compounded by other forms of discrimination such as sex, race, religion, sexuality, religion, to mention a few, legislative frameworks and policies can provide opportunities for meaningful gender-sensitive engagement, ultimately fostering a more inclusive digital landscape that allows all citizens to participate fully in the digital economy and society.

Hirblinger, Hansen, Hoelscher et al [32], found a limitation in existing research on digital technologies in peacebuilding, arguing that the research tend to emphasize tech-solutionist advantages and tech-pessimistic disadvantages of technology, without giving a reflextive focus to the linkages between the coproduction of the technical (technologies for peacebuilding) and the social (peacebuilding with technology) in both academia and practice. These researchers argued that digital technology is shaped by and shapes society, thus peace and IoT studies should shed as much light on the assumptions about the social, economic and political contexts of the peacebuilders in the same manner that they shed light on the claims about technology. This perspective underscores that women's access to IoT platforms and technologies is contingent upon the socio-economic and political opportunities available in their specific contexts, and is a befitting perspective to this study.

2.2. Case Study 1: Sudan

Sudan has very limited laws and policies on digital inclusion. Article 57(2) states that every citizen has "the right to access the internet without prejudice to order, safety and public morals as specified by law" [33]. The Sudan's National ICT Strategy (1999) emphasized digital inclusion, e-governance, and ICT infrastructure development [34]. Sudan's national broadband strategy was documented in the Sudan's National Strategic Development Plan 2012-2016 [1 aimed to increase broadband penetration and accessibility. The Sudan Law Combating Cybercrimes of 2018, amended in 2020 repels the previous Computer Crime Act of 2007[35]. The limited information that is available about this law claims that it prohibits illegal access, data interference and illegal interception, in addition to introducing criminal penalties for the spread of fake news online. In 2019 Sudan enacted one law and 2 policies on digital inclusion. The Sudanese Consumer Protection Act (2019) provides for digital consumer protection. The ICT for Development (ICT4D) Policy (2019) emphasizes leveraging ICTs for social and economic development and The National Policy on Electronic Governance (2019) aims to enhance e-governance and digital inclusion. In reality however, the citizens' civil liberties remain at the mercy of the government, and the law does not always protect citizens' consumer rights. For instance, in 2016, an inspection campaign targeting 103 internet cafes was carried out, resulting in the seizure of large quantities of computer hardware, based on unproven claims that they contained sexually explicit materials [36].

In July 2021, Sudanese authorities blocked more than 30 local news websites in the run up to protests demanding the resignation of the government [36]. The 2020 regulations on content filtering and website blockage have enabled the blocking of websites, which can have severe consequences during critical periods like wars and elections. Restricting access to information can compromise the safety and security of individuals, as it limits access to vital information, hinders communication and coordination exacerbates misinformation and puts citizens at risk of harm. Most women activists and women's NGOs depend on online platforms and toll free lines to report cases of gender based violence and domestic violence, and this rights is compromised when access to information is compromised. Although the blocking of websites is enabled by the 2020 regulations on content filtering and website blockage, blocking people from accessing information during crises times like war and elections has huge implications on the safety and security of people.

In 2020, the Ministry of Communications and Information Technology's established two strategies, the Digital Sudan Strategy, focusing on digital transformation, inclusion, and economic growth, as well as the Sudan's National Digital Economy Strategy which aims to promote digital entrepreneurship, innovation, and inclusion. In view of these limited laws and policies on digital inclusion, Sudan's digital landscape perpetuates gender-based discrimination and marginalisation. Women in Sudan face significant barriers to digital participation. This situation is exacerbated by the existing social and economic inequalities, and these gaps combined undermine the effectiveness of digital inclusion initiatives, further perpetuating gender disparities. A viable and inclusive digital environment that promotes women's empowerment and social change can only exist if and when laws that criminalized GBV and DV are enacted.

Sudanese women play a vital role in peacebuilding efforts, primarily through civil society organisations. The peacebuilding work varies across regions, reflecting the diverse contexts and needs of different communities. Given the context's conflict dynamics, Sudanese women are particularly focused on enhancing women's participation in peace processes and governance, as well as in addressing the welfare of refugees and internally displaced persons (IDPs, to support their return and re-integration into society. Yet despite these and other significant contributions to peacebuilding, women in Sudan remain underrepresented at both national and local levels. Historically, there has been limited effort to ensure their inclusion in formal government structures, such as the 2005 comprehensive Peace Agreement and the 200 and 2006 Darfur Peace Agreement implementation processes.

Sudanese women are vulnerable to online cyberbullying and technology-facilitated violence, a reality that forces them to pull out of online participation [37]. This situation is further exacerbated by inadequate digital legislative and policy frameworks that fail to provide sufficient protection, as well as the absence of laws criminalizing gender-based violence and domestic violence leaving women with no recourse to protection and justice. These gaps in legislation and policy create a toxic digital environment, further perpetuation violence and discrimination against women. The limited technology access and usage in Sudan can also be attributed to internationally imposed sanctions, particularly those imposed by the United States. While the US and part of the global community agree that the economic embargo on Sudan was triggered by the Sudanese government's support for international terrorism, relentless efforts to destabilize neighbouring governments and violation of human rights [33], these sanctions are on the other hand a form of soft power which aim to influence the behaviour and decisions of States to align with US political interests [38].

Furthermore, economic sanctions often have detrimental effects on the free flow of digital communications and communication technologies that are vital for peacebuilding, especially in times of conflict [39]. By prohibiting the export of goods, including technology and

telecommunication equipment and hardware, sanctions have effectively restricted Sudan's access to essential tools for digital development [40]. Research has established that sanctions can have a devastating impact on internet access, exacerbating digital divides and hindering economic growth [41]. The sanctions imposed on Sudan have exacerbated the country's existing technological constraints, perpetuating digital exclusion and hindering social and economic progress. Normally, Sudan has the most affordable mobile internet in Africa and is ranked among the five least expensive countries for mobile internet globally [36]. However, sanctions exert higher operational costs on telecommunications operators, forcing them to purchase equipment and software from third-party companies at inflated prices, the cost of internet data bundles inevitably rises. As a result of war, Sudan has experienced a doubling of poverty and dropped from lower middle income to poor country status over the years. This poverty status, coupled with the increase in internet data costs and other online services costs disproportionately affects women, who are already disproportionately affected by poverty, making it even more challenging for them to access internet access.

As a result, the digital access gap widens, further marginalizing women and limiting their opportunities for economic empowerment, education and social participation. This creates a vicious cycle of poverty and digital exclusion, underscoring the need for targeted interventions to address the intersectional challenges faced by women in Sudan. The sanctions imposed on Sudan can be viewed as a form of structural violence against the entire nation, with a disproportionate impact on women, who are already vulnerable to poverty [42]. In a country where poverty has a feminized face, digital exclusion perpetuates the cycle of suffering, limiting women's access to essential resources and support. Access to technology and the internet is crucial for women to obtain vital information on health services, humanitarian aid, and psychosocial support. By denying them this access, digital exclusion exacerbates poverty and marginalization, closed potential avenues for seeking help and support, and perpetuates gender-based violence and discrimination. In Sudan, addressing digital exclusion is not only a matter of social justice but also a critical step towards mitigating the effects of structural violence against women.

2.3. Case Study 2: Colombia

In presenting the case of Colombia, this research focuses specifically on period of implementation of the 2016 Peace Agreement between the Government of Colombia and the Revolutionary Armed Forces of Colombia (FARC). The success of this peace implementation process has been attributed to women, who used their capabilities to leverage the Internet and ICT to achieve lasting peace. Colombia women were conspicuous for the solution oriented manner in which they used technology to build peace more for the survival of their families, communities and country than for personal and partisan political reasons. In communities where more men died from the gendered effects of battlefronts, women were left with no option but to transcend their typical day to day tasks of fending for the household and families to become champions of using ICTs to build trust in the country.

In Colombia, the Ministerio de Tecnologías de la Información y las Comunicaciones (MinTIC) has introduced policies aimed at closing the country's digital divide by creating policies that in principle aim to provide both rural and urban Colombia with more universal and meaningful access to ICT. Over the years, the MinTIC established new policies as well as revised the old ones for compliance and capability to minimize the existing digital divide. A number of strategies were set in motion through the implementation of Vive Digital, to achieve this objective. These strategies included trebling the country's internet connections to 8 million, developing plans to address digital illiteracy as well as improve access to IoT technologies and internet access to women and girls, improving people in the lowest socioeconomic groups' access to internet and IoT technologies by over 150%, expanding digital tool training and digital entrepreneurship and

improve digital literacy among women [43]. MinTIC further created Revolución policy which reached approximately 30,000 users, mainly high school students and other new Internet users [44]. El Futuro Digital es de Todos (2018 -2022) supports broadband deployment and digital inclusion, providing disaggregated data on Internet users and the quality of Internet that they could access. Likewise the 2019 ICT Modernization Law was promulgated to support the implementation and reach of MinTIC policies. This law improved Colombia's ICT institutional framework, adopted the best practices in spectrum policy, and facilitated strides towards the closure of the urban-rural digital divide, through removal of regulatory barriers to infrastructure deployment.

Alleged criticism in the manner the Colombian government used ICT to disseminate their own messages about the process were that their website presented outdated and unreliable information. Furthermore, there was no transparency in the manner people's submissions reached Havana through the Mesa de conversaciones, a government website-based application which allowed Colombians to submit their concerns and demands to the process. The balance of the information dissemination process in the country was worsened by the alleged usage of the media to spread falsehoods targeted at undermining the peace process by the Opposition polcitcla paties [45]. As identified in previous literature, ICT's main objective is to build trust, but it is still only a tool.

On the other hand, women of Colombia worked hard to complement the government in the area of ICT usage for information dissemination and related peacebuilding processes. Women used IoT technologies for various peacebuilding purposes, including to find useful information on health and well-being, to track resources for family and community support, as well as to relay information from the communities to the peace negotiators and back, as well as to make the demands of local communities known to the responsible stakeholders [45]. During both the peace-making and the peace implementation process, women's civil society organisations worked with mediators through radio, Moodle and WhatsApp to inform people about the Havana negotiations, and were able to convey supplementary information to what the mainstream media chose to be silent on. Mediators used platforms such as Moodle and WhatsApp to include women in the peace process. Mostly WhatsApp, because of its rural reach and language versatility, enabled women to build coalitions and deploy their voices of protest, warnings, communications and calls for action [45].

During the peace implementation process, an average rural and urban cum gender digital divide of 9.95% (a 19% gap identified by El Futuro Digital es de Todos, MinTIC and 0.9% identified by the World Wide Web Foundation). Of the identified the digital divide, Colombia had a 19% gap in access to Internet compared to men. The overall Internet access was established to be about 51% with a 17% gender gap reflected most in the rural communities [46]. Efforts to bridge this rural and urban as well as the gender gap started first and foremost with the government's realisation of how patriarchal stereotypes are reproduced online, leaving women vulnerable and more prone to GBV online and in daily life. The MinTIC responded to this anomaly by creating the Plan Por TIC Mujer (2019), which focused solely on promoting women's use of ICT technologies through leadership and ICT skills training programmes targeting 6000 women in four years (MinTIC, 2018). Table 1 highlights dynamics in access to internet connectivity in Colombia from 2012 to 2021.

	Year	% access	% urban	% rural	Source
2012	Mobile broadband subs	10			[47, 48]
2015	Access to home computer	45.5			
2018	Internet access	52.7			[47,48]
2019	Access to home computer	37			
2019	Internet access	52.2			
2020	Internet access	60%			[49]
2021	Mobile broadband subs	74``			[47,48]
2021	Internet access	61		32.5	[49]

Internet access by class

Year	City and class zone	City and class zone	City and class zone	Source
	Bogota (Capital & wealthiest)	Vaupés (Minority indigenous population)	Vichada	
2020	76	8.9	9	[49]
2021	81	1.0	4.5	[49]

Bogota, the Department with the most affluent residents has the highest internet access, while Varupes and Vichada, housing the most vulnerable populations are losing digital connectivity. Research identified that women peacebuilders who were instrumental in the 2016 Peace Process have become social leaders in their communities and in the absence of FARC, these women have been targeted by proliferating armed groups [50]. Women in Vaupes and Vichada are the most vulnerable as they lack access to internet, which impacts on the manner they receive news, information and access to assistance. In some departments, such as Cauca and Valle del Cauca, the targeting of civilians, which includes social leaders, doubled from 54 to 101 fatalities. Evidence also showed that in 2019, no citizens in Vichada were targeted, but in 2020, there were reports that identified the targeting of few citizens [50]. This targeting can be attributed to the fact that Vichada had a 4.5% decrease in Internet connectivity from 2020 to 2021. The ICT for Peace Foundation further identified that while ICT is helpful for the entire peacebuilding process, it can be most effective after there is a ceasefire and/or peace agreement, as this is the period when the environment on the ground is more conducive to information sharing, collaboration, and to create mechanisms for non-violent engagement for the future [51]. ICTs were found to enable women various opportunities for dealing with violence, as well as opportunities for resources needed for post conflict reconstruction. Further, the lack of home-based Internet access is becoming a deterrent for women to use digital services to attend community meetings or join peacebuilding activities because they are being monitored by men in the household [46]. For women who do not have consistent access to the Internet for communication, they rely on others to access the Internet and relay their messages. This, unfortunately, is increasing the possibility of fabricated messages to be sent or their messages not being sent at all. Moreover, they also revealed the proliferation of fake third-party agents offering access to digital services.

Women were found to frequent places in Medellin, where government developed free Internet hotspots in over 300 locations, for their daily life activities and for Internet connectivity. These places were found to be safe spaces for women's protection. When women have safe spaces with easy Internet access, the stop worrying about their personal safety and protection, and commit most of their time to ensuring the sustainability of peacebuilding activities. This however cannot be a glowing narrative for the whole of Colombia because reaching these centres requires significant travel time and transport expenses for some women. Furthermore, Landerman [44]

found that women traveling to the centres become vulnerable to stalking and monitoring, which renders the women more vulnerable. Replicating this intervention model to all provinces, including rural ones would make the peacebuilding initiatives more effective and more sustainable. Regarding the rural divide, community and other organizations that were able to provide Internet access for their members still faces the challenge of lacking the appropriate digital skills to use for supporting peacebuilding efforts and activities. Moreover, women with ICT skills still face patriarchal challenges and have to negotiate their participation in peacebuilding with family and society. Lwamba, Shisler, Ridlehoover et al [52] noted how women were continuously excluded from meetings where men questioned their competency because of commonly held stereotypes.

2.4. Literature Review Summary

The literature reviewed for this study demonstrated 2 huge gaps that are of interest in the advancement of research on IoT, peacebuilding and gender. Firstly, a huge gap in the available literature that addresses the issue of IoT inclusion between the Global North and the Global South was noted. There was adequate literature analysing the dynamics of women, peacebuilding and IoT in Colombia, as opposed to a paucity of literature on the same in Sudan. Secondly, the legal and policy frameworks for IoT inclusion in Colombia were quite robust, while in Sudan, a lot could still be done to ensure an enabling environment for women's exploitation of IoT in peacebuilding processes.

3. METHODOLOGY

3.1. Introduction

The methodology of this research combined a desk review of literature and published case studies on IoT, women and peacebuilding to provide a comprehensive understanding of IoT's potential in enhancing women's participation and leadership in peacebuilding in both conflict and non-conflict contexts. Various data bases were searched to gather relevant reports, articles, evaluations, and documents from credible sources. Gathering of secondary data through a desk review was facilitated by a desk study matrix. The study differentiated between the three broad research questions highlighted in the ensuing sections and the desk review questions for enabling data collection, which are highlighted in Table1. Research questions aim to guide a study or test a hypothesis, and are typically open-ended. Desk review questions on the other hand are used to collect qualitative information tor a deeper understanding of a subject, to gain insights from individuals in the case of interviews, or from selected documents in the case of a literature review [53]. Research questions were broken down into specific desk review questions, to facilitate effective data gathering through the desk review and case study process, using a desk review matrix with the relevant desk review questions. Breaking the main research questions down into desk review questions was also useful in facilitating a precise thematic data analysis and coding. Table 1 is a desk review matrix with six desk review questions which were applied to the secondary data gathering process.

3.2. Desk Review Questions

Table 1: Desk review matrix

Desk review question 1: What existing IoT initiatives or projects have successfully enhanced women's participation and leadership in peacebuilding processes, and what were the key factors contributing to their success?	
Source of information	(List various sources and their citation details)
Key themes of categories	(List key emerging themes)
Summary of main findings	(List summary of key findings thematically)
Analysis/implications	(Do analysis and implications of key findings, triangulating with the postulations from literature review as well as applying the theoretical framework)
Desk review question 2: What are the potential benefits of using IoT-enabled tools to support women's peacebuilding initiatives, and how do these benefits align with the needs and priorities of women peacebuilders?	
Source of information	(List various sources and their citation details)
Key themes of categories	(List key emerging themes) (List summary of key findings thematically)
Summary of main findings	(List summary of key findings thematically)
Analysis/implications	(Do analysis and implications of key findings, triangulating with the postulations from literature review as well as applying the theoretical framework)
Desk review question 3: What challenges have been encountered in implementing IoT-enabled tools for women's peacebuilding initiatives, and how have these challenges been addressed or mitigated?	
Source of information	(List various sources and their citation details)
Key themes of categories	(List key emerging themes)
Summary of main findings	(List summary of key findings thematically)
Analysis/implications	(Do analysis and implications of key findings, triangulating with the postulations from literature review as well as applying the theoretical framework)
Desk review question 4: How can IoT technologies be used to amplify women's voices and experiences in peacebuilding, particularly in contexts where women's participation is limited or marginalized?	
Source of information	(List various sources and their citation details)
Key themes of categories	(List key emerging themes)
Summary of main findings	(List summary of key findings thematically)
Analysis/implications	(Do analysis and implications of key findings, triangulating with the postulations from literature review as well as applying the theoretical framework)
Desk review question 5: What are the key considerations for ensuring the inclusive and sustainable use of IoT technologies in women's peacebuilding initiatives, and how can these considerations be integrated into project design and implementation?	
Source of information	List various sources and their citation details)
Key themes of categories	(List key emerging themes)
Summary of main findings	(List summary of key findings thematically)
Analysis/implications	(Do analysis and implications of key findings, triangulating with the postulations from literature review as well as applying the theoretical framework)
Desk review question 6: What are the potential risks or unintended consequences of using IoT technologies in women's peacebuilding initiatives, and how can these risks be mitigated or addressed?	
Source of information	List various sources and their citation details)
Key themes of categories	(List key emerging themes)

Summary of main findings	(List summary of key findings thematically)
Analysis/implications	(Do analysis and implications of key findings, triangulating with the postulations from literature review as well as applying the theoretical framework)

These desk review matrix was useful in organising, analysing and synthesizing information from various documents and sources. It also assisted in identifying patterns, themes, and insights related to the broad research questions and the main research topic. Emerging data was analysed using thematic analysis and coding. Information from the various sources was compared and contrasted to identify patterns, gaps and inconsistencies. A detailed construction and description of the three cases was undertaken and conclusions drawn. Findings were then triangulated across desk review and case studies for reliability. Since this was a research solely based on a desk review, a few research ethics were adhered to, to ensure validity and reliability of the data. The first step was the selection of literature sources published by reputable publishers, such as Scopus and indexed journals, to ensure production of credibility, accuracy and unbiased secondary data. Researcher bias during analysis was mitigated through the use of the desk review matrix, which ensured comparison and triangulation of generated data, based on the sources. Limitations of secondary data from the desk reviews was likewise recognized and acknowledged, to avoid forcing the production on unreliable findings.

4. FINDINGS

4.1. Introduction

This section presents the study findings for the research that was carried out to explore the intersection of gender, IoT, and peacebuilding. The study was conceptualized within the rubric of how technologies enhance women-led peace education processes in Africa and beyond. The findings are presented thematically, with each key finding followed by a discussion of its implications and corresponding recommendations. This integrated approach allows for a clear understanding of the study's results, their significance and the actions needed to address the identified challenges and opportunities.

4.2. Inclusive Usage of IoT Advances the WPS Agenda

The study found that IoT platforms and practices provide excellent opportunity for women's participation in peacebuilding processes in various ways, on the social, economic, political and environmental fronts. The success of the Colombia peace implementation process of 2016 for example, was attributed to women, who used their capabilities to leverage the Internet and ICT to convey required data, information, awareness and intelligence during the mediation process and beyond. Women exhibited a desire for collective peace than for advancing any personal or partisan agendas during the peace making and peace implantation process in Colombia. It was noted how Colombian women were conspicuous for the solution oriented manner in which they used IoT to advance peace and development. They worked hard to complement the government in the area of ICT usage for information dissemination and related peacebuilding processes, including to find useful information on health and well-being, to track resources for family and community support, to relay information from the communities to the peace negotiators and back, as well as to make the demands of local communities known to the responsible stakeholders. The study likewise found that Sudanese women play a vital role in peacebuilding efforts both as individual activists and through civil society organisations. Their peacebuilding work varies across regions, reflecting the diverse contexts and needs of the different communities that they come from. Given the context's conflict dynamics, Sudanese women are particularly focused on enhancing women's participation in peace processes and governance, as well as in addressing the

welfare of refugees and internally displaced persons (IDPs, to support their return and re-integration into society. This finding confirmed the postulation that women's usage of IoTs is primarily through their collective efforts of building peace which is more for the enhancement and survival of their families, communities and States, than for ideological reasons [29]. This finding aligned also with the Feminist Techno-science Framework which was used for the research. This theoretical framework aligns with feminist standpoint theoretical goals of bringing the marginalised, in this case women, to the centre of development action and knowledge production. Based on this finding, the need for African governments to increase women's access to IoTs by availing internet access and access to affordable technologies, to enable women to maximize their peacebuilding efforts.

4.3. Women's Experiences of Using IoTs for Peacebuilding Vary by Regions and Contexts

The study found a lot of variations in the manner in which Colombian women and Sudanese women engaged with IoTs in their peacebuilding efforts. Colombian women were found to have better access to IoTs platforms and technologies than the Sudanese women. A number of factors were found to be the cause of this variation. Firstly, this disparity can be attributed to Colombia's more favourable economic regional positioning, despite both countries experiencing conflict. Moreover, in contexts marked by both conflict and economic challenges, patriarchal dynamics often intensify due to power imbalances, further exacerbating gender-based disparities in access to IoT technologies. As a more developed nation than Sudan, Colombia demonstrated the capability to unveil better and affordable IoT technologies to its citizens, including women, than Sudan. This variation confirms the notion of geographies of insecurity and how it impacts on citizens and the marginalised disproportionately. For Sudan, poverty and continuous erosion of infrastructure and the economy by war, as well as economic sanctions were found to be debilitating factors against women's opportunity to exploit usage of IoTs like the Colombian women.

The recommended action for State governments is to realise that every community has different needs when it comes to implementing peace agreements and building lasting peace. It is therefore imperative for governments to have clarity on what ICT infrastructure and digital skills each community may need. Governments also need to formulate the partnerships to get funding, training, and the infrastructure out to the community. While Colombia can be commended for establishing workable and useful partnerships and collaborations that have enabled the construction of technological usage centres for women and other citizens, Sudan is still lagging behind on this aspect. It is imperative for the government to have clarity on what ICT infrastructure and digital skills each community may need. It then needs to formulate the partnerships to get funding, training, and the infrastructure out to the community. Besides the infrastructural issues, related factors including discriminatory legal and policy frameworks, poverty, GBV, social norms were also found to be facilitating the digital divide, especially in Sudan. These factors are discussed separately below:

4.3.1. Legal and Policy Frameworks

Colombia was found to be more advanced in enabling gender inclusive legal and policy frameworks for enabling digital inclusion. In Colombia, the Ministerio de Tecnologías de la Información y las Comunicaciones (MinTIC) successfully introduced laws and policies aimed at closing the country's digital divide, ensuring that people who live in the rural and urban areas have equitable access to ICT. The implementation of Vive Digital for example, as Vera (2013) established. trebled the country's internet connections to 8 million, improved people in the lowest socio-economic groups' access to internet and IoT technologies by over 150%, expanded digital

tool training and digital entrepreneurship and improved digital literacy among women. Enactment of Revolución policy likewise expanded internet reach to approximately 30,000 users, mainly high school students and other new Internet users [44]. On the contrary in Sudan, the few laws that exist on digital inclusion are not gender sensitive. Furthermore, the Sudan 2020 regulations on content filtering and website blockage legitimize the blocking of people from accessing information during crises times like war and elections. These state-centric regulations have had huge negative safety and security implications for citizens, with deeper gender specific implications for women. Instances where the 2016 inspection campaign that shut down 103 internet cafes, seized large quantities of computer hardware, based on unproven claims that they contained sexually explicit materials and blocked more than 30 local news websites in the run up to protests demanding the resignation of the government. Furthermore, restricting access to information can compromise the safety and security of women, as it limits access to vital information on health for families, support for IDPs and refugees, reporting cases of GBV. Most women activists and women's NGOs who depend on online platforms and toll free lines to report cases of gender based violence and domestic violence have their rights violated when access to information is compromised. Government of Sudan is encouraged to align its laws and policies on ICT usage to the inclusive global and regional protocols that call for gender equality and equity as well as protection of rights to ICT usage.

4.3.2. Online GBV

Women in both countries, Colombia and Sudan were victims of online GBV through cyber-bullying, trolling, online defamation of character, bad usage of their online profiles and stalking for purposes of stealing their online identification information. In Colombia such ills are perpetrated by FARC dissidents who target known women peacebuilders as part of their revenge strategy. Likewise in Sudan, the online violations of women are a result of war revenge games. This situation is even worse in Sudan where legal frameworks discriminate and marginalize women both socially and economically as gender-based violence (GBV) and domestic violence are still not criminalized. It was also found that even those women with basic digital literacy do not know how to access the Internet safely, which renders them vulnerable to cyber stalking and cyber bullying. Women from ethnic minorities, who do not speak the majority language, are often marginalized in online discussions.

4.3.3. Gender Norms

Gender norms and stereotypes were also found to be a huge contributor to the digital divide in both countries. Women are generally looked down upon as people incapable of using IoTs technologies, and as a result, they are left out of many processes where men are champions. Furthermore, although NGOs in both countries provide capacity building for ICT usage to women, that knowledge cannot transcend the gender norms in society, where women, especially from Sudan, require the permission of their husbands and families to engage in peacebuilding using IoTs technologies.

4.3.4. Poverty

Women in both countries, especially those who live in rural areas, lack resources to obtain personal IoT gadgets as well as internet data. In Colombia government developed free Internet hotspots in over 300 locations, where women get access to WIFI as well as gadgets for their daily life activities and for Internet connectivity. This development however has loopholes that increase the digital divide because women who live in rural and semi-rural areas are far from these centres and require significant travel time and transport expenses to get there. Moreover, women traveling to the centres become vulnerable to stalking and monitoring, which renders the

women more vulnerable. Replicating this intervention model to all provinces, including rural ones would make the peacebuilding initiatives more effective and more sustainable. All the above findings confirm Harblinger's [19] postulation that contrary to their benefits, in practice, online spaces often reproduce, and often amplify, the patriarchal structures, practices, and culture of contemporary life.

4.3.5. Power and Class Dynamics

In Colombia where internet connectivity was found to be above par, 88% of people who had access to computers and internet services are residents of affluent low density suburbs, while the remaining 12% are minority indigenous groups who live in high density surbubs. In similar manner in Sudan women who live in rural areas of high conflict intensity have no access to internet at all. These dynamics perpetuate a digital divide along both gender and class lines. These findings confirm postulations by [12] that combating digital divides is not as simple as providing Internet to a designated area. Universal and meaningful digital connectivity are both needed to close the gap of the digital divide. Universal connectivity is achieved by providing Internet to everyone, whereas meaningful connectivity identifies a specific level of connectivity that enable users to have a productive and safe online experience at an affordable price. Plans to implement inclusive IoT infrastructure should be accompanied by people cantered education plans that can accommodate the community's digital literacy skills.

5. CONCLUSIONS

The study concluded that inclusive usage of IoT advances the Women, Peace, and Security (WPS) Agenda by providing opportunities for women's participation in peacebuilding processes, enhancing their social, economic, political, and environmental engagement, provided that policies and practices are matched to the specific realities of each context, and also provided that operating legal frameworks for ICT usage are gender inclusive. Secondly, the study concluded that women's experiences of using IoTs for peacebuilding vary by regions and contexts, highlighting the need for context-specific approaches to address the digital divide and ensure effective IoT adoption. Furthermore, discriminatory legal and policy frameworks, poverty, online GBV, gender norms, and power and class dynamics perpetuate the digital divide, particularly in Sudan, and must be addressed to ensure gender-inclusive digital connectivity. The fourth conclusion was that governments and stakeholders should increase women's access to IoTs, provide affordable technologies, and develop gender-inclusive policies and partnerships to support women-led peacebuilding initiatives. Finally, the study concluded that addressing the digital divide requires a comprehensive approach that includes universal and meaningful digital connectivity, people-cantered education plans, and simultaneous roll-out of ICT infrastructure to ensure a productive and safe online experience for women.

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