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How can bridging the digital gender divide accelerate the achievement of the United Nations Sustainable Development Goals?

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Abstract

The purpose of this research is to identify how bridging the online gender divide can accelerate the achievement of the United Nations Sustainable Development Goals. At present 200 million fewer women are online than their male counterparts, highlighting the gender inequality that exists online. The disparity in the number of women online is having a detrimental effect on the ability to achieve the Sustainable Development Goals by the United Nations target date of 2030. The research first endeavours to understand the current discourse of what is understood by the term “digital gender divide” within contemporary literature. Drawing knowledge from existing literature, the reasons for the digital gender divide are critically assessed and conceptualised within an empirical framework before offering an insight into how such barriers can be addressed and overcome. The removal of such obstacles therefore paves the way for the United Nations Sustainable Development Goals to flourish. The evidence collated throughout the study details the intricate connection between sustainable development and gender equality, concluding that considerable advancements towards sustainable development can be made if more women are online.

Key Questions

- What is the digital gender divide?
- What barriers are responsible for the current gender gap in global internet access?
- By having a greater online presence, in what ways can women drive effective change towards achieving the United Nations Sustainable Development Goals?

Acronyms and Abbreviations

BCDD……..Broadband Commission for Digital Development

BCSD……..Broadband Commission for Sustainable Development

ICT……..Information Communication Technology

ITU……..International Telecommunication Union

LDC……Less Developed Country

MDG……...Millennium Development Goal

OECD…….The Organisation for Economic Co-operation and Development

PC……...Personal Computer

SDG……Sustainable Development Goal

UN……...United Nations

UNICEF……..The United Nations Children's Fund

UNESCO…....United Nations Educational Scientific and Cultural Organization

1 Introduction

In 2010 the then United Nations Secretary-General, Ban Ki-Moon, called for further efforts to be made to meet the United Nations Millennium Development Goals (MDGs). The MDGs were established as a blueprint agreed to by all the world's countries as well as the world's leading development institutions to meet the needs of the world's poorest, such as alleviating extreme poverty and encouraging socio-economic development[1]. One of the initiatives created to support the progression of the MDGs was the Broadband Commission for Digital Development, a joint venture by the International Telecommunication Union (ITU) and the United Nations Education, Scientific and Cultural Organisation (UNESCO). "The Commission was established in May 2010 with the aim of boosting the importance of broadband on the international policy agenda, and expanding broadband access in every country as key to accelerating progress towards national and international development targets[2]." In 2015, the MDGs were replaced by the United Nations Sustainable Development Goals (SDGs) as the new policy framework for poverty reduction and socio-economic development. There are currently 17 SDGs:

- No Poverty
- Zero Hunger
- Good Health and Wellbeing
- Quality Education
- Gender Equality
- Clean Water & Sanitation
- Affordable & Clean Energy
- Decent Work & Economic Growth
- Industry Innovation & Infrastructure
- Reduced Inequalities
- Sustainable Cities & Communities
- Responsible Consumption & Production
- Climate Action
- Life Below Water
- Life on Land
- Peace, Justice & Strong Institutions
- Partnerships for the Goals

Following this expansion, there was a greater emphasis placed on technology, broadband and information communication technology (ICT). The previous MDGs, created at the turn of the millennium, could not have foreseen the rapid development and growth of ICTs and therefore they were not incorporated within the goals. We now know the rate at which technology improves will increase exponentially over time.

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[1] United Nations Millennium Development Goals, The United Nations, available from: < http://www.un.org/millenniumgoals/bkgd.shtml>, [accessed 4th August 2016].

[2] Broadband Commission for Sustainable Development, available from: <http://www.broadbandcommission.org/about/Pages/default.aspx>, [accessed 4th August 2016].

However, it is estimated that the capabilities and efficiency of any given technology can double within 18 months. The rapid development of technology is particularly true with ICTs[3]. Therefore, the new SDGs placed a greater emphasis on the role of technology, with ICT specific targets mentioned in 4 of the 17 goals. As well as these particular targets, there are also 38 other targets within the SDGs whose success is dependent on access to ICTs. It is important to note that the use of the term ICTs encompasses the use of broadband as, without it, many functions of the functions of ITCs would be obsolete.

The Broadband Commission for Digital Development was subsequently relaunched as the Broadband Commission for Sustainable Development, further solidifying its contribution to the new SDGs. The Broadband Commission currently has five targets. These are:

1. Making Broadband Policy universal
2. Making Broadband Affordable
3. Connecting Homes to Broadband
4. Getting People Online
5. Achieving Gender Equality in Access to Broadband

Having presented a broad overview of the topic, the next section focuses on how this research defines gender as well as the aims and objectives of the paper and the specific relationship between the target of achieving gender equality in access to broadband and the United Nations sustainable development goals.

[3] Chandler, David. (2013), How to predict the progress of technology, *Massachusetts Institute of Technology News*, available from: <http://news.mit.edu/2013/how-to-predict-the-progress-of-technology-0306>, [accessed 8th August 2017].

1.1 Understanding Gender within the context of the research

It is also important to note at this stage how the term gender is interpreted within this research. Most of the previous literature on the subject of the digital gender divide has categorised gender as biologically identifiable by using the terms men and women. An individual's sex does not necessarily identify their gender, and often the two terms are incorrectly used interchangeably. Historically, societies have corresponded an individual's traditional gender role of masculinity or femininity as their biological sex of male or female. While in the present day the most common genders remain as man and woman; gender is increasingly understood as being social and cultural constructions of masculine and feminine characteristics that can be adopted by an individual by choice.

Some individuals choose to not identify with aspects of gender that are usually consigned based upon their biological sex, instead choosing to identify as non-binary or transgender amongst many others. However, within this research, the term gender will equate to an individual's biological sex, due to the existing literature using the term gender to identify between male and female. The current data that is used to inform this research would be void if the same definitions were not applied. Nonetheless, there is vast potential for further academic studies to be conducted to understand the relationship between the digital gender divide and gender identity amongst individuals. It would no doubt be an interesting area to research and would prove particularly valuable to not only to the study of digital gender divide and sustainable development but also the field of gender studies, which is becoming increasingly applicable and significant in the interpretation of many disciplines.

1.2 Research Aims and Objectives

Target five of the Broadband Commission for Sustainable Development (BCSD) seeks to achieve gender equality in access to broadband by the year 2020. Access to broadband is now considered a fundamental human right by the UN whether it be via public access such as an internet cafe, or a personalised electronic device such as a PC or electronic tablet. At present, several organisations are working in collaboration with the BCSD with the objective of accurately measuring if this goal is being met by producing quarterly progress reports. These collaborations aim to measure the progress and include the global mapping of actors and initiatives on women on gender and ICT to identify key issues and gaps, which includes a focus on access[4]. Many have also agreed to develop a "common and open set of baseline indicators on the gender digital divide, which they will promote amongst research institutions and government stakeholders. This will build on existing recommendations for gender-specific indicators and methodologies taking into consideration previous efforts and guidelines[5]." The International Telecommunication Union are also measuring this process by collecting gender disaggregated data on internet users worldwide to provide accurate estimates regarding the gender gap and access to ICT's, more specifically broadband and internet access.

At present 1.3 billion "internet users will be women (37% of all women worldwide will be using the Internet), compared with 1.5 billion men online (41% of all men), equivalent to a global Internet gender gap of 200 million fewer women online[6]." These figures highlight the need for higher penetration rates of internet access for females. Perhaps more disconcerting is a 2017 ITU report which demonstrated that this divide is growing, albeit slowly by 1% between 2013 and 2017.

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[4] The Broadband Commission for Sustainable Development, 2017, Working Group on the digital gender divide: Recommendations for action: bridging the gender gap in Internet and broadband access and use progress report, available from: <http://www.broadbandcommission.org/workinggroups/Pages/digital-gender-divide.aspx>, [accessed 24th September 2017].

[5] Ibid.

[6] The Broadband Commission for Sustainable Development Advocacy Target 5, Broadband Commission for sustainable development, available from: <http://www.broadbandcommission.org/Documents/Targets-Separated/Target-5.pdf>, [accessed 6th August 2017].

Currently, the gender gap between male and female internet users is more pronounced in the developing world where it now stands at 31% in the least developed countries (LDCs) and 23% in Africa[7]. However, this is hardly a surprising finding as these regions have a more pronounced gap regarding almost all areas of gender equality.

This paper aims to research how this has serious implications not only for gender rights but also its adverse effect on the UN's Sustainable Development Goals as women's lack of access to the internet is one of many factors regarding gender equality that leads to the stagnation of goals such as No Poverty, Good Health and Wellbeing, Quality Education, Decent Work and Economic Growth as well as Reduced Inequalities to name a few. However, by first addressing the issues faced by the lack of broadband opportunities and the factors that drive these issues such as cultural and economic barriers, the paper predominantly seeks a solution and explores how by delivering on target five, the increased number of women with an online presence and access to broadband would accelerate the growth of many of the UN's Sustainable Development Goals giving detailed examples of specific areas that would flourish. For instance, according to the World Bank "productivity can be enhanced if disparities between male and female are diminished by giving them equal access in all spheres[8]". Research by the ITU has consistently shown that providing more females with access to broadband can significantly contribute to economic growth producing several case studies to support this claim[9]. Similarly, UNESCO has identified education as one of the key areas where gender equality in relation to broadband access can drive effective change.

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[7] The International Telecommunication Union, 2017, New Broadband Commission call to action provides guide to close digital gender gap, available from: <http://www.itu.int/en/mediacentre/Pages/2017-PR08.aspx>, 'accessed 20th September 2017].

[8] Klasen, S. (2002). Low Schooling for Girls, slower Growth for All? World Bank Economic Review, 16: 345-373

[9] International Telecommunications Union, 2012, Impact of broadband on the economy, available from: <https://www.itu.int/ITU-D/treg/broadband/ITU-BB-Reports_Impact-of-Broadband-on-the-Economy.pdf>, [accessed 26th September 2017].

1.3 Literature Review

The purpose of the literature review is to provide an analytical overview of literature related to this specific topic. In doing so, I also aim to determine the existing concepts, ideas and theories surrounding this topic and how they can provide a framework from which to present my findings. As the use of ICTs has become increasingly prevalent in the lives of many people across the globe, their usage and impact on the way in which we live has resulted in a surge of 21st-century literature on the topic. The sheer scope of ICTs and the possibilities and opportunities that they present to those with access to them has resulted in a plethora of texts from numerous and vastly different sources. This too, is true for the field of research that focuses on the digital gender divide as it is an issue recognised from governments and international institutions to groups that focus on the empowerment of women, amongst many others.

International organisations and governmental institutions have conducted a substantial amount of the existing research and literature published on this topic with the intention of informing and potentially implementing policy. Annual reports and agenda initiatives such as the information provided by these organisations outlining the SDGs and their content themselves form the basis of pre-existing texts on this topic. For example, the UN has played an incredibly significant role in the promotion of gender equality and has established the very notion of the SDGs from which most literature relevant to this topic is based. Without these texts, there would be no gender equality initiatives or SDGs for independent authors and institutions to analyse, a fact which applies to this very paper. The existing literature from these institutions is useful regarding the gathering statistics that this research alone could not. For example, the ITU produces a yearly report on ICT figures, ranging from global and regional usage to specific demographic breakdowns of who uses the internet and for what purpose. These institutions provide rich data sets and are a useful tool in understanding critical issues. They inform this research and facilitate the identification of trends over a period of time and subsequently generate theories as to why this trend is occurring and how it is relevant to the research questions. However, a clear majority of this literature stemming from these organisations and institutions is quantitative heavy. This has resulted in there being little theory within the discourse surrounding this topic from such organisations as it is predominantly factually based.

Academics have sought to apply theoretical concepts to the digital gender divide and the role of SDGs to complement the more data heavy literature that forms the foundation of this topic. There are many books, journals and articles coming from a variety of sources, that while occasionally using their own quantitative data, interpret the results to allow for a more qualitative review of these concepts and apply their own theories. The existing literature tends to be relatively narrow in focus. This is not necessarily a criticism as the qualitative nature of the literature and the depths at which the authors study the topic provide theoretically rich literature. However, current discussions tend to focus on either just the digital gender divide or the UN's SDGs, with few demonstrating the significance of the relationship between the two.

At present, academic literature with a focus on the digital gender divide principally seeks to identify the key reasons for why the divide is present and showing limited signs of regressing. Although some studies understandably differ, most determine that the same influences are responsible for the divide and argue that these can mainly be attributed to several key factors which are generally socio-cultural and socio-economic. There is evidence that these studies are correct in their assertations, yet there is disagreement as to which factor is the most influential in impeding gender equality online and appears to be a consistent trend amongst contemporary academics. Some such as Sophie Edwards, a global development reporter, attribute it to one factor more so than another. In her text "Cultural barriers need to be challenged to close the gender digital divide[10]", she claims that the most significant reason there are 200 million fewer women online than men, is down to patriarchal dominated sociocultural factors within the communities in which some women live[11]. In analysing the existing literature that is socio-cultural centric, it appeared that few texts investigated the historical factors that have resulted in women being underrepresented online. Therefore, this research aims to fill that void by giving a significant historical account of how the use of the internet has been portrayed within different societies. Technology, Scientific and Phycology journals such as *Science Computer Review* and *Psychology of Women Quarterly* have been particularly helpful in providing valuable information from those academic disciplines that can be transferred to this field of study, therefore enabling this research to apply alternate theories to the gender divide and sustainable development that may otherwise remain overlooked.

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[10] Edwards, S. (2017), Cultural barriers need to be challenged to close the gender digital divide, Devex, [online], available from: < https://www.devex.com/news/cultural-barriers-need-to-be-challenged-to-close-the-gender-digital-divide-90213>, [accessed 12 April 2018].
[11] Ibid.

Perhaps the most influential and well-established research comes from Martin Hilbert's *Digital gender divide or technologically empowered women in developing countries? A typical case of lies, damned lies and statistics*. While it primarily conducts its study on LDC's and developing countries, this has proved to be useful as these states are the demographic that will benefit the most from the achievement of the SDGs. Hilbert analysed a diverse group of 25 countries that represented different levels of development, geography, culture and social structure. Using empirical evidence, he examines men and women's experiences of internet usage via these variables and asserts that "the reason why fewer women access and use ICT is a direct result of their unfavourable conditions concerning employment, education and income[12]." This statement alone highlights the perpetual cycle that the digital gender divide and SDG's find themselves in. An individual's (in this case a woman's) employment, education and income prospects can increase by gaining access to the internet, yet do this they often need some level of employment, education or income. However, it highlights the need to study the two mutually and leads the question as to how bridging the gender divide can accelerate the achievement of the SDG's, something Hilbert himself concedes his research does not accomplish. Therefore, this study aims to build on Hilbert's research by further explaining how it can apply to SDG growth.

Other academics have expressed the necessity for this, for example, books such as '*Gender Equality and Sustainable Development*' edited by Melissa Leach, address both issues simultaneously, although excluding some digital-specific elements, and are useful in the sense that they critically assess the earlier, more policy-based texts academically, allowing for a reflective view that brings the two areas of gender equality and sustainable development together. The book outlines the necessity that "Accelerating sustainable development, and enhancing gender equality are both current imperatives in research, policy and public debate. Too often, however, they are addressed separately[13]." This is predominantly what this research paper aims to recognise on a large scale by focusing on multiple specific SDGs instead of sustainable development as a whole. The current literature often encompasses sustainable development as one and fails to establish the how intricately related it is to the gender divide.

[12] Hilbert, M. (2011), "Digital gender divide or technologically empowered women in developing countries? A typical case of lies, damned lies, and statistics", Women's Studies International Forum, vol. 34, no. 6, pp. 479-489.

[13] Leach, M. (2015), Gender Equality and Sustainable Development, p.2, Routledge

However, one area in which much of the literature falls short is the very few numbers of texts which instead of analysing imperial data, examine the "terminology, structure, and form that make articulation of the problem of the digital divide possible[14]." David Gunkel's *Second thoughts: toward a critique of the digital divide* explores this very theme and provides an insight into aspects of the field that are unresearched. It provides a critical examination of the context in which this body of work is often presented by academics and institutions alike, and seeks to understand the common starting points and desired outcomes between the two. It is not a commentary that argues differing viewpoints via anecdotal evidence, instead, attempting to understand how the framing of the digital gender divide can shape research. This was text was very insightful in understanding how the terminology behind the digital gender divide can alter and frame the context of the study, sometimes subconsciously, other times through the authors own discretion. The term digital gender divide can have different denotations, and this text informed this research in ensuring clarity in what is meant by digital gender divide within the context of this paper as well as within research within the field of study.

These texts have helped shaped this research, which aims to fill the void left by other academic authors who are yet to link the digital gender divide to each SDG specifically. Both forms of academic and policy-related literature have heavily influenced this paper and have provided it with statistical data that this research alone would not have the resources to obtain. While being beneficial in forming the knowledge needed to pursue this topic, they also aided in developing the research questions for this paper. It became apparent that there was limited study in gender equality, ICTs and SDGs all within the same text. And even fewer which incorporated more than one SDG, researching how the achievement of each goal via bridging the digital gender divide could accelerate sustainable development and that this was something that should be explored. This research will hopefully fill this gap within the existing literature.

[14] Gunkel. D, (2003), Second thoughts: toward a critique of the digital divide, p.2, 2003 SAGE Publications London, Thousand Oaks, CA and New Delhi Vol5(4):499–522

1.4 Methodology

The paper will utilise both qualitative and quantitative data. It is necessary to include both forms of research due to the exploratory nature of the subject matter. While there is somewhat substantial research on both the UN's SDG's and Gender Equality, there are few papers that address the role that ICT's can play in achieving these targets in parallel with one another. Therefore, I will be required to draw upon primarily secondary research in both these areas to ensure that the quality of data allows me to make a fair and detailed analysis. It is essential, however, to highlight the structure of the paper regarding its chapters as well as the content of these chapters as this provides the reasoning behind each research method used.

After the initial introduction outlining the focus of the paper, as well as the literature review and methodology section, the core of the paper will split into approximately four parts. The first details of what is meant by the digital divide and the history of the term within academic literature. Secondly, the barriers that are preventing women from engaging with ICTs will be addressed. This is crucial to understanding, why there is a digital gender divide and why it is an important issue. The next section identifies ways in which these barriers can be overcome. By analysing the current initiatives that are in place, the paper assesses if these initiatives are succeeding or not, while also proposing potential new initiatives based on the findings of this paper. The final section will be the longest as it highlights how the SDGs that will benefit from the bridging of the digital gender divide while exploring theoretical debates around the SDGs. However, not all the SDGs will be presented. This is reflective of the SDGs which based on the evidence collated, would benefit the most by reducing the gender gap that currently exists between male and female broadband users. The chapters will be focused on:

- No Poverty
- Good Health and Wellbeing
- Quality Education
- Gender Equality
- Decent Work & Economic Growth
- Reduced Inequalities

The rationale behind choosing these SDGs is that there is currently sufficient evidence to suggest that achieving gender equality online will accelerate the rate at which these goals can be met. Prominent individuals within the BCSD have strongly advocated the necessity of attaining gender equality online if the SDGs are to be achieved by 2030. Houlin Zhao, Secretary-General of ITU and co-Vice Chair of the Broadband Commission, stated that "Our central conviction is that broadband and ICTs are critical if we are to achieve the Sustainable Development Goals. ICTs underpin important achievements and modern services in many sectors, and governments and industry must increasingly work together to create the conditions so badly needed to facilitate the growth of broadband for sustainable development[15]." Furthermore, Irina Bokova, UNESCO Director-General and co-Vice Chair of the Broadband Commission supported this by stating "The framework for all our work is the 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals. We must ensure the digital revolution is a revolution for human rights and promote technological breakthroughs as development breakthroughs[16]."

However, all seventeen of the UN's SDGs will not feature in this paper. For example, development goals such as 'Life Below Water' which seeks to "Conserve and sustainably use the oceans, seas and marine resources[17]" will not be given a chapter as there are limitations to the length of the paper. While the engagement of more women online has benefits for every goal, adding a section for all seventeen SDGs would not allow me to explore key areas in depth and would, therefore, damage the quality of the paper. Whilst it could be argued that in this particular case that more women would have the opportunity to become actively involved in environmental projects and support this specific goal through online activism, which is entirely plausible, I am required to focus my attention on areas where a more significant link between online gender equality and achieving specific SDGs the can be established. There is substantially more work in the areas highlighted above, and due to my own limitations of conducting primary quantitative research, these are the areas where I must focus my attention.

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[15] International Telecommunication Union, 2017, Press Release: UN Broadband Commission: Time for a "New Deal", available from: <http://www.itu.int/en/mediacentre/Pages/2017-PR09.aspx>, [accessed 1st October 2017].
[16] Ibid.
[17] The United Nations Sustainable Development Goals, The United Nations, available from: <http://www.un.org/sustainabledevelopment/oceans/>, [accessed 2nd September 2017].

As previously mentioned, the research in this paper will consist of both qualitative and quantitative, as well as primary and secondary data. The overall aim is to provide evidence that shows how women's access to ICTs can accelerate the achievement of the UN's SDGs while identifying potential barriers and providing solutions as to how they can be overcome. As a prominent global organisation, the UN has produced large amounts of research on topics related to this paper. For example, the SDGs are incredibly rich in statistical data ranging from percentages to numerical values that represent counts or measures such as the number of women worldwide who lack basic literacy skills. If there are variables included in this data such as time, it can be converted into graphs to provide a visual aid. This is an excellent source of secondary quantitative data as it is likely to be highly accurate. The United Nations, as an impartial body, use their data to inform critical decisions on charters and policy that have ramifications on a global scale. Therefore accuracy is imperative to their research.

I will also be using qualitative data from other secondary sources such as books, online resources, academic journals and various governmental statistics. This will be particularly useful as I intend to provide case studies within several of the chapters, focusing on how specific countries have improved in areas such as Education and the Economy by taking steps towards gender equality. To establish this link, I will be analysing previous case studies by organisations such as the UN, UNICEF, the OECD as well as individual journals to interpret their findings which, through my research thus far, have drawn similar conclusions and highlighted how getting more women online can further benefit these areas. This statistical data will allow me to understand current as well as historical trends and enable me to analyse what can be done in the future as well as identifying potential barriers. There are limitations to this method, however. While I can use it to draw my own analytical conclusions, I do not have the resources to provide my own primary statistical estimates to substantiate these conclusions further. Another limitation is that statistical data alone does not provide an in-depth understanding of an issue as complex as the one being researched in this paper.

The research will also use case studies to present both secondary qualitative and quantitative data to understand complex issues by applying contextual analysis to the existing literature. The case studies aim to investigate and present heavy quantitative data with greater clarity, applying them to contemporary scenarios and highlighting current trends or progress to produce a qualitative analysis.

It is an effective method to utilise multiple sources of existing data within an empirical context and in some cases, will be used to compare and contrast the progress of states. For example, when analysing the barriers that are preventing women from accessing the internet, a comparative study between two countries will assess the data holistically to formulate conclusions as to why a particular phenomenon is occurring.

1.5 Introduction Summary

In a world becoming ever dependent on technology, it is crucial that women and men have equal access to these services. Broadband internet access is now considered a fundamental human right, highlighting its growing global importance and the necessity of this research. The literature review has brought to light how there has been little research in identifying the present barriers that have resulted in a gender gap of 200 million fewer women on the internet than men. The rest of this paper will fill this gap and examine the detrimental effect this is having both on gender equality as well as the United Nations SDGs while proving solutions as to how to overcome them and in turn, drive effective change that will accelerate the rate at which these goals can be achieved.

2 Barriers Preventing Digital Gender Equality

2.1 The Digital Divide

From the early 1990's, ICTs were becoming increasingly accessible to individuals for their personal use, most prominently in the form of home computers and cell phones. In 1991, the World Wide Web, which had previously been available only to universities and governmental institutions, became accessible to the public. The World Wide Web was free for everyone to use and develop, with no fees payable – something that would prove to be a key factor in the revolutionary impact it would soon have on the world[18]. In 1990, prior to the public consumption of the Wide World Web, there were approximately 2.8 million users online, equating to 0.05% of the population. By 2002, the number of people using the internet had reached 631 million, some 11% of the global population[19] and today that figure stands at 3.2 billion, approximately 47% of the global population. As these figures continued to grow, it became increasingly apparent that as more people gained access to the World Wide Web via ICTs, a particular pattern was emerging. Further research yielded more magnificent datasets which enabled the accurate gathering of information on the demographics of individuals, organisations and countries not only using the internet but ICTs in general. However, it too highlighted the demographics of individuals who were not using ICTs and demonstrated a worrying divide between the two.

This became known as the digital divide, and evidence suggested that the greater an individual's (or household's) wealth and social freedoms, the more likely they were to have access to ICTs. "Underprivileged members of society, especially the poor, rural, elderly, and handicapped portion of the population[20]" were excluded from access and usage of ICTs and is a problem that persists to this day. Moving into the 21st century, the digital divide began to encompass other issues once individuals had gained access such as poor bandwidth connections and whether those using the internet have the IT skills to participate in online activity successfully.

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[18] Bryant, M. (2011), 20 years ago today, the World Wide Web opened to the public, The Next Web, [online], available from: <https://thenextweb.com/insider/2011/08/06/20-years-ago-today-the-world-wide-web-opened-to-the-public/>, [accessed 10 April 2018].

[19] World Mapper Communication Maps, World Mapper, [online], available from: <http://archive.worldmapper.org/textindex/text_communication.html>, [accessed 9 April 2018].

[20] Stanford University, The Digital Gender Divide, [online], available from: < https://cs.stanford.edu/people/eroberts/cs181/projects/digital-divide/start.html>, [accessed 1 May 2018].

The divide itself has no specific definition and can be interpreted many ways. Martin Hilbert, explains the complexity of the term; “For example, counting with only 3 different choices of subjects (individuals, organizations, or countries), each with 4 characteristics (age, wealth, geography, sector), distinguishing between 3 levels of digital adoption (access, actual usage and effective adoption), and 6 types of technologies (fixed phone, mobile... Internet...), already results in 3x4x3x6 = 216 different ways to define the digital divide. Each one of them seems equally reasonable and depends on the objective pursued by the analyst[21]." In this research, the primary analysis is on individuals with the defining characteristic analyst of gender as opposed to age, wealth and geography, although these too can play a role women’s access and use of ICTs as they are all invariably intertwined as the next segment will discover.

2.2 What factors that have caused the Digital Gender Divide?

If we are to bridge the current digital gender divide, it is first imperative to understand the causes of the current inequality that exists regarding women’s presence online. As previously highlighted, this divide currently stands at 200 million fewer women using the internet than their male counterparts. Digital advancements in the form of Information Communication Technologies (ICTs) continue to revolutionise the way we interact with one another and the world in which we live, with digital influences now spanning the globe. The ability to use ICTs is rapidly becoming a source of cultural capital and an integral part of daily life for many. These figures emphasise the inequality and disadvantages suffered by women, who are being excluded from this revolution. ICTs empower the people who have access to them, while those with little or no access are faced with the prospect of social and economic inequality[22] which subsequently creates corresponding social and economic barriers[23]. “The digital divide serves to further isolate those less well off from the various opportunities Internet connection may provide compared to those that are in the position of regular access.[24]”

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[21] Hilbert, M. (2011). The end justifies the definition: The manifold outlooks on the digital divide and their practical usefulness for policy-making. Telecommunications Policy, 35(8), 715-736, [online], available from < http://martinhilbert.net/ManifoldDigitalDivide_Hilbert_AAM.pdf>, [accessed 12 April 2018].

[22] Betterplace lab, (2017), Bridging the Digital Gender Gap, [online], available from: < http://www.betterplace-lab.org/wp-content/uploads/BDGG-Brochure-Web-ENGLISH.pdf>, [accessed 4 April 2018]

[23] Pontis, D. (2015), Inequalities creating economic barriers to owning mobile phones in India: Factors responsible for the gender digital divide, Information Development 2016, Vol. 32(5) 1332–1342.

[24] Anderson RH, Bikson TK, Law SA & Mitchell BM. (1997), "Universal Access to e-mail: Feasibility and Societal Implications", *Educational Media International,* vol. 34, no. 2, pp. 86-87.

While those less “well off” could be interpreted as a range of demographics from age, wealth, race amongst others yet in this study it is women who are deemed less well off when it comes to the opportunities internet access enables. Not only are these factors significant in explaining levels of access, they can influence an individual’s motivation to interact with ICTs and their level of IT skills showing that there is also a disparity in the way individuals use the internet. Economic and structural barriers are inequalities that are deeply rooted within many less economically developed and developing states and location can bear some influence in the levels and type of inequality experienced. Are these pre-existing inequalities to blame for preventing women from engaging online or are their other factors at play? The following chapter answers this and aims to further explore how women’s perceptions and use of technology is influenced by a complex set of variables including class, infrastructure, resource access and the political situation of the country in which they live.

During the early phase of rapid technological development and accessibility, there were already signs that women were not participating in this new digital age as frequently as their male counterparts. Whilst there is relatively limited data on the gender of early internet users, which perhaps explains its initial exclusion from early definitions of the digital divide, one 1993 study by University of Rhode Island's Research Institute for Telecommunications & Information Marketing demonstrated that even when given the opportunity to do so, women were using the internet less than men. The study was conducted throughout households in the US with access to the internet and identified precisely who was using the internet and for what purpose. The findings of the study concluded that although fewer women were online, they were more likely to use computers as they become more familiar with the technology and may even surpass men regarding computer usage[25]. Unfortunately, this is something that has yet to be achieved but it demonstrates that there has always been an online gender divide and that if given the opportunity to develop the knowledge and skills required to navigate the internet, women can engage online as often as men, which is of significant benefit not just to them, but to the world as a whole.

[25] Dholakia, Ruby Roy, et al. "Putting a byte in the gender gap: men use home computers more than women do, but women may have greater potential." *American Demographics*, Dec. 1994, p. 20+

As a study focused on those already with home computers in 1991, the sample demographic was that of individuals in economically developed countries, in this case, the United States. It concluded that for this demographic, the primary factor preventing women from accessing the internet was low levels of self-efficacy regarding the use of technology as opposed to economic or structural elements which will be demonstrated later in this chapter. However, studies would then go on to confirm that societal and cultural barriers influence demographics throughout the world but under different circumstances.

2.3 Societal and Cultural Factors

Many researchers when identifying the causes behind the current online gender divide attribute the existence of the current division on the early portrayal of ICTs, particularly personal computing. In this regard, it is essential to state that ICTs can refer to any device that allows for broadband connectivity. Jane Badagliacco, one of the first researchers to explore the impact computer technology, would have on society, suggested that women's perception of technology was that it was inherently a male-dominated arena, which created gender-specific attitudes[26]. Further studies in the late 1980's and early 1990's also concluded that women had a significantly less favourable attitude towards computing which was heavily focused towards male culture as opposed to traditional female values and goals[27]. This male-centric attitude towards technology had been further exacerbated by the early marketing of personal computers, subsequently leading to the contribution of stereotypes about who should be using the internet. Due to the success of this initial marketing, the production of early web services continued to be aimed to towards men and did not correspond to the needs of women, thus further reinforcing these stereotypes[28]. Women had very few successful role models in technology and computing, becoming disenfranchised as a result.

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[26] Badagliacco, J.M. (1990), "Gender and Race Differences in Computing Attitudes and Experience", *Social Science Computer Review,* vol. 8, no. 1, pp. 42-63, [online], available from: <http://journals.sagepub.com.ezproxy.lib.gla.ac.uk/doi/pdf/10.1177/089443939000800105>, [accessed 8 April 2018].

[27] Kiesler, S., Sproull, L. & Eccles, J.S. 1985, "Pool Halls, Chips, and War Games: Women in the Culture of Computing", *Psychology of Women Quarterly,* vol. 9, no. 4, pp. 451-462.

[28] Bimber, B. (2000), "Measuring the Gender Gap on the Internet", *Social Science Quarterly,* vol. 81, no. 3, pp. 868, [online], available from: <http://www.jstor.org.ezproxy.lib.gla.ac.uk/stable/42864010>, [accessed 6 April 2018].

Many researchers including Badagcliaco, Wesserman and Richmond-Abbott [29] have agreed that this combination of factors resulted in women becoming technophobic and developing low self-efficacy levels regarding computing, which due to these perceptions, became a self-fulfilling prophecy. Since technology and gender are both socially constructed and socially pervasive, technology had been gendered to be perceived as a male-driven area[30]. Therefore, the early gender divide, from which women are still playing catch up today, is in part attributed to these stereotypes and misconceptions, with such misconceptions challenged by feminist technoscience theory.

Addressing these social and cultural barriers is proving difficult. Such pre-existing power dynamics where men have a higher social standing than women mean any attempt to roll out ICTs requires a thorough analysis of the specific cultural contexts and norms at play, something that is overlooked when generating new initiatives to bridge the gender divide[31]. Patriarchal societies where women are not as empowered as their male counterparts are often subjugated to cultural norms that suppress their freedom to access ICTs. In parts of Africa and Asia, women are discouraged from accessing ICTs as it is feared that it will create disturbances within these societies whereby women are tasked with much of the domestic responsibilities. In these societies, men are often seen as the financial provider for a family whereas women are expected to prioritise these domestic responsibilities over pursuing ICT activities. Even when given the opportunity for leisurely pursuits, it is expected that women would utilise this time to study, unaware that ICTs can be a crucial learning tool. For example, in India, there are cases where women have been prohibited from using ICTs as it is thought it will prevent them from fulfilling their domestic responsibilities and therefore the status quo of society will shift and deteriorate[32]. Those prohibiting the use of ICTs have claimed they are doing so to protect women as well as the community in which they live. At first glance, this may seem like a mere justification to maintain patriarchal dominance.

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[29] Wasserman, I.M. & Richmond-Abbott, M. 2005, "Gender and the Internet: Causes of Variation in Access, Level, and Scope of Use", *Social Science Quarterly,* vol. 86, no. 1, pp. 252-270.

[30] Lohan, M. & Faulkner, W. 2004, "Masculinities and Technologies: Some Introductory Remarks", *Men and Masculinities,* vol. 6, no. 4, pp. 319-329, [online], available from: <http://journals.sagepub.com.ezproxy.lib.gla.ac.uk/doi/pdf/10.1177/1097184X03260956>, [accessed 7 April 2018].

[31] Edwards, S. (2017), Cultural barriers need to be challenged to close the gender digital divide, Devex, [online], available from: < https://www.devex.com/news/cultural-barriers-need-to-be-challenged-to-close-the-gender-digital-divide-90213>, [accessed 12 April 2018].

[32] Lewis, K. (2016), Girls and unmarried women in India banned from using mobile phones to prevent 'disturbance in society', *The Independent,* [online], available from: <https://www.independent.co.uk/news/world/asia/girls-and-unmarried-women-in-india-forbidden-from-using-mobile-phones-to-prevent-disturbance-in-a6888911.html>, [accessed 12 April 2018].

However, there is significant evidence to suggest that women are reluctant to engage in ICTs as they do not feel safe online. Once again, this is an issue that is more prevalent in less economically developed and developing countries however it has been documented as concern for women in most nations.

Many women reported fear of online misogyny including aggressive, often sexualised hate speech, harassment, direct threats of violence, revenge porn involving the use of personal/private information for defamation as well as the fear of information theft[33]. Women have also raised concerns over experiencing verbal and physical harassment from men in areas where access to the internet may only be available outside the home or in "locations that are unsafe or inaccessible, and/or where social or cultural norms and safety concerns may constrain women's freedom of movement and ability to visit, for example, public access facilities[34]." Harassment is also commonplace online, with many women experiencing abuse, intimidation and surveillance, which is further discouraging access. These societal and cultural factors have been hindering the progress to empower women online in all countries, yet there are further issues that persist, particularly in LDCs and developing countries which are significantly contributing to the figure of 200 million fewer women than men online.

The existing literature on social and cultural barriers detail the issues with the purpose of being informative in the hope of achieving positive solutions in the future. However, there is also an argument to made that there is a danger of ICTs deepening social exclusion for those who have limited access. As new technologies develop at such pace, even those who have access face exclusion as they are unable to adapt to new technologies be it due to lack of education or regular access needed to develop the skills to become proficient. If only a select group of individuals use ICTs, then information and the subsequent knowledge that stems from that is accessible to those with pre-existing economic and social power. The ICT skills needed to gain this information are inaccessible, and thus, the perpetual cycle continues. However, if one were to view the digital gender divide from a cynical perspective, a competing theory that challenges the discourse states that there is the case that these social and cultural barriers are beneficial for certain individuals.

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[33] World Wide Web Foundation, (2015), Five barriers, five solutions: Closing the gender gap in ICT policy

[34] Working Group on the Digital Gender Divide, (2017), Recommendations for action: bridging the gender gap in Internet and broadband access and use, Broadband Commission, online: available from: < http://broadbandcommission.org/Documents/publications/WorkingGroupDigitalGenderDivide-report2017.pdf>, [accessed 8 September 2017].

Most texts on the social and cultural obstacles acknowledge the lack of access and usage for women is partially due to patriarchal hegemonic structures that subordinate women, such as those demonstrated above. However, they fail to allude to the fact that the digital gender divide may be beneficial to these male-dominated hegemonic structures and therefore those in power within these structures (known as hegemonic masculinity) may wish to maintain them. The perspective that it is not in the hegemonic masculinity interest to include women in patriarchal dominated structures is one that is rarely given credence yet is important in understanding the gender power dynamics between men and women and how this shapes not only access to ICTs but society as a whole. The bridging of the digital gender divide could be observed simply as rhetoric, employed by a male-dominated hegemonic masculinity of elites to maintain the status quo, particularly in states where social structures already heavily favour men. For the reasons outlined above, it seems logical that the status quo could be maintained via these methods.

Proponents of this assessment contend that if it was desired for women to have access to opportunities that are possible via ICTs, those who direct initiatives to bridge the digital gender divide would have first addressed inequality for all concerning housing, adequate nutrition, safer job environments, and equal access to educational opportunities for dominated and underrepresented groups, without regarding gender and ICTs specifically[35]. Therefore, the all-encompassing social and cultural barrier is, in fact, these structures, as eliminating the digital gender divide would be antagonistic to the existing status quo by gradually eroding historically embedded social ills such as sexism which results in injustice, inequality, and discrimination for women[36]. A claim such as this is crucial in examining the existing assumptions the digital gender divide and provides an alternate broader social perspective that is required when analysing a global issue.

[35] Tisdell, E., Kucukaydin, I. (2008), The Discourse on the Digital Divide: Are We Being Co-opted?, InterActions: UCLA Journal of Education and Information Studies, 4(1), [online], available from: < https://escholarship.org/uc/item/85m2z8j2>, [accessed 17 May 2018].
[36] Ibid.

2.4 Economic Factors

However, it is not only social and cultural constraints that are preventing women from accessing ICTs. Financial barriers are limiting internet access not just for women but all demographics across international borders. As previously highlighted, this is more prominent in LDCs and developing countries. Approximately 47% of the global population is using the internet, almost one out of every two on the planet. However, statistics show that only one in seven people are using the internet in less economically developed countries, regardless of gender[37]. To aid the closing of the digital gender divide, there must be significant progress in limiting global inequality and poverty as there is a direct correlation between high levels of poverty and limited internet access[38]. However, women face higher levels of poverty than men for many observed social and cultural reasons which is leaving them at a significant economic disadvantage when attempting to access ICTs. The cost of ICT devices needed to access the internet is too high in many areas, and women do not have the financial resource to possess them. The lack of financial resources is in part due to the gender pay gap which persists globally as well as less financial independence and a reliance on external sources of income, often coming from patriarchal sources. If men control the finances within a domestic setting, they can dictate the level of access and opportunity for women which is often limited due to such domestic commitments. Another critical barrier is the cost of purchasing and using ICTs. Even when women are employed and/or in control of their own finances, many are unable to access the internet as the cost of products needed to do so, such as personal computers and mobile phone devices are inaccessible due to their cost.

[37] ICT Facts and Figures 2017, (2017), International Telecommunications Union, [online], available from: < ICT Facts and Figures 2017>, [accessed 12 April 2018].
[38] Fuchs, C. & Horak, E. (2008), Africa and the digital divide, *Telematics and Informatics,* vol. 25, no. 2, pp. 99-116.

Again, this is predominantly a barrier that is representative of many less economically developed countries. For example, "to buy just 1GB of data in Africa, costs an average citizen nearly 18% of their monthly income[39]". Not only does it emphasise the cost of access, but it also highlights a significant gap in the field of this area of study in which many reports fail to account for women who purchase the devices needed to access the internet, yet are unable to maintain the payments required to continue to use it. The need for the continuation of broadband and data payments prevents women from initially purchasing devices, even if they have the financial capability to do so. The use public access is also a possibility, but once again, this service comes at a cost and societal pressures have resulted in many women feeling the spaces in which to use them are unsafe and lack privacy. At present, just 50% of all countries have policies to support public access[40], many of which contribute inadequate attention to gender equality perspectives.

As well as lacking public access policies, 41% of states have no developed national policy for reducing the cost of broadband to achieve universal access. This is problematic as the low wages for those living in less economically developed countries, and even lower wages for women in those countries do not correspond to the cost of broadband access, which fluctuates worldwide. For example, as a less economically developed country, the average household salary in Burkina Faso is $150 US Dollars a month[41], yet the average monthly cost for broadband access is $961.22 [42]. Similarly, in Haiti "more than 6 million out of 10.4 million Haitians were living below the national poverty line of $2.41 per day, and over 2.5 million were living below the national extreme poverty line of $1.23 per day"[43], with the average cost of broadband standing at $7.46 per day. This global disparity demonstrates the need for greater policy and regulatory measures to make access to the internet affordable for both men and women. There have been many initiatives launched which are aimed at improving the cost of these services, particularly in more rural areas where the scope of such projects often fails to reach.

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[39] 2017 Affordability Report, (2017), Alliance for Affordable Internet, [online], available from: < http://a4ai.org/affordability-report/report/2017/>, [accessed 17 April 2017].
[40] Ibid.
[41] BBC News, (2015), Burkina Faso MPs agree to cut pay by half, [online], available from: <http://www.bbc.co.uk/news/world-africa-30794822>, [accessed 12 April 2017].
[42] McCarthy, N. (2017), The Most and Least Expensive Countries for Broadband, Statista, [online], available from: <https://www.statista.com/chart/11963/the-most-and-least-expensive-countries-for-broadband/>, [accessed 12 April 2017].
[43] Haiti Overview, (2017), The World Bank, [online], available from: < http://www.worldbank.org/en/country/haiti/overview>, [accessed 17 April 2017].

The United Nations, as well as the International Telecommunication Union, are currently working with private providers of broadband access to lower the cost of broadband worldwide. Policy initiatives to drive down these costs must consider the financial disparity between men and women to provide affordable access for all to bridge the gender divide. However, broadband can only be used if there is adequate infrastructure in place to facilitate its use. Without such an infrastructure, policy initiatives are nothing but rhetoric. The importance of infrastructure cannot be understated, as without it, there can be no use of such digital devices, and therefore the gender divide will remain at its current levels.

2.5 Structural Factors

Finally, structural barriers are further perpetuating the gender divide, as many states lack the necessary requirements needed to use ICTs and therefore the internet. The rate at which ICT distribution can penetrate internet access levels is first dependent on the pre-existing infrastructure of the state in which they are situated. For example, many regions within these states and approximately 1 in 7 of the global population currently live without the resources needed to utilise ICTs such as electricity. “Only 45% of countries have developed plans to reduce costs by facilitating resource sharing (e.g., sharing of infrastructures like towers or fibre networks) among telecommunications companies. The effective implementation of such policies is even rarer”[44]. There are further structural impediments to women’s access such as poor roads and transport links to urban areas where there is statistically a higher density of ICTs available for public use. This public access is the only source of internet connectivity for many, yet many less economically developed states do not have the financial resources to provide such services by building safe, female-friendly community centres, cafes and libraries. It is often the case that individuals making such financial decisions within governmental departments are statistically more likely to be men and therefore women continue to be underrepresented in the key decision-making process regarding women’s access to ICTs. Thus, many opportunities to enhance women’s experience on the internet by addressing their concerns and promoting its usage via educational programmes and promoting digital skills do not materialise, further prolonging the gender divide.

[44] 2017 Affordability Report, (2017), Alliance for Affordable Internet, [online], available from: < http://a4ai.org/affordability-report/report/2017/>, [accessed 17 April 2017].

While, in essence, all factors stated are competing theories as to why there is a digital gender divide, the consensus within existing literature as that all play a part in some form or another. The main disagreement tends to focus on exactly which factor is the most important. However, the literature fails to account for reasons that are difficult to quantify with statistics and are therefore often not considered. For some women, there is merely a lack of interest in using the internet, even if they have access and opportunity to do so. This trend can be seen globally, yet other variables often play a role in women's decision not to engage and differ between regions and the economic prosperity of these regions. For example, in economically developed countries there is a correlation between age and gender as a choice for not wishing to engage with those over 65 the most likely to claim a lack of interest is resulting in a lack of online engagement.

In LDCs, women choose not to engage online for the reasons previously detailed in that it is possible they do not feel safe online or are preoccupied with a profession or domestic responsibility that they can achieve without the use of internet access. However, in these regions, there are also those who simply do not wish to engage on the internet, similar to women in economically developed countries. "They do not want the Internet, do not feel that they need it, and do not feel that it holds anything of interest or value for them. They believe they are not missing out on anything by not being online[45]." While it could be argued that this lack of willingness to engage is due to not possessing the skills to do so or a lack of education about the benefits online access can bring, academics have seemingly neglected the simple fact that some women do not wish to participate. They are active in engaging in other pursuits, be it professionally or socially; something women are more likely to do than their male counterparts[46] which goes some way to explaining the 200 million deficit. This factor is one which is rarely noted and is a critical gap in existing literature. A simple lack of interest is something that can not be explained or quantified easily on a global scale as it is a personal preference and choice. Therefore, it is left unaccounted for.

[45] Madden, M. (2003), The changing picture of who's online and what they do, Pew Internet & American Life Project, [online], available from: < http://www.pewinternet.org/files/old-media/Files/Reports/2003/PIP_Online_Pursuits_Final.PDF.PDF>, [accessed 2 May 2018].
[46] Szell, M. & Thurner, S. 2013, "How women organize social networks different from men", *Scientific reports,* vol. 3, pp. 1214.

2.6 A Case Study: Burkina Faso and Finland

As has been demonstrated, many factors have been attributed to causing the digital gender divide with studies reaching the consensus that there is no one single factor that is responsible. In individual countries, some of these factors are particularly prevalent and therefore perpetuate the digital gender divide and explain why there are such low levels of internet penetration rates for women in these countries. To illustrate this, a brief case study will examine all these factors in a single country to emphasise the difficulty of the bridging the digital gender divide. To do this the states of Burkina Faso and Finland will be analysed. It puts all these factors in a practical setting and shows how they can amass and generate such a vast divide. It also explains why the gap is growing in some countries and closing in others. Putting the hypothesis from the literature to the test to determine what are the most important factors.

Burkina Faso has a population of 20.1 million, of which approximately 640,000 people (3.7% of the population[47]) are using the internet. Of that number, only 14,166[48] (less than 0.1% of the population) have fixed broadband subscriptions, for many of the reasons as highlighted in the previous chapter. Firstly, the average cost of a fixed broadband subscription in Burkina Faso currently stands at $961.22 a month, over seven times the monthly household income. Secondly, those generating income within these households are likely to be men due to the role of women within Burkina Faso. The role of most women in Burkina Faso is dictated by the patriarchal societies in which they live with male members of the community making the economic and social decisions on behalf of the community, particularly in rural areas. This is something that is deeply ingrained in the Voltaic and Mandé cultures that form the major ethnic groups within the state. Therefore, women's roles are divided between agricultural work and carrying out domestic responsibilities within the household, with the two taking up an average of 16 hours per day leaving little time to access the internet in the few places in which it is available. Agricultural work is the primary source of employment for women with 95%[49] of those in work taking up agrarian roles.

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[47] US Census Bureau, (2012), Countries and Areas Ranked by Population, International Programmes, [online], available from: < https://www.census.gov/population/international/data/idb/rank.php>, [accessed 1 May 2018].

[48] International Telecommunications Union, (2012), Fixed Broadband Subscriptions Per 100 Inhabitants, International Telecommunications Union Dynamic Report, [online], available from: < http://www.itu.int/ITU-D/ICTEYE/Reporting/DynamicReportWizard.aspx>, [accessed 1 May 2018].

[49] Food and Agriculture Organisation of the United Nations, (2018), Role of Women in Agriculture, [online], available from: <http://www.fao.org/countryprofiles/index/en/?iso3=BFA>, [accessed 1 May 2018].

This dependency on agriculture has resulted in both men and women lacking basic education with a literacy rate of 35%, and female literacy rate slightly lower at 26%[50], as the need for manual labour within the economy, is greater than that of skilled jobs that require higher standards of education. Therefore, if women do not have this basic level of literacy, they will be unable to use ICTs, even if they do have the opportunity to access them. Lastly, Burkina Faso lacks an adequate infrastructure needed to enable greater access to ICTs. At present, only 18% of the country has access to electricity, with these figures further showing the disparity between rural and urban access which stand at 1% and 56% respectively[51]. Without limited power supplies even if economic and sociocultural barriers are overcome, it would still not be possible to support the use of ICTs due to a lack of electricity.

Whereas if this is compared to an economically developed country, it emphasises the area the global community must focus on if we are to bridge the divide. Finland is the state that will provide the example as it is considered an economically developed country, yet has seen significant growth regarding internet usage since the turn of the millennium. Within Finland, it is evident that these exist on a considerably smaller scale. With a population of 5.5 million, there are 5.1 million internet users[52] (88% of the population), with 87% of the female population having access to the internet on a regular basis.

[50] The World Bank, (2014), United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics, [online], available from: < https://data.worldbank.org/indicator/SE.ADT.LITR.FE.ZS?end=2014&locations=BF&start=1975&view=chart>, [accessed 1st May 2018].

[51] US Agency for International Development, (2018), Burkina Faso: Power Africa Factsheet, [online], available from: < https://www.usaid.gov/powerafrica/burkina-faso>, [accessed 1 May 2018].

[52] The World Bank, (2016), Individuals using the internet (% of the population), [online], available from: < https://data.worldbank.org/indicator/IT.NET.USER.ZS>, [accessed 2 May 2018].

The high numbers of Finnish citizens online can firstly be attributed to the average price of a monthly broadband subscription which is $26[53], while the average monthly wage is $4016[54] and $3657[55] for women and shows one of the areas in which inequality still exists and can contribute to the divide. While it is an important issue, this financial deficit for women is small in comparison with the funds needed to access a broadband subscription, with Finland having one of the lowest income disparity rates globally. Secondly, Finnish society is very active in promoting gender equality and is regularly cited as one of the best places for women to live. Women are equal to men in most social aspects even surpassing them in key areas such as education, equipping women with the knowledge and IT skills needed to enter the workforce with 67% of women in employment. These high levels of employment provide women with the financial resources that they control, further empowering the choices they make. In Finland, the division in internet access is centred on age as opposed to income or gender, with the most substantial reason for over 65's not accessing the internet is a lack of interest. The impact of ICTs has altered social attitudes towards the internet with some not feeling the need to participate and others viewing it as a hindrance to society arguing that it displaces time that should be allocated to physical and social activities[56]. Attitudes towards internet access differ globally, and this highlights that the practical use of the internet is open to interpretation. Yet this effective use is just as important as gaining access. Access to the internet in Finland is something that is not an issue however as the infrastructure is very advanced with 100% of the country having access to electricity[57].

These brief case studies have been used as examples to illustrate how the barriers to online access differ globally. They highlight the different variables between states and emphasise how women in different regions face these barriers which are seemingly intertwined with one another and the difficulty in the scale of overcoming them.

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[53] Tyson, M. (2017) Broadband pricing study shows a huge disparity worldwide, British Telecom, [online], available from: < http://hexus.net/business/news/internet/112433-broadband-pricing-study-shows-vast-disparity-worldwide/>, [accessed 1 May 2018].
[54] Statistics Finland, (2017), Average earnings by employer sector and gender, [online], available from: < http://www.stat.fi/til/ati/2016/01/ati_2016_01_2016-05-27_tau_011_en.html>, [accessed 1 May 2018].
[55] Ibid.
[56] Nasi, M. (2013), ICT Disparities in Finland: Access and Implications, University of Turku, [online], available from: < https://www.utupub.fi/bitstream/handle/10024/90544/AnnalesB366MattiNasi.pdf?sequence=2&isAllowed=y >, [accessed 1 May 2018].
[57] The World Bank, (2016), Individuals using the internet (% of the population), [online], available from: < https://data.worldbank.org/indicator/IT.NET.USER.ZS>, [accessed 2 May 2018].

While there is considerable disparity between the two states, neither is entirely free of such barriers which manifest themselves in different ways. Of course, this is not to state both are at a similar disadvantage, the situation in Burkina Faso is used to emphasise the barriers faced by many LDCs and the difficulty for women to access the internet effectively within these states. While some social nuances and statistics may slightly differ between LDCs, it gives a broad overview that clearly shows the correlation between those who need to close the gender divide and those who would benefit from the achievement of the SDGs. Particularly in Africa where statistics show this is the worst affected area for both. This is the area of focus if we are to bridge the digital gender divide and where the area of attention needs to be as this is where the majority of the 200 million fewer women online can make progress.

This chapter has presented the complex factors that have created the gender divide we see today. As has been demonstrated, many of these diverse causes are interconnected with one another, often both facilitating the divide. It has also shown how the gender divide is more complicated than merely being an extension of the so-called global north-south socioeconomic and political divide. Some barriers affect women regardless of geographical location, yet evidence suggests these are predominantly sociocultural. A perceived lack of digital skills from women themselves is preventing them from engaging online and is a phenomenon that is experienced worldwide. If ICTs can empower women globally and reduce the gender divide, the developing world holds a significant amount of potential. If appropriate countermeasures are taken, there is the potential to decrease the gender divide in equal measure due to the interconnected nature of the causes. By alleviating one barrier, there is greater potential for the others to follow and provides the opportunity for more significant progress in achieving gender equality online due to the lower starting point for such a transition to take place. This next chapter analyses the way in which these barriers to access can be overcome.

3 Overcoming barriers facilitating the digital gender divide

The ITU have indicated their desire to achieve online gender by 2020 by aiming to create an inclusive global "information society, empowered by the interconnected world, where telecommunication/ICT enables and accelerates socially, economically and environmentally sustainable growth and development for everyone[58]." However, current statistics indicate that the target of achieving an extra 200 million women online by 2020 is unfeasible. While there are many initiatives devised by governments, intergovernmental organisations as well as non-governmental organisations and charities, more needs to be done. If the United Nations SDG are to benefit from bridging the gender divide, the pre-existing barriers that are preventing internet access and usage must be addressed. Firstly however, it would be beneficial for all those researching the digital gender divide to become increasingly proactive in supporting the collection of sex-disaggregated data if the resources to do so are available. If governmental departments within states dedicated more resources to obtaining sex-disaggregated data, they would benefit greatly. Governments would benefit by further expanding their research potential to form collaborative partnerships with external institutions such as the World Bank and United Nations as well as regional and international women's groups. These groups must collaborate to develop a common set of baseline indicators as this would give government sources a greater depth of knowledge on the topic. Integrating this data into the government's official national statistics database would enable a more detailed and consistent understanding as to why there is a gender divide in their respective countries specifically. This knowledge could then be used to implement an effective national policy regarding bridging the gender divide to achieve sustainable development. It would also provide the opportunity to become a leading figure in the collection of this data, highlighting the state's commitment to this endeavour.

[58] The International Telecommunications Union, (2018), Connect 2020 Agenda, [online], available from: < https://www.itu.int/en/connect2020/Pages/default.aspx>, [accessed 7 May 2018].

3.1 Addressing Sociocultural Barriers

The digital inclusion of women requires a detailed understanding of the sociocultural expectations of women in different societies. As shown in the case study, the roles of women as well as the levels of independence and self-autonomy that they possess differ. However, despite these different experiences, it has been shown that women globally have negative perceptions of ICTs due to the continual reinforcement of stereotypes that the field of technology should be a male-dominated arena. To combat such stereotypes, it is essential to take measures that to bring women into the culture of computing "there must be a serious and critical look at how we have socially constructed the computer as a male programming tool, and exploit the computer as a medium that different people use in different ways[59]." These stereotypes are gradually being eradicated in countries with high levels of development as technology becomes more readily available, women are being encouraged to engage in a diverse range of online activities that interest them and to pursue careers in ICT as in the case in Finland. This is further evident by analysing ITU statistics that show the gender divide is 2.8% in developed countries and is continually decreasing, whereas, in LDCs, this figure stands at 32.9% and is rising[60]. We are now seeing a trend whereby these low levels of self-efficacy, initially experienced during the early years of the internet, are now being experienced by women in LDCs. They are experiencing the gendering of technology which those in developed countries had done previously and is an issue that has persisted across international borders for three decades. Education can play a pivotal role not only in overcoming the cultural and social barriers previously outlined, but is the most crucial step in enabling sustainable development.

By investing in education initiatives that promote online access as well as digital skills, states, and in particular LDCs can be expected to accelerate the achievement of its sustainable development targets. These education initiatives should have two primary objectives.

[59] Turkle, S. & American Council of Learned Societies, (1984), The second self: computers and the human spirit, Simon and Schuster, New York

[60] ICT Facts and Figures 2017, (2017), International Telecommunications Union, [online], available from: < ICT Facts and Figures 2017>, [accessed 12 April 2018].

Firstly, they should increase awareness of the issues that prevent women from using online services such as cultural and societal norms. However, this could potentially be a difficult task as norms are deeply embedded within a given society. The effectiveness of sustained educational awareness campaigns directed at men as well as women is likely to be limited in the short term. There is the possibility of behavioural changes, particularly once the benefits of greater female engagement can be witnessed first-hand over a sustained period of time[61]. The second objective is for the government to implement digital literacy initiatives and opportunities that enable women and girls to develop the skills needed to be confident online without fear of harassment. To combat the vulnerability of online harassment, Facebook and WomensAid have been raising awareness on how to remain safe online which is hoped will continue to empower women. The growing presence of web campaigns and support groups are becoming increasingly visible online in an attempt to prevent the threats which are discouraging women. The deficit can also be reduced by training individuals in educational roles such as teachers or community leaders to understand and propagate the benefits of delivering essential digital training to women and girls within their local communities which would expand the number of women gaining crucial online skills that can significantly improve their own social mobility. By acquiring these skills at a young age via the inclusion of online access during primary education, regardless of income or region, women have the potential to learn the skills needed to gain access to the job market which in turn can significantly increase the number of people within the global workforce. This diversification and increased number of women in employment would enable LDC's to grow economically which in turn alleviates poverty thus achieving primary sustainable development targets. Yet there is more than can be done via developing economic and structural initiatives to overcome the divide.

[61] Digital Gender Gap Audit Scorecard Toolkit, (2017), World Wide Web Foundation, [online], available from: <http://webfoundation.org/docs/2016/12/WRO-Digital-Gender-Gap-Audit_Toolkit.pdf>, [accessed 1 May 2018].

3.2 Addressing Economic and Structural Barriers

Even if such sociocultural barriers can be removed, there is still the task of providing women with physical access to ICTs. Many economic barriers are intertwined with the societal and cultural obstacles on a microeconomic level, with both needing to be eradicated simultaneously. For example, in a patriarchal society where males control the finances within the family unit or household, women's finances are out of their control and is, therefore, an economic barrier that can only be addressed via cultural changes. Since the introduction of the SDGs, macroeconomic initiatives have become increasingly prevalent. Macroeconomic initiatives focus on the capability to achieve physical access via the financing of ICT equipment such as computers and public spaces in which to use them, as well as improving issues such as bandwidth speed. There have been many large-scale macroeconomic initiatives that have sought to address and overcome these obstacles preventing women from engaging online. For example, higher levels of cooperation between governments and international stakeholders have been seen in recent years as they look to reduce the cost of prices and services within the ICT industry.

Such initiatives have also been extended to increase network coverage as well as capacity and quality to all nations, with a particular focus on underserved and geographically isolated areas within LDCs. An increased effort has been made to improve access to the networks and capabilities that already exist as well as the promotion of infrastructure sharing between both state and international stakeholders. There is a need for country-specific policies that support public or shared access as well as personal access to a PC for example as this is where a significant proportion of women will access the internet. Before the development of the Millennium Development Goals and the SDGs that succeeded them, many developing and LDCs did not have national ICT policies. Policy directives that include gender perspectives are essential for this to be successful with feminist academics arguing that merely stating gender considerations will be taken into account is not enough to help bridge the digital gender divide. Nancy Hafkin, a United Nations expert from the Division for the Advancement of Women, states that those who make policy must be adequately educated to think from a gender perspective. "Very few policymakers are trained to think from a gender perspective, and unless they are educated on how to do so at all steps of the process, we simply do not get gender integrated into policy[62]."

[62] Hafkin. N, (2002), Gender Issues in ICT Policy in Developing Countries: An Overview, p.9

If gender issues are not included these ICT policies, women and girls will not benefit from these new policies. Critics of these current policy initiatives argue that this exclusion is evident in the fact a high number of states, regardless of economic capability, have national ICT policies and yet the digital gender divide persists.

However, many of these policy initiatives often cannot be financed by states alone, a fact that is particularly true for LDCs. LDCs are often forced to prioritise other areas of sustainable development that are risking the lives of many of their citizens such as reducing poverty and hunger as well as improving health. Although these issues can be alleviated by bridging the digital gender divide, it is a process that takes time and therefore is, understandably, not prioritised. To aid LDCs, who do not have the economic capability to finance all areas of sustainable development. Therefore, countries have established communal funds known as Universal Service and Access Funds (USAFs). The USAFs are committed to expanding connectivity opportunities to unserved and underserved communities and are financed by mandatory contributions from telecommunications companies[63]. They serve as a collective investment for the telecommunications industry, whilst funding market development that benefits the population in the regions in which they operate. A prime example of USAFs is Costa Rica's Fondo Nacional de Telecomunicaciones which runs a programme that indirectly addresses the digital gender divide. "The Connected Homes Programme provides a subsidy to low-income households to purchase fixed internet service and a computer, and approximately 95% of the households that qualify for a subsidy under this programme are headed by women. As a result, the initiative has been recognised internationally as a way to support access for women and low-income groups[64]." They have been widely praised by the Broadband Commission for Sustainable Development as an effective tool in bridging the digital gender divide and will be instrumental if they continue to target the barriers that prevent women from accessing the internet[65].

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[63] World Wide Web Foundation, (2018), Universal Services and Access Funds: An Untapped Resource to Close the Gender Digital Divide, p.2. [online], available from: < http://webfoundation.org/docs/2018/03/Using-USAFs-to-Close-the-Gender-Digital-Divide-in-Africa.pdf>, [accessed 28 May 2018].

[64] The World Wide Web Foundation, (2017), REACT-with-Gender-Responsive-ICT-Policy: The Key to Connecting the Next Four Billion, p.7, [online], available from: https://webfoundation.org/docs/2017/09/REACT-with-Gender-Responsive-ICT-Policy.pdf, [accessed 28 May 2018].

[65] Working Group on the Digital Gender Divide, (2017), Broadband Commission for Sustainable Development, [online], available from: <http://broadbandcommission.org/Documents/publications/WorkingGroupDigitalGenderDivide-report2017.pdf>, [accessed 1 May 2018].

While this may appear to be a positive and encouraging initiative, some academics disagree and believe that all may not be as it seems. There is evidence to suggest these initiatives, while positive on paper, are rarely utilising the funds they have at their disposal. USAF's have been criticised for gathering funds, but not spending them on community-based projects that support greater access to IT for both men and women. Recent data on the level of unspent USAF funds in developing and less economically developed countries in Africa is alarming. A report on 13 states in Africa concluded that Across just these 13 countries, unspent USAF funds total approximately US$177 million[66]. Further disconcerting is that the same data also discovered that across all 37 USAFs in Africa, the total of unspent funds amassed to $408 million USD. This amount could also bring "approximately 6 million women online, or could be used to provide digital skills training to nearly 16 million women and girls[67]." This missuse of funds is proving frustrating for many, as the resources to aid the bridging of the digital gender divide are there, but are being misused.

Some feminist academics have proposed that this misuse of funds is systematic within USAFs and that states giving the responsibility of its citizens welfare to private businesses is detrimental to sustainable development. There is the belief that joint public and private initiatives pose more challenges than solutions with the actions of these private organisations remaining unchallenged by their State and NGO partners. "The role of the corporate sector in development and their accountability thereof is one that did not receive adequate debate during the negotiation, and yet as was evident, the corporatization of the development agenda continues to take centre stage. Women's development groups are concerned that is that as businesses and governments shake hands, exchanging promises to work together on the SDGs, little has changed on the structural issues that allow an unprecedented concentration of wealth in the hands of the richest 1%. Ultimately, the story of the impact of the 2030 agenda will be told on the ground, based on the capacity of civil society organizing to make this agenda a reality by reclaiming the power of the people[68]."

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[66] World Wide Web Foundation, (2018), Universal Services and Access Funds: An Untapped Resource to Close the Gender Digital Divide, p.2. [online], available from: < http://webfoundation.org/docs/2018/03/Using-USAFs-to-Close-the-Gender-Digital-Divide-in-Africa.pdf>, [accessed 28 May 2018].
[67] Ibid.
[68] Abelenda. A, (2015), Sustainable Development Goals: What's next from a feminist perspective?, The Association for Women's Rights in Development, [online], available from: < https://www.awid.org/news-and-analysis/sustainable-development-goals-whats-next-feminist-perspective>, [accessed 21 May 2018].

This theory is in line with the earlier feminist theories on the structural patriarchy inherent within most societies. They see these USAF initiatives as an extension of these structures and therefore very little will change, and the problem will continue to persist and possibly deepen.

This chapter has identified the barriers that are currently the progress of digital gender equality online as well as analysing the ways in which these barriers are being addressed. Now it has been demonstrated as to how these barriers can be eradicated, or not dependent on perspective; it is essential to understand the role women can play in facilitating the achievement of the United Nations SDGs.

4 The benefits of bridging the gender divide on the United Nations Sustainable Development Goals

Having identified the reasons for the digital gender divide and the methods in which they can be overcome, it is now appropriate to explore how the bridging of the divide would accelerate the United Nations SDGs. Women have a critical role to play in the SDG's with many targets acknowledging gender equality as both an objective and a solution. This chapter seeks to demonstrate the relationship between women's access to ICTs and the positive effects that this can have on achieving sustainable development if they are both addressed together simultaneously. It does so by first defining each goal and addressing the current progress within the goal using statistical data. This data helps to build a picture of the progress made, as well as identifying areas for improvement. It is then explained how each goal would benefit from the bridging of the digital gender divide, linking these benefits to targets of improvement. However, some goals do not feature all of these components due to the word limitations of the paper. They are still referenced as they can provide an insight into the comprehensive benefits of gender equality online. For example, SDG 5 which is to achieve gender equality and empower all women is the goal that perhaps underpins the theoretical basis of the research. Therefore much of its content has already been presented.

Instead, the focus will be on the significance of this goal in its relation to the study as a whole as well as the other SDGs. Some of the goals, while still significant, are by-products of the success of other goals and will, therefore, be analysed in less detail. Another illustration of this is SDG 10, which is the goal to reduce inequalities. The reduction of disparities is exemplified in detail within the analysis of the other goals, stating how the bridging of the digital gender divide can reduce these inequalities. As well as providing original analytical contributions to the literature, the research will include theoretical perspectives to the existing literature where appropriate to understand female-centric approaches to sustainable development and offer alternate critical perspectives due to the multi-dimensional topic of the research.

While there is existing evidence to suggest that there is a distinct correlation between providing women with greater access to the internet and the subsequent progression of sustainable development this brings, there has been little research that connects this to each specific UN SDG. This chapter aims to demonstrate the interconnected nature of the SDGs which although having been previously described as indivisible by some academics, the exclusive role of women in linking these SDGs is something that has previously been overlooked. It identifies how succeeding in one SDG by bridging the gender divide also accelerates the achievement of the others. As stated in the introduction, there are 17 SDGs which replaced the Millennium Development Goals in 2015, with several targets within each goal amassing to 169 targets in total. Many of these individual targets, have direct links to other goals as well as their own and therefore should be viewed as an interconnected network of goals. For example, target 4.4 under goal 4 which is to improve the global quality of education states "By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship[69]." This target unequivocally references how increasing and diversifying individuals skills it would benefit their employment prospects with the opportunity to obtain decent jobs. This is mirrored by target 8.3 under goal 8 which is to improve decent work and economic growth with the target seeking to "promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services[70]." This example shows how many of the goals are related. The goals which will be researched are:

- No Poverty
- Good Health and Wellbeing
- Quality Education
- Gender Equality
- Decent Work & Economic Growth
- Reduced Inequalities

[69] The United Nations, (2015), The United Nations Sustainable Development Goals, Development Goal 4, [online], available from: < https://sustainabledevelopment.un.org/sdg4>, [accessed 12 May 2018].
[70] The United Nations, (2015), The United Nations Sustainable Development Goals, Development Goal 8, [online], available from: < https://sustainabledevelopment.un.org/sdg8>, [accessed 12 May 2018].

These SDGs have been selected as prior research has indicated that they are the goals would benefit the most from equal gender access online. The selection was calculated via a thorough analysis of the SDGs which determined that the 8 selected out of the 17 had some key references to equal ICT access within their targets. It is important to note that some of the SDGs which did also demonstrate access to ICTs as an essential contributor to their success will be omitted from the research due to the limited word count for this research. The sheer global scale of the SDGs which effectively includes all areas of human life and enterprise also make it difficult to cover them all, therefore only the SDGs outlined above will be analysed. Some of the SDGs will also be studied in depth more so than others due to such limitations. However, this is not an indication of their importance to achieving sustainable development as the significance of the goals should be viewed in equal measure. Again, the structure in which the SDGs are presented is not a reflection of their importance in bridging the digital gender divide for that particular goal, or in chronological order but are instead structured to enable the research to flow from one point to another. It would, therefore, be appropriate to start with SDG number five, which seeks to achieve gender equality and empower all women and girls.

4.1 Sustainable Development Goals 5 & 10: Achieve Gender Equality & Reduce Inequalities

This goal is important as it demonstrates the commitment of the United Nations to include gender perspectives within their new sustainable development framework that replaced the millennium goals. Many of the causes of unsustainability and issues that stagnate the progress of the SDGs are also causes of gender inequality, which includes the digital gender divide. However, this goal is far more than a symbolic gesture as gender has been mainstreamed within most of the other SDGs and shows its importance within the new goals. It is also the goal that underpins the framework for the entire study. The need to bridge the digital gender divide is propelled by the pursuit of gender equality which is integral to all dimensions of inclusive and sustainable development. Therefore, all the SDGs depend on the achievement of Goal 5 as it is a precondition for the rest to succeed. Due to the expansive nature of this goal as well as Goal 10, the importance of gender equality and empowerment for women will be demonstrated within the analysis of other elements of sustainable development, hence the limited analysis on these goals individually.

4.2 Sustainable Development Goal 3: Good Health & Wellbeing

The situation

One of the goals in which women can benefit dramatically is SDG 3: Good Health & Wellbeing and seeks to ensure healthy lives and promote well-being for all at all ages. This goal references specific issues that affect women, thus highlighting the importance of gender to the United Nations. Target 3.1 states "By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births[71]", whilst target 3.7 focuses on reproductive health care aiming to "ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes[72]." As can be seen, maternal and reproductive health is a principle concern for this goal and if not achieved, can be detrimental to the other goals. This is echoed by Ann Starrs, a maternal health expert who states "How can we end poverty if women and couples cannot determine whether or when to have a child, or how many to have? How can we ensure equitable education for all if so many girls drop out of school due to unwanted pregnancy? How can we achieve gender equality if women's reproductive rights are not fulfilled[73]."

Current statistics further emphasise the need for this goal to be achieved as due to lack of access and information to healthcare, women and children globally are suffering the adverse effects. For example, at present, the global maternal mortality ratio stands at 216 maternal deaths per 100,000 live births[74], most of which are preventable with the correct knowledge of skilled care during delivery.

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[71] The United Nations, (2015), The United Nations Sustainable Development Goals, Development Goal 3, [online], available from: < https://sustainabledevelopment.un.org/sdg4>, [accessed 12 May 2018].
[72] Ibid.
[73] Starrs, A. (2015), Sustainable development is only possible if women's health is prioritised, Global development: women's rights and gender equality, The Guardian, [online], available from: <https://www.theguardian.com/global-development/poverty-matters/2015/jan/21/sustainable-development-is-only-possible-if-womens-health-is-prioritised>, [accessed 12 May 2018].
[74] Ibid.

Research from the Guttmacher Institute estimates that 290,000 women and 2.9 million newborn babies die each year[75], for the same reasons, most of which are avoidable. Another critical issue is that is having an adverse effect on women's health is access to appropriate contraception. Each year "225 million women who want to avoid pregnancy are not using contraceptives and as a consequence there are 74 million unintended pregnancies, 28 million unplanned births and 20 million unsafe abortions each year[76]". These alarming statistics emphasise the importance of achieving this goal for women as research shows that they are the most vulnerable regarding healthcare. Further burdens imposed by gender disparities which impact on women's health such as gender-based violence and being required to carry out manual labour for long hours similar to their male counterparts. The question is how can more numbers of women online reduce these statistics and accelerate the achievement of this goal?

Benefits of bridging the digital gender divide

This is primarily a concern in LDCs, as women in economically developed countries have more significant levels of access to medical information and treatment due to the opportunities available to use the internet, as well as expanded healthcare facilities such as hospitals and medical centres, even in rural areas. However, these commodities are often a luxury for women in LDCs, as is internet access for many. Initiatives have been ongoing for several decades. However, ICTs have provided women with the opportunity to eradicate these issues quickly and efficiently as enabling higher levels of ICT access it gives both women and young girls with the opportunity to achieve greater levels of autonomy by offering more efficient ways of accessing health-related information. In turn, this information empowers women as they are no longer constrained to traditional forms of accessing healthcare. Due to gender inequality in employment, such traditional ways of obtaining information often comes from male healthcare professionals in LDCs which may deter women from discussing personal issues in traditional cultures.

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[75] Ashford, S. Darroch, J. Singh, S. (2017), The Costs and Benefits of Investing in IT Sexual and Reproductive Health, Guttmacher Institute, [online], available from: < https://www.guttmacher.org/sites/default/files/report_pdf/addingitup2014.pdf>, [accessed 13 May 2018].

[76] Starrs, A. (2015), Sustainable development is only possible if women's health is prioritised, Global development: women's rights and gender equality, The Guardian, [online], available from: < https://www.theguardian.com/global-development/poverty-matters/2015/jan/21/sustainable-development-is-only-possible-if-womens-health-is-prioritised>, [accessed 12 May 2018].

For example, women who may feel embarrassed to address reproductive or sexual problems with a male medical professional now have the opportunity to do so online where women's health clinics and organisations have email accounts to interact with women anonymously or for those in rural areas with no clinic in the vicinity. This concept has proved immensely popular and cheap for women, each consultation costing roughly 80 US cents and is saving lives for those in LDCs and developing countries who otherwise would not have sought medical attention. More interactive approaches have also been adopted with clinics in rural areas providing access for women to speak to medical professionals via video call, detailing their health and wellbeing concerns.

A number of these clinics are staffed by health workers who measure vital signs, such as "blood pressure and heart rate to then transmit the information to a doctor in a nearby city. Local workers also run diagnostic tests, such as cholesterol or pregnancy tests; the results are relayed to the physician and recorded in the patient's electronic health record[77]", another initiative made possible by ICTs. Although not directly linked to women-specific access, the development of such databases that maintain electronic health records improve the efficiency of healthcare systems and can also prevent medical errors.

These initiatives increase women's confidence twofold in both accessing the internet and also gaining autonomy over their health and can also be used by a higher number of women, including those who are illiterate. For those who are literate, the ability to engage online allows women to access information to educate themselves on health concerns, as evidence shows once they have access, 53% of women are using the internet gain health or medical information[78]. The information that they obtain can they be transferred not only to their own health but their family and the local community. As previously stated, women are often the predominant caregivers in domestic settings and this knowledge provides them with a greater sense of risk perception and the ability to develop an understanding of the correct course of action to can take to mitigate such risks. Risks that are particularly pertinent in LDCs, particularly in Africa, include unwanted pregnancy due to a lack of contraception, sexually transmitted diseases and also the possibility of contracting HIV.

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[77] Singer, E. (2011), From No Doctor to E-Doctors in Rural India, MIT Technology Review, [online], available from: < https://www.technologyreview.com/s/425429/from-no-doctor-to-e-doctors-in-rural-india/>, [accessed 4 May 2018].

[78] Brodie, M. *et al,* (2018), Health Information, The Internet, And the Digital Divide, DataWatch, [online], available from: <https://www.healthaffairs.org/doi/pdf/10.1377/hlthaff.19.6.255>, [accessed 17 May 2018].

Not only are women at a higher risk of contracting HIV/AIDS themselves, in LDCs as the predominant caregivers in a household they will be expected to care for those with HIV/AIDS, in which case the information they obtain is vital in providing medical care to others as well as themselves. There are websites dedicated to assisting women tasked with this undertaking which has an impact on them emotionally and physically whether they are a carer or infected themselves. These websites provide crucial information regarding nutrition, skills to care for people living with HIV/AIDS as well as how to remain economically stable within their communities if they or a family member is unable to work due to the disease[79]. All such advancements would not be possible without women's access to the internet. Therefore, the higher numbers of women online will help to achieve this goal.

The evidence presented suggests the bridging of the divide is not only an undeniably a good cause, but it does in fact aid the process of achieving the goal of good health and wellbeing. However, there are some criticisms as to how much of an effect it has on the goal and the relevance of the bridging of the digital gender divide. Such criticisms of the existing literature do hold some validity. For example, it could be argued that while women do play an essential role within this goal, there are 12 other targets within the goal which have to require a higher input than just bridging the digital gender divide.

An example of this would be target 3.9 which by 2030, aims to "substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination[80]." It could be argued that there is little progress to made within this target by solely relying on bridging the digital gender divide as this alone would not benefit targets such as this one. Therefore, the bridging of the digital gender divide is just one of many steps that need to be taken to achieve this goal and on its own, does very little. While there is evidence to support both claims, much of the literature fails to demonstrate the external benefits of making these health gains, whether they encompass all the 13 targets within the goal or just 2 or 3. Firstly, empowering women to gain control of their own health reaps the rewards not only for the women themselves but the broader community through social and economic benefits. "Poverty reduction leads to improved health and well-being, while good health is a strong enabling factor for effective poverty reduction.

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[79] United Nations, (2005), Gender equality and empowerment of women through ICT, The United Nations: women 2000 and beyond, p.18

[80] The United Nations, (2015), The United Nations Sustainable Development Goals, Development Goal 3, [online], available from: < https://sustainabledevelopment.un.org/sdg4>, [accessed 12 May 2018].

In fact, a healthy population is a prerequisite for development, constituting an engine for economic growth[81]." If women and young girls are digitally educated on crucial issues that affect them such as unplanned pregnancy and sexual health they can mitigate these risks and contribute to the reduction of poverty in a variety of ways. If women can avoid these risks at an early age, they have the potential to remain in school and gain an education which not only offers them greater prospects in life, including ICT skills, but it improves women's participation in the labour force of a community or state. Statistics from the Guttmacher Institute, a research and policy organisation advancing sexual and reproductive health and rights, support these claims. Their research has indicated that planning, delaying and spacing births improves women's level of education and reduces the pay gap that typically exists between working mothers and their childless peers and can reduce women's need to rely on other sources of income, therefore economically empowering them[82]. By remaining healthy and providing the social conditions of their community or state allow them to take up employment, women, their households and communities benefit financially through higher levels of participation and contribution. All these benefits have direct impacts on a wide variety of other development goals, one of them being SDG 8, Decent Work and Economic Growth.

[81] International Council for Science, (2017), A Guide to SDG Interactions: from Science to Implementation, p.85, [online], available from: < https://www.icsu.org/cms/2017/05/SDGs-Guide-to-Interactions.pdf>, [accessed 4 May 2017].

[82] Hassted. K, *Et Al*, (2013), The Social and Economic Benefits of Women's Ability to Determine Whether and When to Have Children, Guttmacher Institute, [online], available from: < https://www.guttmacher.org/report/social-and-economic-benefits-womens-ability-determine-whether-and-when-have-children>, [accessed 4 May 2018].

4.3 Sustainable Development Goal 8: Decent Work & Economic Growth

The situation

Women's healthcare knowledge has been identified as one of the prerequisites that promote economic growth for women, their families, their communities and their state. Economic prosperity, as well as the other key SDGs presented within this chapter, are also key prerequisites to eradicating poverty which is the first SDG. Similarly to SDGs 5 and 10, it can only be achieved by making significant progress in other goals, therefore has been incorporated into this analysis. "Women's participation in the labour market varies greatly across countries, reflecting differences in economic development, social norms, education levels, fertility rates, and access to childcare and other supportive services[83]." However, bridging the gender divide and encouraging women's participation in the ICT sector, not only expands the industry itself but is a catalyst for promoting economic prosperity for all, which another goal of the United Nations. SDG number 8 contains targets that specifically reference women and highlight need to improve their employment opportunities, thus creating economic growth. Targets 8.5 and 8.8 state the UN's intent to "Protect labour rights and promote safe and secure working environments for all workers, in particular women migrants[84]" and to "achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value[85]." At present, there is a gender disparity in global employment, with women participating in labour markets far less than their male counterparts. As of 2013, the male employment-to-population ratio stood at 72.2%, while the rate for females was 47.1% globally[86]. Currently, the gender gap in equal employment which stands at 25% globally is not predicted be eradicated and closed until at least 2086. Despite this, figures on this disparity have been narrowing in recent decades and are accurate for the vast majority of countries across all levels of income.

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[83] Verick, S. (2014), Female labor force participation in developing countries, IZA World of Labor, 87
[84] United Nations, (2018), The United Nations Sustainable Development Goals, Sustainable Development Goal 8, [online], available from: < https://sustainabledevelopment.un.org/sdg8>, [accessed 5 May 2018].
[85] Ibid.
[86] International Labour Organization (2014). Global Employment Trends 2014: Risk of a jobless recovery? p. 19, [online], available from: < http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_233953.pdf>, [accessed 5 May 2018].

However, the gap is still undoubtedly vast and predominantly affects both developing and less economically developed countries. Levels of women's employment fluctuates between regions, with Latin America and the Caribbean seeing significant improvement with 11% growth of women in work over the last two decades while employment in Central and Southern Asia has fallen by 37%[87]. A substantial reason for this disparity is the technological opportunities presented to women within these regions. Figures from the International Telecommunications Union, show that there is a correlation between the bridging of the digital gender divide and levels of female employment. When women have access to the internet and the education to know how to use it, their employment prospects grow. This growth is evident in the fact that in Latin America and the Caribbean the female employment rate has improved, as has the digital gender divide. The Americas are the only region worldwide where women have surpassed men regarding internet penetration rates and usage, with 2.6%[88] more women using the internet than their male counterparts. Meanwhile Central and Southern Asia, where employment has fallen, holds the most significant divide globally between male and female internet participation rates with 8.5%[89] more men using the internet than women. The global average currently stands at 6% in favour of men.

These figures show that globally, women remain marginalised in access to ICTs which creates patterns of occupational segregation between males and females. This is prevalent in numerous industries with many remaining dominated by men, with the few women who are active in those industries tending to hold lower positions and receiving less pay. One of the occupations that remains male-dominated and is difficult for women to forge a career in is the IT sector. Women are far less likely to join the IT industry and currently are severely underrepresented within this sector with only 25% of computing jobs being occupied by women[90]. This is an issue that is pertinent globally, affecting the industry in developed, developing and less developed countries.

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[87] United Nations Women, (2018), Sustainable Development Goal 8, [online], available from: < http://www.unwomen.org/en/news/in-focus/women-and-the-sdgs/sdg-8-decent-work-economic-growth>, [accessed 5 May 2018].
[88] Internet Telecommunications Union, (2017), ICT Facts & Figures 2017, [online], available from: < https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2017.pdf>, [accessed 5 May 2018].
[89] Ibid.
[90] Ashcraft. C, Eger. E, McLain. B, (2014), Women in Tech: The Facts, National Centre for Women & Information Technology, [online], available from: < https://www.ncwit.org/sites/default/files/resources/womenintech_facts_fullreport_05132016.pdf>, [accessed 8 May 2018].

Even in developed countries, where ICTs and prospective careers within the industry are more widely accessible for females due to the quality of infrastructure required to use ICTs in the first place, women are still underrepresented in this career field. They are less likely to take up formal computer science studies or hold technical or leadership roles in tech organisations. “Globally, the founder of a digitally-driven enterprise is five times more likely to be a man than a woman, and in many places that ratio is closer to ten-to-one[91].” This highlights the difficulty of accessing the IT industry for women and provides a discouraging outlook for states who are striving for greater access to ICTs with the aim of inclusivity for women online. It appears that even if the digital gender divide is bridged, there would still be a deficit in the numbers of women employed in the IT sector, perhaps due to the societal and cultural perceptions as previously demonstrated in the text.

Benefits in Bridging the Digital Gender Divide

However, bridging the gender divide provides the opportunity for more women to gain the digital skills required to access the industry, which in turn offers the opportunity for women to remove these patriarchal structures and direct initiatives to encourage more women to obtain employment the tech industry, which as will be demonstrated would greatly benefit the industry economically. It is not only the economy of the IT sector that would benefit from the bridging of the digital gender divide but every industry and economic sphere. If women are able to fully realise and demonstrate their potential as economic, social and political actors in the new digital society we find ourselves in; evidence indicates that greater female participation in these key areas has a positive impact on economic growth. Incorporating women's digital skills into other labour force sectors as well as IT would yield tremendous benefits for the global economy for a number of reasons.

Firstly, more women in employment increases the labour force as a whole, thus, contributing to economic growth. Women's economic equality, be it equal access to jobs or equal pay is beneficial for the woman individually as well as business.

[91] Van Dyck. C, (2017), The Digital Gender Divide Is An Economic Problem For Everyone, GE Reports, [online], available from: < https://www.ge.com/reports/digital-gender-divide-economic-problem-everyone/>, [accessed 8 May].

“By integrating both men and women into a working environment research has indicated that organisational effectiveness increases. It is estimated that companies with three or more women in senior management functions score higher in all dimensions of organisational effectiveness[92].” Both companies and businesses benefit significantly from diversifying their workforce and increasing leadership opportunities for women within their structure. A diverse and equal workforce comprised of both men and women builds women's confidence in the labour market and encourages female talent to take up roles that give them the opportunity to promote gender equality, therefore continuing this trend which supports economic growth. Statistics have continually shown the benefits that more women online would have for the global workforce.

Numerous studies from international organisations have supported this with empirical evidence. The UN, for example, has calculated that by bridging the digital divide and closing the gap of 200 million fewer women online than men, the annual global GDP would receive a boost of $6 billion[93]. Similarly, a study by the European Commission highlighted the that the equal participation of women in the ICT sector would contribute as much as €9 billion to the European economy annually[94]. This would prove to be immensely beneficial for the European Union which is currently experiencing a growing need for employees with digital skills. Currently, there is a demand for digital skills in Europe with not enough proficient employees to fill vacancies with an estimated one million ICT jobs in Europe that remain unfilled. The European Parliament has also analysed how an increased number of women would provide economic growth for other regions and states, as well as Europe. The report states that; ”when more women work, economies grow: If women’s paid employment rates were raised to the same level as men’s, the USA gross domestic product would be approximately 9 % higher, the Euro zones would climb by 13 %, and Japan’s would be boosted by 16 %. In 15 major developing economies, per capita income would rise by 14 % by 2020, and by 20 % by 2030[95].”

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[92] Kabeer. N, (2012), Women’s economic empowerment and inclusive growth: labour markets and enterprise development, [online], avaialable from: < http://www.lse.ac.uk/gender/assets/documents/research/choice-constraints-and-the-gender-dynamics-of-lab/Women's-economic-empowerment-and-inclusive-growth.pdf>, [accessed 8 May 2018].

[93] The United Nations Broadband Commission, (2013), Doubling Digital Opportunities: Enhancing the Inclusion of Women and Girls in the Information Society, p.17, [online], available from: < http://www.broadbandcommission.org/documents/working-groups/bb-doubling-digital-2013.pdf>, [accessed 8 May 208].

[94] European Commission, (2013), Women active in the ICT sector, [online], available from: < https://ec.europa.eu/digital-single-market/en/news/women-active-ict-sector>, [accessed 8 May 2018].

[95] European Parliament, (2016), Women’s Empowerment and its Links to Sustainable Development, Directorate General for Internal Policies, [online], available from: <

There is also the opportunity for women to utilise their IT skills to form their own businesses to empower them financially using microeconomics. Such IT knowledge can be used by women to connect with potential consumers and investors as well as the distribution of goods and services. Women can utilise ICTs to reach broader markets and new economic ventures.

There is no denying that bridging the digital gender divide has a positive effect on economics and employment for women and their societies. However, there are differing opinions on the theoretical approaches to ICT inequalities and its impact on the labour market. Feminist economists contend that gender discrimination is a persistent problem within economics and that even if women have a choice over whether to participate in employment and if so, what type of jobs to pursue, there will always be limitations due to patriarchal structures. When "women make choices and exercise agency, but suggest that they do so within the limits imposed by the structural distribution of rules, norms, assets and identities between different in their society. Gender disadvantage in the labour market is a product of these 'structures of constraint'[96]."

This incorporates the theory presented earlier in the research that patriarchal structures continue to remain as one of these constraints, preventing more women developing ICT skills and accessing employment. The social inequality, in this case, women's access to ICTs and jobs, as well as the wage gap, are socialised being natural. These patriarchal structures are heavily influenced by capitalism which is in turn used to obtain the patriarchal objectives while at the same time reinforcing the structures that subjugate women. Economic feminists hope that by making progress towards gender equality and giving women more high profile positions within employment, these structures will be eradicated. However, contenders to this view would argue that these patriarchal structures are systematic of a capitalist system and the two are invariably intertwined. Therefore, as these structures are reliant on capitalism to succeed, it would be nonsensical to deny women the opportunity to participate within the system as their contribution would benefit capitalism, making a substantial profit. The question is as to whether they would be willing to lose some control of the patriarchal structures for economic gain.

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http://www.europarl.europa.eu/RegData/etudes/IDAN/2016/556927/IPOL_IDA(2016)556927_EN.pdf>, [accessed 4 May 2018].

[96] Kabeer. N, (2012), Women's economic empowerment and inclusive growth: labour markets and enterprise development, [online], available from: < http://www.lse.ac.uk/gender/assets/documents/research/choice-constraints-and-the-gender-dynamics-of-lab/Women's-economic-empowerment-and-inclusive-growth.pdf>, [accessed 8 May 2018].

Feminist economists contend that a loss of such economic gain is a small price to pay to keep the pre-existing structures in place. Regardless, both competing theories agree that "one of the strongest determinants of labour market outcomes in both developed and developing countries is educational attainment. From a supply-side perspective, education has an important impact on an individual's decision to participate in the labour force[97]." A reasonable level of education is an essential prerequisite to employment and is increasingly becoming the first point of contact with ICTs for women and young girls as ICTs are becoming ever more integrated into the education system of schools globally.

4.4 Sustainable Development Goal 4: Good Education

The Situation

As demonstrated, a good level of education is a favourable prerequisite for women to forge a long-term career and economic empowerment. This particular goal is one which has seen the most significant improvement since the formation of the SDGs as well as the Millennium Goals before them. Target 4 of the current SDGs is to provide good quality education and "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all[98]." The targets within this goal do not feature the need to prioritise and accelerate the educational development of women and young girls as this has already been achieved, instead addressing male and female needs in equal measure. More girls than ever are attending school at all stages from primary and secondary to higher forms of education such as college and university. This is true in all states, regardless of development and is undoubtedly an encouraging sign that the SDGs can be achieved. At the university level, the number of women attending higher education has surpassed their male counterparts and continue to rise. Now, women are more likely to obtain a bachelor's degree than men. "Panama, Sri Lanka, Argentina, Cuba, Jamaica and Brunei – to name a few – have some of the highest female to male ratios in higher education[99]". In Malaysia, more than 64% of university enrolments are female, while in the UK women are 36% more likely to apply to attend university than men.

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[97] Verick, S. (2014), Female labor force participation in developing countries, IZA World of Labor, 87

[98] United Nations, (2015), Sustainable Development Goal 4, [online], available from: <https://sustainabledevelopment.un.org/sdg4>, [accessed 12 May 2018].

[99] Bilton. I, (2018), Women are outnumbering men at a record high in universities worldwide, Study International, [online], available from: < https://www.studyinternational.com/news/record-high-numbers-women-outnumbering-men-university-globally/>, [accessed 12 May 2018].

These statistics demonstrate the willingness for women worldwide to access higher levels of education when given the opportunity to do so. However, while significant progress has been made, it is at the primary level of education in which more young girls must be supported to access education. This is crucial as it is often the first point of ICT interaction for young girls, particularly in developing countries where the issue of low levels of primary education attendance is more prevalent. A key area for improvement is the current ICT infrastructure in schools, particularly in developing and less economically developed countries. “On the basis of data from 65 developing countries, the average percentage of schools with access to computers and the Internet for teaching purposes is above 60% in both primary and secondary education. However, the share is less than 40% in more than half of sub-Saharan countries with data[100]. Infrastructure is a key investment that many states still have to make, yet if these figures can be improved, the gender gap of 200 million would soon be eradicated.

Although gender gaps have been bridged in further education, even so far as significantly surpassing men, gaps in primary and secondary education remain although not by a large number. Yet 15 million girls are currently not in primary education, compared to 10 million boys[101]. The figure is similar when young women reach secondary education, with many leaving the education system due to the expectation of contributing to household work or falling pregnant. Those that do remain in education face issues with gender bias. Textbooks, language within the education system as well as the national curriculum can be dated and include sexist language that is discouraging for young girls. This can manifest in many ways, from the exclusion of the important contributions of women throughout history to encouragement from teachers to enter traditional routes of study such as textiles as opposed to entering male-dominated courses such as Science, technology, engineering, and mathematics, all subjects where men comprise of 75% of students. These attitudes, although unintentional, are harmful to the opportunities available to young women and girls as they assign them traditional gender roles to and reinforce negative stereotypes.

[100] United Nations, (2015), Sustainable Development Goal 4, [online], available from: <https://sustainabledevelopment.un.org/sdg4>, [accessed 12 May 2018].
[101] Ibid.

These barriers preventing women from remaining in education have been detailed in the research and if addressed, can pave the way for greater access to education. Once again, this reveals the interconnectedness of the SDGs and how by making progress towards the achievement of each goal can also accelerate the success of another. Yet the goal of quality education is of vital importance as It is here that women can learn not only literacy and numerical skills but ICT skills which are becoming increasingly important as we continue to grow ever reliant on technology. It is here that knowledge of how to bridge the digital gender divide can first be applied.

Benefits of Bridging the Digital Gender Divide

Teaching women and young girl's digital literacy is possibly the most important tool for bridging the digital gender divide. By incorporating this into early education, women will have the competency and skills to not only access the internet but to use ICTs for numerous purposes. ICTs can give educational access to all genders that can improve educational basics such as literacy and numeracy skills via online, web-based learning tools. This would provide a distinct advantage for women as of the 781 million illiterate people in the world; two-thirds are women[102]. As well as improving literacy and numeracy development ICTs can facilitate learning and research across the board and can achieve a computational approach to education, as ICTs become ever more important in society. "The joy of ICT is that anything is possible on the net – maths tests that are multiple choice, automatically corrected, can be done at whatever level is required. Languages can be learned; programming can be learned. Musical instruments and note reading can be learned – the whole world is at our fingertips, yet millions are still not enjoying it[103]." The type of education can, therefore, go beyond just academic practise as women and men can educate themselves on matters such as health, financial markets and anything that may be of interest to them.

[102] United Nations Women, (2015), SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all, [online], available from: < http://www.unwomen.org/en/news/in-focus/women-and-the-sdgs/sdg-4-quality-education>, [accessed 12 May 2018].
[103] Castle. D, (2016), UNESCO: Women and ICT, an Educational Perspective, [online], available from: < http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/ED/images/GWIDanieleCastle.pdf>, [accessed 12 May 2018].

By bringing these types of experiences into a learning environment at an early age, both genders will benefit. Bridging the digital gender divide would create a cycle of continual growth for the number of women and young girls engaging in ICTs.

"Girls and women with a good understanding of the digital space can impact the world through starting and joining mentorship programmes, passing on these skills through peer education, protecting themselves online and most importantly, they may be inspired to take up careers in ICT[104]." As women engage with the online community, they learn and align their identity and their practices with that of other community members[105]. ICTs can deliver multifaced approaches to education in a language they understand and a medium in which they feel comfortable with using. If more members of this community are women due to the fact that they have the knowledge to use the internet efficiently, it encourages other women to participate and remain online, thus narrowing the divide as equal access to ICTs becomes normalised, breaking down previous patriarchal structures. Current initiatives supported by governments, policy makers, community leaders, religious leaders and educators in all regions are striving to develop the infrastructure necessary to make this access available to all genders in their countries. In doing so and familiarising young women with ICTs at a young age via education, it would break the societal and cultural barriers that discourage women, therefore bridging the digital gender divide by 2030.

[104] United Nations Women, (2018), Why does digital literacy matter for women and girls?, [online], available from: < http://www.unwomen.org/en/news/stories/2016/10/take-five-with-joy-chebet-bii>, [accessed 23 May 2018].
[105] Castle. D, (2016), UNESCO: Women and ICT, an Educational Perspective, [online], available from: < http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/ED/images/GWIDanieleCastle.pdf>, [accessed 12 May 2018].

4.5 India: A Case Study

A brief case study will be used to analyse the progress of the SDG's in an empirical setting by applying the broad levels of data presented in the SDGs to the state of India. It aims to assess what impact the efforts to bridge the digital gender divide has had on the SDGs within India. Although understandably each state has a different set of conditioned variables such culture, economic prospects and infrastructure, India has been chosen as the state to be presented in this case study due to the vast differences in all these variables within the country's borders. For example, India experiences great disparity amongst its large population of 1.3 billion inhabitants[106], from its social classes to economics to access to basic healthcare. Therefore, it provides an intriguing case to understand why this disparity exists and how, if at all, it is being reduced with the aid of bridging the gender divide. It is also an appropriate state to analyse for this study as of the 200 million fewer women online, 42% of this shortfall are women in India[107].

As previously stated, India has the second largest population in the world at 1.3 billion of which 462 million are online, equating to 30% of the population[108]. The internet has grown considerably in India over the last decade as in 2008, this figure stood at just 4.8% of the population, therefore demonstrating that the internet has become an incredibly popular commodity in India, with the IT sector growing exponentially. Currently, the number of internet users is increasing by 5.6% every year, with urban India accounting for much of this growth. "Urban India with an estimated population of 455 million already has 295 million using the internet. Rural India, with an estimated population of 918 million as per 2011 census, has only 186 million internet users leaving out potential 732 million users in rural India[109]." The fewer number of internet users in rural areas is unsurprising and supports the data presented previously. Despite this, there has been considerable growth, and it is important to assess as

[107] Kini, S. (2018), She is offline: India's digital gender divide, The Livemint, [online], available from: < https://www.livemint.com/Opinion/sD6mVqLAEa7cvfJtmdXXuO/She-is-offlineIndias-digital-gender-divide.html>, [accessed 28 May 2018].
[108] The World Bank, (2018), Total Population, [online], available from: < https://data.worldbank.org/indicator/SP.POP.TOTL?locations=IN&view=chart>, [accessed 28 May 2018].
[109] Agarwal. S, (2018), Internet users in India expected to reach 500 million by June: IAMAI, The Economic Times, [online], available from: < https://economictimes.indiatimes.com/tech/internet/internet-users-in-india-expected-to-reach-500-million-by-june-iamai/articleshow/63000198.cms>, [accessed 28 May 2018].

to whether this growth has benefited the sector as a whole as well as individuals accessing the internet, regardless of gender in equal measure.

Statistics currently suggest that this is not the case. There are an estimated 143 million female internet users in India, which accounts for approximately 30% of the population online[110]. This disparity is mostly in part to the barriers that face women everywhere such as societal, economic and structural, all issues which have been addressed previously. India is a state in which these barriers are more prominent than in other states due to the large population that extends to very rural areas and traditional society which favours patriarchal structures. Despite this, there is cause for optimism, with numerous examples of how the achievement of the SDGs can be accelerated in India.

The female workforce in India is currently stagnating. “Only 31% of women in India are part of the labour force that is engaged in any form of work in the market economy, compared with a global average of 50%”[111]. However, this statistic may not be as disconcerting as it first appears, as many women are now entering the labour force at a later age due to remaining in the education system. The Indian government has shown the intent to deliver on initiatives that encourage gender equality across all SDGs, including equal access to good levels of education. Although not specifically IT related, from 2007 to 2012, the government funded bicycles for 871,000 schoolgirls mostly in rural India. “The return on that investment was exponential. Girls enrolling in schools in the state in which the programme was implemented shot up three times, from 160,000 in 2006-07 to 490,000 in 2012. Dropouts among girls declined to 1 million from about 2.5 million in the same time period[112].” This highlights India’s commitment to improving the gender disparity within the country. Once women and young girls are in the education system, further policy initiatives are being implemented to improve ICT proficiency.

[110] Ibid.
[111] Ibid.
[112] Kini, S. (2018), She is offline: India’s digital gender divide, The Livemint, [online], available from: < https://www.livemint.com/Opinion/sD6mVqLAEa7cvfJtmdXXuO/She-is-offlineIndias-digital-gender-divide.html>, [accessed 28 May 2018].

The Draft National Policy for Women 2016 states that "efforts will be made to remove the disparities in access to, and proficiency in information and communication technology (ICT), particularly between socioeconomically advantaged and disadvantaged children, and between rural and urban schools as the use of ICT has now become pivotal for the entire education system. Public-private partnerships (PPP) will be adopted for building ICT infrastructure, developing applications and locally relevant content using gender-sensitive language, operations and maintenance and developing the capacity of teachers required for harnessing the full capacity of ICT productive tools[113]."

These newly adopted new IT policies with the aim of getting more women into work via access to ICTs, thus making a significant contribution to the economy and benefiting their own finances. A report from the McKinsey Global Institute titled *The Power of Parity: Advancing Women's Equality in India*, conducted a study that concluded by improving the female labour force from the current level of 31% to 41%, the Indian GDP would gain an extra $700 billion USD by 2025 and would be the single most impactful leveller to drive economic growth in India[114]. These IT initiatives are currently succeeding in promoting growth in India, thus further improving sustainable development. Gender equality progress is accountable for an annual 1.4% incremental growth in the Indian GDP, with 70% of this growth stemming from greater equality in regard to internet access. Although the gender gap still persists in India, evidence has suggested that progress has been made and that when more women do have access to the internet, they are able to contribute significantly to the achievement of the SDGs.

The aim of this case study has been to condense the information from the previous chapter to assess the validity of the claims and theories propagated within it. It has combined elements of the SDGs examined in detail and applied them to an empirical setting, in this case, the state of India. It concludes that in fact if the digital gender divide is bridged, sustainable development sees significant progress, therefore further accelerating the achievement of the SDGs.

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[113] Parihar. J, (2017), How Digital India minimised the Great Gender Divide?, *IOSR Journal Of Humanities And Social Science*, (IOSR-JHSS), Volume 22, Issue 11, Ver. 8, p.29-33, [online], available from: < http://www.iosrjournals.org/iosr-jhss/papers/Vol.%2022%20Issue11/Version-8/E2211082933.pdf>, [accessed 28 May 2018].

[114] McKinsey Global Institute, (2015), The Power of Parity: Advancing Women's Equality in India, [online], available from: < https://www.mckinsey.com/~/media/McKinsey/Global%20Themes/Employment%20and%20Growth/Full%20report_November%202015.ashx>, [accessed 29 May 2018].

5 Conclusion

5.1 Summary and Conclusions

This research paper has sought to provide an in-depth analysis of the digital gender divide and provide evidence how achieving gender equality online enables the progression of sustainable development. The United Nations Sustainable Development Goals have outlined the targets for sustainable development globally with all recognised states and organisations subscribing to these ideals. Yet many have been lacking in the ideal of gender equality which has stagnated the progress of these goals. While evidence suggested gender equality in all aspects was a crucial prerequisite to accelerating the achievement of the goals, the form of gender equality that would yield the greatest result for sustainable development was that of equal online access. While the strive for gender equality faces obstacles in every facet, the research has shown that the barriers preventing women from accessing and utilising the internet efficiently are diverse and complex. With societal, economic and structural barriers proving to be significant obstacles, it makes the task of achieving sustainable development even more challenging as they are yet another set of difficulties to be overcome before the SDGs can be achieved. The conclusions of the research were as anticipated at the start of the process that bridging the digital gender divide would, in fact, have a positive impact on, and accelerate the United Nations Sustainable Development Goals. The evidence for this is overwhelming, with existing literature all confirming this hypothesis. This can, however, be problematic as a hypothesis that appears irrefutable has the potential to become an informative policy paper as opposed to an analytical study. However, by including theoretical perspectives within the text, it provided the opportunity to present alternative perspectives, which whilst were ultimately unable to refute the evidence, provided an insight into the flaws of the hypothesis. Offering alternate theories and perspectives highlighted flaws within the current academic literature and forced the research to support its own theories by exposing details and weaknesses that would have otherwise been overlooked, therefore presenting a balanced analysis.

The research is important as it combines two very pressing issues of the 21st Century. The digital gender divide and sustainable development are both issues that require immediate action. This research has demonstrated that an effective method to address these challenging issues is via technology.

The solution to the problem highlights the disparity of the world in which we live. The use of technological resources which have, for several decades been a luxury of the financially stable, can be used to alleviate the suffering of the poorest and provide them with the opportunity to develop. It is also beneficial for researchers as well as practitioners as it has demonstrated intricate links between several academic fields, providing an insight into the relationship between each field by collating data in such a way that condenses large amounts of information on a topic of a global nature.

5.2 Limitations & Recommendations

However, there are limitations to this research. The first limitation is one that has impacted other academics as well as institutions when analysing this field and is the lack of sex-disaggregated data. This is data that divides men and women with the purpose of gathering information that provides valuable insights into how men and women are indeed similar or dissimilar within a particular context. In this instance, this data is used in specific relation to internet penetration rates for women and how women use the internet once they have access to it. Sex-disaggregated data is crucial if the digital gender divide is to be bridged and is also integral in quantifying the success of the SDGs. It enables researchers to understand current trends and also aids evidence-based policymaking. However, "sex-disaggregated data on internet access and use is currently limited. While existing indicators aimed at measuring and studying ICTs for development can be used to document and identify variations in access and use, there are still no globally representative data sets on internet access that are also sex-disaggregated[115]." This highlights the limitations in the field of gender equality and the use of ICTs, and although there is data available, it is perhaps an area that is underrepresented and would benefit from further research such as a globally representative data set as suggested by the Broadband Commission for Sustainable Development.

This also demonstrates the statistical limitations to the research. Large multinational organisations often find it difficult to obtain such data which is partly due to the current data, if any, is scattered across different platforms and agencies.

[115] The Broadband Commission for Sustainable Development, 2017, Working Group on the digital gender divide: Recommendations for action: bridging the gender gap in Internet and broadband access and use, available from: <http://www.broadbandcommission.org/workinggroups/Pages/digital-gender-divide.aspx>, [accessed 24th September 2017].

This is further exacerbated by receiving the information from these third parties such as broadband providers and governmental departments. To counteract this, these organisations such as the UN and ITU have been gathering their own data which demands a significant number of resources. Collecting such large-scale primary data is challenging for large organisations and has been a limitation of this research. Collecting sizeable primary data sets myself would be unfeasible due to a lack of resources, time and the scope of the task at hand in attempting to gather statistics on a whole nation or women in a specific region for example.

Consequently, I was unable to obtain primary statistical data to my specific needs and had to use data that was already available and had been to be collected from other sources fulfilling their own agenda, be it a policy or academic question. This may have impacted the quality of my findings somewhat as the statistical data was not collected and tailored solely for this research paper and therefore I was limited in the questions I could answer as there needed to be data within the existing literature to substantiate my argument or alternatively counterargue a theory or statement. Due to the scope of the question, this is a limitation that is perhaps difficult to avoid as it addresses a global issue. However, in the future, as research papers such as this one continue to highlight the importance of studying the digital gender divide and sustainable development, institutions and academics can gather large-scale sex-disaggregated data to provide the field with an overview of the progress that has been made, as well as recommend areas for improvement.

The final limitation is the lack of primary qualitative research. Initially, the study was due to benefit from first-hand interviews with women within the United Nations who specialise in information communication technology, gender equality and sustainable development. As this research has been written in collaboration with the United Nations, it was due to benefit from these interviews with the aim of providing an in-depth insight into the topics of the research. However, individual with whom I had built a rapport with, with the view of potentially conducting interviews were no longer in contact at the United Nations, and therefore the option to conduct interviews was no longer available.

Making others aware of the limitations provides future researchers to avoid such limitations and identify gaps in existing literature. While conducting the research for this paper, it became apparent that there was little research into all the United Nations SDGs and how they are intertwined. This is vital as has previously been stated throughout the text, as achieving one SDG target will reap wider benefits in regard to sustainable development.

Recommendations for future research would consist of the collection of sex-disaggregated data, particularly in LDCs where there are already limited data sets, let alone those that are sex-disaggregated. This type of gender-based data is crucial as academics and institutions further develop research within this field. Without this data, there is no way to measure the progress that is being made and therefore no way to identify areas in which to improve. To consider that the vast majority of the digital gender disparity exists in LDCs, it is not surprising that these are the states with limited sex-disaggregated data sets. However, this provides future researchers with an opportunity to make significant progress by compiling such data; we can better understand the needs of individuals and technological requirements to measure progress and implement strategies that accelerate that progress, therefore achieving the SDGs. Another area in which to focus future research would be to greater understand the relationship between individually perceived gender roles and access the ICTs. There is little research in this area of study and one which undoubtedly raises interesting questions such as whether biological or self-ascribed gender alters an individual's access to, and perceptions of ICTs and if these would change dependant on variables such as income or location. A comparative analysis of the usage of ICTs between both biological and self-ascribed gender would enable a greater understanding of the role of identity within technology as well as sustainable development.

5.3 Final Comments

To conclude, this research has provided an in-depth perspective on the interconnected relationship between digital gender equality and sustainable development. As an original contribution, it has demonstrated the unparalleled benefits of utilising digital gender equality to achieve a number of SDGs within the same text, whilst also providing suggestions as to how initiatives can drive this change.

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