The Fourth Industrial Revolution and Women in Zimbabwe

Threats and Opportunities

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Abstract

The world of work is undergoing a revolutionary change which has brought forth technological advancements, artificial intelligence (AI) and the use of 'big data'. There has been a lot of debates regarding the Fourth Industrial Revolution (4IR) and how it will be received in developing countries especially in Africa. However very little attention is being given to how women fit into this process. This paper provides a nuanced analysis of the opportunities, threats and challenges posed by the 4IR for women in Zimbabwe. This paper will give an analysis that is specific to Zimbabwean women and how they fit into the 4IR. Automation in productive sectors is placing women's employment at risk, as they are largely found in low-skill professions. It can be noted that in specific female-dominated industries, technology will reduce jobs. Achieving optimum gender equality is still far from being reached as women are constantly marginalized in Zimbabwe, hence the other misgiving in is that the 4IR, like the previous revolutions, will further entrench gender inequalities. This is based on the observation that most women are unlikely to benefit from technological advances, as they do not possess the skills to compete in the emerging knowledge economy. At the same time they are likely to experience the same improvements in the quality of life as everyone else. The paper's main research question is what are the threats and opportunities that the 4IR brings to Zimbabwean women. This question will be answered through the use of qualitative research methodology. This study will also provide various recommendations on how to make the 4IR conducive for women in Zimbabwe so that they fit into the process without facing challenges.

1. Introduction

The industrial revolution has been arguably been one of the most important and pivotal development for mankind. It signalled the advent of modernisation from predominantly agrarian economies to ones driven by manufacturing and constant technological advancements. The world has not stopped from evolving within the progression spectrum and over the past two decades there has been a shift from the third industrial revolution one which was dominated by the rise of computer processing and other technologies to one driven by data and information sharing via public or private networks or now commonly referred to as the Fourth industrial Revolution (4IR). It is axiomatic that the world is taking a great shift with the way growth and progress are taking place and the advent of technology has made the changes more rapid and inevitable. The anticipated changes thus require a systematic, comprehensive, closely coordinated and well-thought out response which includes all the stakeholders in the economy. The world of work is changing with the rapid increase in industrial Internet connectivity and automation. The greater use of robots in industrial production is placing

many jobs at risk, especially in the manufacturing sector. One study estimates that up to 66% of all jobs in developing countries are at risk.

The face of the global economy is changing and like many African countries, Zimbabwe has started to embrace the revolution and is starting to transcend its traditional economic outlook of being a resource extraction market, and the government is working in close conjunction with the private sector in order to re-assess the role and priority of 4IR within the economy. According to the World Economic Forum's most recent Global Gender Gap Report it would take another 118 years for women to earn the same as men at current rates of convergence. The 41R in its current form is thus entrenching gender inequalities. Without a concerted effort to undertake socially inclusive processes, the revolution will in many ways fail women, especially in Africa. It is therefore imperative to understand not only the challenges facing women but also the vast opportunities that technological advances provide.

The renewed focus is predominantly on the development of research, science, technology, innovation and ultimately, industrialisation. Now therefore, it is evident that the advance of artificial intelligence and machine learning, the adoption of block chain, and the increase in the automation of jobs, the advent of 3D printing and additive manufacturing, nanotechnology, and the logistical impact of self-driving cars mean that the very structure of society will change (Schwab 2016). Developing African countries will lose their cost advantage and potentially their ability to achieve rapid economic growth, by shifting workers to factory jobs. This is because the 4IR is characterised by the development of disruptive technologies that are causing shifts in business and work models. Across much of Africa women do not own assets, such as houses and cars, which would allow them to participate in these shared economies. Patriarchal norms and practices have largely excluded women from ownership of productive assets, especially land (Chimedza, 2018). This is either a boon or a bane for Zimbabwe. However like in any part of the world, the advent of the Fourth Industrial Revolution in Zimbabwe poses a great deal of different dynamics for women within the country.

This entails a mixture of opportunities and threats or challenges for female labourers and entrepreneurs as the 4IR provides both advantages or benefits and its own limitations and difficulties for women within the Zimbabwean economic, social and political landscape. Henceforth, this paper will belabour to present a comprehensive discussion on the impact and role of the Fourth Industrial Revolution in Zimbabwe, appreciating the opportunities and challenges it presents to women in the country. The focus of the review will be on the conceptualisation of the notion, the history and development in Zimbabwe, perspectives on the Fourth Industrial Revolution within the Zimbabwean context. Moreover, the paper will present the challenges, opportunities for women and then conclude by proffering possible and plausible recommendations to ensure that Zimbabwean women are competently party to the inevitable changes that are on the horizon.

2. Definition of the Fourth Industrial Revolution

While there have been multiple apples of discord on the true and comprehensive definition of the Fourth Industrial Revolution among scholars, they all seem to agree that the revolution is inevitable and will be cyber-based (Schwab 2016, House of Commons 2016, Hwang 2016). (Schwab 2016) defines the Fourth Industrial Revolution "as embracing innovations in microelectronics, communications, the offshoots of genetics, the laser, robots, and new synthetic materials. Before it runs its course, it may yield breakthroughs in photovoltaic cells,

hydrogen, and more economical ways of producing synthetic oil." It is important to note that (Schwab 2016) definition places robots at the centre of the revolution.

The British House of Commons (2016) weighs in and defines the Fourth Industrial Revolution as "a vaguely defined term used to refer to a variety of technological changes and innovations that have occurred since the beginning of the 21st century, with potentially dramatic effects on economy and society." The authority further opines that the revolution is characterised by "increased automation of working practices, effecting both low and middle skill jobs, greater connectivity, machine learning and developments in new and emerging technologies, occurring at a considerably faster pace than in preceding industrial revolutions." Distilled from the above conceptualisation, the paper views the Fourth Industrial Revolution as a unique and rapid transformation of the digital space involving the advancement and integration of digital, physical and biological technology through the internet, allowing for the amortisation of the current mode of industrialisation and its accompanying value chain.

3. Brief History and Development

As mentioned earlier, the world has been constantly evolving to match the demands of the present generations. Thus, five stages can be distinguished in the continuous process of revolutionising the industries. The first industrial revolution occurred toward the end of the 18th century and was characterised by the mechanisation of production through the use of steam and water (Hwang 2016, 10). The 2nd Industrial Revolution at the beginning of the 20th century was characterised by the modification of the means of production and the introduction of equipment such as conveyor belts and increased production. The 3rd Industrial Revolution saw the digital automation of production by means of electronics (Hwang 2016:10). This era saw the introduction of computers, the internet thereby invariably improving efficiency and effectiveness in production, communication and data storage (Schwab 2016, 20).

4. Perspectives on the Fourth Industrial Revolution

Again, the advent of the Fourth Industrial Revolution has been met with ambiguous connotations. The one side opines that 4IR will change the modus operandi of business, making it faster, more efficient and more responsive particularly to the user needs. Others posit a contrary argument, noting that 4IR will lead to job losses and in the developing world, with a distended youthful population expected to triple by 2050, the threat of unemployment and underemployment is looming. But in all that, both schools of thought are in agreement that the Fourth Industrial Revolution is already underway. Most technologies that will have a big impact on the world in five or ten years from now are already in limited use, while technologies that will reshape the world in less than fifteen years probably exist as laboratory prototypes (Hwang 2016). In Europe, the possibilities of mobile devices connecting billions of people driving unparalleled processing power, storage capabilities and access to knowledge is no longer a pipe dream. The same cannot be said for Africa and the same cannot be said for Zimbabwe which is currently facing the protracted challenge of deindustrialisation. Although many are still in early stages of development, they are already introducing an inflection point as they build on and amplify each other in a synthesis of technologies across the physical, digital and biological worlds.

5. Zimbabwean Perspectives on the Fourth Industrial Revolution

Since the adoption of the Economic Structural Adjustment Program reforms in 1990 followed by the "isolation" of Zimbabwe at the turn of the Millennium, Zimbabwe has been facing the unprecedented challenge of large-scale deindustrialisation. This regression delayed Zimbabwe's ability to fully embrace and reap the benefits of the 3rd Industrial Revolution that came with the widespread use of the internet, digital networking and the overall narrowing of the digital divide between the developed and the developing world. While the government, especially between 2009 and 2013 made giant strides towards narrowing this digital divide, the gap seemed too big especially in an economy with limited resources (Nyamadzawo 2011). Such interventions include policies such as the ICT Policy (2015), removal of duty on mobile phones (2011), programmes such as the ICT programme and projects such the Cyber Café projects across the country. While these have been more than noble initiatives, a huge digital divide still remains between the urban and rural population. This divide places a formidable challenge on the prospects of embracing, adopting and implementing the reforms that will come with the Fourth Industrial Revolution. However, the post-2017 era in Zimbabwe has seen a renewed, deliberate and vigorous drive towards the reindustrialisation of Zimbabwe through science, technology and innovation. The Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development has reconfigured its modus operandi; focusing on Education 5.0 which places importance on innovation for industrialisation. Resultantly, through the 2019 and 2020 budgets, the national fiscus committed to financing the construction of innovation hubs and industrial parks in the higher and tertiary institutions (GoZ 2019). For example, the innovation hub at the Chinhoyi University of Technology is focusing on artificial insemination and production of modern agriculture technology, the innovation hub at the National University of Science and Technology is focusing on Gene Sequencing. Additionally, the 2020 budget committed to availing funds to launch a space satellite. The thrust of this initiative is to improve the Geographic Information Systems; this will assist decision-making and policy formulation within the context of the volatile environment due to the climate change phenomenon. Such an initiative resonates with the sentiments echoed by (Hwang 2016) and (Schwab 2016) that within the context of the volatility due to climate change, the Fourth Industrial Revolution offers a panacea to the dilemmas of decision making. This is a step in the right direction towards the Fourth Industrial Revolution in Zimbabwe.

6. Key Drivers for the Fourth Industrial Revolution in Zimbabwe

Information and Communication Technology Infrastructure

It is prudent to note that technology is one of the critical drivers of the Fourth Industrial Revolution in Zimbabwe. Technologies such as cloud computing, the internet of things (development of smart products), the internet of services (smart mobility and smart logistics) and internet of energy (efficient use of natural resources) has assumed an important role (Pribyl and Svitek, 2016). Reiterating the importance of reliable telecommunications infrastructure, (Zhou 2015) presuppose that "industry 4.0 requires the establishment of a comprehensive and reliable industrial broadband infrastructure." However, while Zimbabwe has made great strides on the frontier, the country still lags behind in terms of the production of its own infrastructure. Moreover, the cost of the bandwidth for internet connectivity is out of reach of many individual and institutions (Musewe 2019). This poses a great impediment in the quest towards partaking in the Fourth Industrial Revolution. The Government has

encouraged innovation particularly in the higher and tertiary education and SME sectors, but this encouragement should be accompanied by adequate financing for the projects.

Education and Training

The 4th industrial revolution is projected to bring disruptive changes to the labour market (Schwab 2016). The digital transformation and innovations in the 4th industrial revolution demand a new breed of worker, one that is skilled, innovative and technological savvy (Manda and Backhouse 2017). Thus, in order to fully participate in the Fourth Industrial Revolution, Zimbabwe, through its higher and tertiary education ministry has embarked on an aggressive policy (Education 5.0) towards equipping its students with the skills that resonate with the changes in the environment. Albeit the nobility of this policy thrust, the laboratories and workshops in most of these institutions have obsolete equipment. This therefore calls for conceited efforts from both the private sector and government to synergise and retool these learning spaces.

Innovation

The Fourth Industrial Revolution places a demand for the increased production of innovative products, business models and production techniques driven by technology. It should be noted that this increase production is a function of adequate investment in research and development. As mentioned *en passant*, the Government of Zimbabwe has made deliberate efforts to encourage research, development and innovation through the establishment of innovation hubs. These innovations have been followed by efforts to patent models and ideas developed in these hubs. However, the greatest impediment to these initiatives is a general lack of adequate funding to improve or increase the production of these prototypes.

The Fourth Industrial Revolution and Women in Zimbabwe

In light of the aforementioned dynamics and contextualisation, 4IR has a notable impact on different social structures, like any other development, has on people of different social standing, gender, age and economic status. Women present one social structure that is susceptible to be impacted or affected by 4IR and this entails both positive and negative consequences, implying, challenges and opportunities set to be encountered along the way. As such it is important to appreciate that women have an important role to play in any development on national processes and in like manner they indeed have a role to play in the embracing and utilisation of 4IR in the country.

7. Opportunities for Women

Use of technology in agriculture

With the advent of 4IR, there is somewhat of renewed hope for women in dire and backward situations where women are used as tools of labour on agricultural land. With many farms within the developed world adopting automated machinery and smart farming implements, the future for the Zimbabwean female farm worker is alleviated from hard strenuous and rigorous labour. Instead 4IR in farming has the potential to exchange the roles for women in agriculture in Zimbabwe from being mere unpaid domestic labourers to becoming architects of their own success through training and use of these technologies women have the ability to utilise 4IR tools and replace their own physical labour with them. This in turn has the

potential to economically empower women and remove the perennial reliability on their male counterparts as is the dominant practice in most patriarchal African societies through increase in productivity and efficiency in farming practices. (Ane and Yasmin 2019, 115-122), support this notion by noting that 4IR technologies in farming promote and maximise production and also help the minimisation of farming risks as with traditional farming methods thereby giving farmers more and more financial incentives from more produce from their land. In addition, as already alluded to, Zimbabwean women play a pivotal role in ensuring food security and 4IR reliant implements will most certainly help them achieve this perennial goal through the efficiency and use of less risky farming practices, as 4IR applies agricultural robotics technology that has beneficial outcome for promoting advanced agricultural system reducing labour costs and increasing quality (Duckett et al 2018).

Zimbabwe is a predominantly agriculture based economy and for decades since independence from Britain in 1980, the country has lived off its agricultural produce and agro-resource extraction as the main source of exports and subsequent revenue. However, since the turn of the new millennium, Zimbabwe's agriculture has taken a constant downward spiral effected mainly by the politically motivated seizures of commercial large scale farms from white farmers by the ruling liberation war party, the Zimbabwe African National Union Patriotic Front (ZANU-PF). This has had a huge impact on the economy of the country as asserted by (Hammond and Tupy 2018), who noted that, "the socio economic consequences of land expropriation were extensive, and Zimbabwe experienced a truly miserable decade between 1998 and 2008. During that time, its economy contracted at an annual rate of 6.09 per cent and per capita income fell from $1,640 a year to just $661." The consequences of this land reform program were not only limited to economic stagnation, but also had a strong impact on gender perspectives as most farms were divided into small scale land plots worked on by peasants in a subsistence and small scale commercial fashion. This meant that the majority of the workers or farm labourers were women who were subjected to most of the agricultural work on these implement stricken land potions. According to the (Food and Agricultural Organisation (FAO) in Zimbabwe, 2014),

> "Approximately 80% of women live in the communal areas where they constitute 61% of the farmers and provide 70% of the labour. Thus, the work of women farmers is essential for food security. Most women are unpaid family workers. Rural women work 16 to 18 hours a day, spending at least 49% of their time on agricultural activities and about 25% on domestic activities."

The fourth industrial revolution (4IR) is starting to change how every agricultural player, from a family farmer to a global conglomerate, produces food and related products. The spread of the new technologies to agriculture is leading to increased yields, lower costs, and reduced environmental impact. These tools are also empowering farms to unlock new plant-based innovations and increasing their resilience to extreme weather events and climate change. These technologies have the potential to have a positive impact on the productivity and profitability of the agricultural sector and the creation of new locally based added value.

8. Breaking into the Male Dominated Workspace

Like in many African societies division of labour has been patriarchal at most with many tasks and jobs being taken up by men particularly the most lucrative ones though not limited to this. Jobs in many economic sectors also require manual labour that needs strong physical man power, another aspect used in dividing labour requirements and tasks. Yet in all of this,

the coming of the Fourth Industrial Revolution has the great advantage of setting aside these qualifications and division of labour according to physical strength or lucrativeness of a job. The use of robots, automated systems, and computerised heavy machinery has made it easier for basically anyone irrespective of gender to venture into any profession such that traditional male dominated jobs like in the mining, manufacturing and construction sectors can even be accessed by women too. (Fernandez-Stark, etal 2019, 4-24) attest to this notion noting that, "industry 4.0 technologies are seen to offer an opportunity to break gender-bias in employment, primarily by reducing previous technical barriers to female entry into the workforce."

9. Access into the Mining sector

The introduction and adoption of digital and smart technologies in the historically male dominated mining industry has the great potential of changing employment patterns in the lucrative Zimbabwean mining sector. Mining in Zimbabwe has been an important part of its economy in all the three phases of the country's history, that is, pre-colonial, colonial and post-independence eras, according to (Chingwaramuse 2020), an estimated 60% of the country's export earnings are from mineral exports while the mining sector covers 16% of the national Gross Domestic Profit (GDP). Zimbabwe has mineral deposits of various important minerals like gold, platinum, diamonds, chrome, coal and lithium being the major ones. The (International Trade Administration 2021) notes that the predominant minerals include platinum, chrome, gold, coal, and diamonds and the country boasts the second-largest platinum deposits and high-grade chromium ores in the world, with approximately 2.8 billion tons of platinum group metals and 10 billion tons of chromium ore. The sector accounts for a healthy and commendable chunk of the country's GDP and if the assertions of the ministry of mines are anything to go by the mining in Zimbabwe sector has the prospect to generate around US$12 billion annually by 2023 if the government addresses challenges such as persistent power shortages, foreign currency shortages, and policy uncertainties.

However the mining sector has been long dominated by men with few women working in different large scale mines, and a low number also being found in small scale and artisanal mining hence limiting the contribution and role of women in this important economic sector. Women working in mines have generally been general hands working in domestic jobs like cooking, laundry and cleaning only recently have women in Zimbabwe started to study disciplines like mining or metallurgy and geology to become engineers and mineral geologists yet the uptake is still very low. Mining in Zimbabwe follows two main channels, the first one being large scale mining where big companies and investment corporations are involved in the extraction of the various minerals and these mines are generally male dominated in terms of employment and labour prospects. The other strand is small scale or artisanal mining which is mainly also male dominated with only around 10% being women and yet they are not heavily involved in the extraction of minerals such as gold.

These low numbers are a product of societal beliefs and traditional division of labour perspectives which attribute mining jobs to men because of issues like physicality and unfounded views on mental strength in strenuous and demanding sectors like mining. (Chingwaramuse 2020), acknowledges this by stating that, the challenges that women are facing revolve around societal opinions on gender equality, legal and policy restrictions and lack of adequate support from the government. Society plays a bigger role in demotivating women into this sector usually by the patriarchal approach that demean the mind-set, physic and general capability of women to perform and execute mining jobs competently. Women's

roles as wives and mothers, along with their generally smaller stature and physical strength discouraged their recruitment in the mining industry (Abrahamsson et al 2014). With time, this has typically progressed towards women evading the sector due to fear of judgment by communities for leaving out or absconding their traditional gender roles (Peetz et al 2014).

Considerations over safety and hazardous conditions and other occupational dangers presented by mining have also been factored in explaining why Zimbabwean women are lowly represented in the mining sector. Furthermore, the complications in infrastructure on mining sites have also been a hindrance as most sites do not meet hygiene and sanitary standards conducive for women but men are generally tolerant even to the worst of conditions. Society plays a bigger role in demotivating women into this sector usually by the patriarchal approach that demean the mind-set, physic and general capability of women to perform and execute mining jobs competently.

However, the advent of 4IR technologies has perhaps become a game changer in the whole matrix as the influx of digitally dependent equipment and machinery in the mining sector means less and less reliance on physical built or strength of labourers but rather technical and better mental abilities. This entails that women can no longer be restricted or relegated to domestic and house-keeping duties in mines or less demanding jobs but can also become involved in the real mineral extraction roles as well. (Fernandez-Stark, etal 2019, 4-24) concur with this idea, asserting that "these technologies (4IR) have removed major barriers for women in the sector – being employed in a mining company will not be determined by such discriminatory aspects like physical built, human endurance or strength or will it be only conducted in remote locations where most women would not be prepared to leave their families and work for months. Rather, as a significant opportunity brought about by the 4IR, mining operations can now be done by anyone with the technical knowhow of how to operate large automated gravel excavators, dozers, drilling rigs, mills and heavy duty crashers. The huge advantage of these technologies is that they are not gender selective and as such Zimbabwean women can largely benefit from them.

In addition, operations like these thanks to the possibility of working remotely, the technology introduced in 4IR makes it feasible for one to operate machinery from long distances thereby removing the need to be physically available at a site. As a consequence, employment of women within the mining sector will significantly grow as the whole value chain of mining can be exploited, from exploration, extraction and value addition and women can play a part in all these stages of mineral production. In like manner, the advent of 4IR has resonated with an increase in STEM courses for qualification in jobs in the mining sector by women and girls. These had been shunned by both society and women in Zimbabwe, with a very low female enrolment in metallurgy, geology and mining engineering programs as there was huge uncertainty over employment prospects within the sector, however due to the easing up of requirements brought about by new technologies the fears of unemployment within the sector have significantly diminished.

10. Ability to venture into Industrial Manufacturing

Another traditional mainstay of the Zimbabwean economy is its manufacturing industry, which by any means now is a pale shadow of its former self, with many factory closures in the last two decades due to economic stagnation and decay, bad and controversial politically motivated policies and poor outputs of raw materials in the agricultural and mining sector. However, industrial manufacturing presents one of the most important cogs in the economic development of any nation as posited

by the (United Nations Conference on Trade and Development (UNCTAD) Report 2016) that, "a broad and robust domestic manufacturing base is the key to successful economic development, since it helps generate virtuous and cumulative linkages with other sectors of the economy, drives technological progress (industrial revolution), and has the strongest potential for productivity gains". Needless to say, implementing 4IR mechanisms within the manufacturing sector will serve to potentially resurrect this sector and start competent production and remove Zimbabwe's over reliance on imports and status as a consumer country. While this will help resuscitating a fallen industrial giant in Southern Africa, women will also be very welcoming of the developments as they will improve and change their condition within the manufacturing sector from previous impediments to professional growth within the sector and even employment in its entirety.

Like in the aforementioned fields women have generally been relegated to less demanding work within any sector serve for perhaps, agriculture where they do much of the work. Yet this has conversely limited their professional growth even their remuneration with these being enjoyed for decades by their male counterparts. In Zimbabwe, estimates show that women are underrepresented in industrial work with only one in every four labourers being a woman with many industrial firms having fewer to even none female workers. This is due to a number of factors which include traditional stereotypes which viewed manufacturing work being found within the male realm only as it is dominated by gruelling, rigorous and strenuous work that will need long hours to complete shifts. According to (Jerkins 2014, 329-339) "one of the biggest hurdles for women to perform manufacturing jobs in industrial factories and plants is rooted in the conception that women are less suitable than men for activities that require extreme physical strength and endurance." This has consequently led to women apparently having negative reception over the idea of working in a line factory and perform duties in manufacturing like their male counterparts.

However with the coming in of 4IR or Industry 4.0 these stereotypes and traditional beliefs are quickly becoming obsolete as many of the fears of women having to perform strenuous work are diminishing due to the growing use of automated robots, artificial intelligence and computerised machinery in manufacturing industries. As is the case in the Zimbabwean mining sector, 4IR presents opportunities for women as this now only requires taking a more technical approach rather than the traditional conception of manual labour and gruesome work.

11. Caregiving and Non-Technical Duties

This is probably the constant within the discussion of 4IR and even the precedent industrial revolutions. There are roles that have long been attributed to women and have never been affected by technological advancement simply because they hardly depend on outside intervention but rather human skills that depend on human connection and interaction. These include caregiving, teaching and art, and yet a huge number of Zimbabwean women fall within any of these categories. According to Imafidon (2019),

> Research has shown that some of the careers that won't be as impacted by the Fourth Industrial Revolution are the caring and teaching professions – professions where you have to connect to human beings. If this is so, there's actually a huge opportunity for women who work in these industries. They almost have a head start over men since they have the opportunity to keep their jobs in these sectors, move up the career ladder and attain managerial positions – conditional on their expertise being valued in these professions of course.

Probably this is one of the positive taking from the era of 4IR in the Zimbabwean context as the existence and progress of women will not be determined by the improvement of algorithms and technological advancements. Though it may seem like change inertia, in an impoverished country like Zimbabwe where women are heads of many families with little to no help from their male counterparts, the last thing they may want experience are job losses to robots and other automated systems. Caregiving has been an important and remains an important part of women's career paths though 4IR may help improve the way it can be operationalised to make it smoother and more effective, it is not under threat of being replaced by artificial intelligence because its efficacy is mainly grounded on human attributes of empathy and patience. This also resonates with professions like teaching and mentoring which also boast of high female representation across Zimbabwe. These are a spine of any system as education is arguably one of the most important sectors of any nation and again they rely mostly on the human to human connection with attributes of patience, encouragement and trust being the driving forces of these activities. Owasanoye (2020) notes that "jobs that rely on intrinsic human traits and abilities such as empathy, compassion, & cross-team collaboration skills often found in women will be high demand for psychological reasoning." They will see women thrive in these sectors for decades if not centuries because they do not rely on updating versions of algorithms but rather improvement of thee skills through experience and observation. As such women in Zimbabwe, in light of the current politico-economic crisis that the country is facing also ought to consider careers within this sector as they are also important and contribute significantly to the national economy yet at the same time they are hardly going to be threatened by the progression towards full utilisation of 4IR mechanisms.

12. Threats

Loss of employment

A recurrent theme of loss of employment for many people including women will be a constant reality of the introduction of 4IR in many sectors and as such many women involved in agriculture will be faced with this threat. Automated robots, computerised irrigation systems and spray drones will all have the potential to replace human labourers of which tasks such as pruning, weeding, spraying and irrigation have been a mainstay of women in Zimbabwean farms. This then entails that a significant female population will be left without employment for those who were employed on farms. With unemployment already rife in the country, the advent of smart agriculture may actually end up being a big threat to women, though in another dimension it can be viewed as an opportunity for women to break the glass ceiling of just being farm labourers. It is also important to note that most women are in agriculture where protections and rights are absent. In many ways, they are already involved in flexible, low-paying and task-specific jobs that offer little protection for workers. The 4IR thus does not provide any promise of improvement for women in low- skilled professions. These jobs are also at risk of automation, as noted earlier, thus further increasing women's vulnerability.

Incapacity to react to 4IR changes

While the introduction of 4IR has managed to forge a number of opportunities for women within the mining sector, mainly due to the removal of technical barriers and hindrances grounded in obsolete perspectives, there have been challenges that have not been mitigated by the advent of 4IR, particularly the non-technical issues. These challenges are not only peculiar to Zimbabwean women but also to across the world, however Zimbabwe being a developing country these challenges are exacerbated due to a number of issues ranging from financial

inertia to societal stagnation. In the first instance, mines and mining companies are likely to be slow to react to the changes in 4IR uptake particularly due to policy constraints and also lack of financial willingness to initiate these changes and incorporate the required changes. The delayed and slow uptake of innovative communications technology means that in many cases, it has not been feasible to move all remote controlled and monitoring operations away from the mine (Ane and Yasmin 2019, 115-122). In Zimbabwe, it is going to be difficult for mining firms to part ways with huge investments to implement these capital intensive improvements and adaptations. Issues like network bandwidth essential to transmit the tremendously high data levels in real time are also pertinent, with a lot of the required technological equipment needing faster networks, like Fifth Generation networks only getting adopted recently albeit with a very low uptake in the country, due to financial limitations and also poor knowledge on the technology, it remains to be seen if 4IR mechanisms will be fully adopted in time to benefit and improve the conditions of women yearning for opportunities in the sector. This then cancels out the theoretical opportunities that women can enjoy in the ideal 4IR environment, as they are still finding themselves needing to relocate to remote mining sites, where not much of the intended technological equipment have not yet been installed, consequently this entails that in Zimbabwe, women still have to wait for full implementation of 4IR in order to at least get to enjoy the benefits of the revolution.

Cultural gendered inequalities

Patriarchal systems in post-colonial African culture have evolved somewhat in the face of growing feminist and rights-based challenges, but remain largely entrenched within the state and traditional governance systems. This creates multiple vulnerabilities for women, including gender-based violence and exclusion from land ownership (Tyagi, 2014). Technological advances in Africa have not been met by a change in socio-cultural systems, which underpin women's exclusion and gender disparities. The danger is that the new technologies will entrench these patriarchal inequalities, as women still lack access to resources such as land, technology and credit. Previous industrialisation processes in Africa largely reproduced women's exclusion from the workspace and led to their being relegated to low-paying jobs and the unpaid care economy. The 4IR is most likely to perpetuate the structural nature of inequality. While the number of women moving into senior positions and earning good salaries is increasing, on a broader scale, the historical and cultural gendered inequalities are likely to persist.

13. Recommendations

- Implement robust policy frameworks for social inclusion programmes in education to train more young women in science, technology, engineering and mathematics.
- Initiate retraining programmes focused on increasing the presence of women entrepreneurs in renewable energy industries, especially in rural areas.
- Roll out industrialisation programmes that promote women's advancement through a variety of affirmative action programmes across sectors. These would include special funds to promote female entrepreneurship in STEM-related industries.
- Set up 4IR commissions with a key objective being to mainstream gender in the industrial policies of African countries.

- Realign labour laws and policies to the new realities of work to ensure workers are protected from the negative impacts of the 4IR.
- Provide safety nets for workers who lose their jobs to automation.

14. Conclusion

The Fourth Industrial Revolution is arguably a seminal development of our times and one certainly for the future generations and as such should be embraced by all and sundry as it presents many advantages and opportunities for humanity. In a world troubled by inequality particularly gender based discrimination and disparities it is always important to find opportunities to redress these inequalities whenever possible. Thus in light of this, it was the thrust of this paper to look into the opportunities as well as the threats that are presented by 4IR to women in Zimbabwe and find a way to fit the gender discourse within the concept of 4IR and what it gives in terms of benefits and limitations. The paper discussed and analysed the role of 4IR and its perceived impact on women in Zimbabwe within four sectors of the economy, agriculture, mining, manufacturing and caregiving, teaching and art as a single sector on its own. While the former three sectors presented progressive opportunities for women in Zimbabwe, the threats of 4IR in these sectors were also significantly important to note. However the last sector provided a constant within an ever changing world and as such presented an opportunity and threat-free outlook from the possible challenges posed by 4IR to women in Zimbabwe.

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