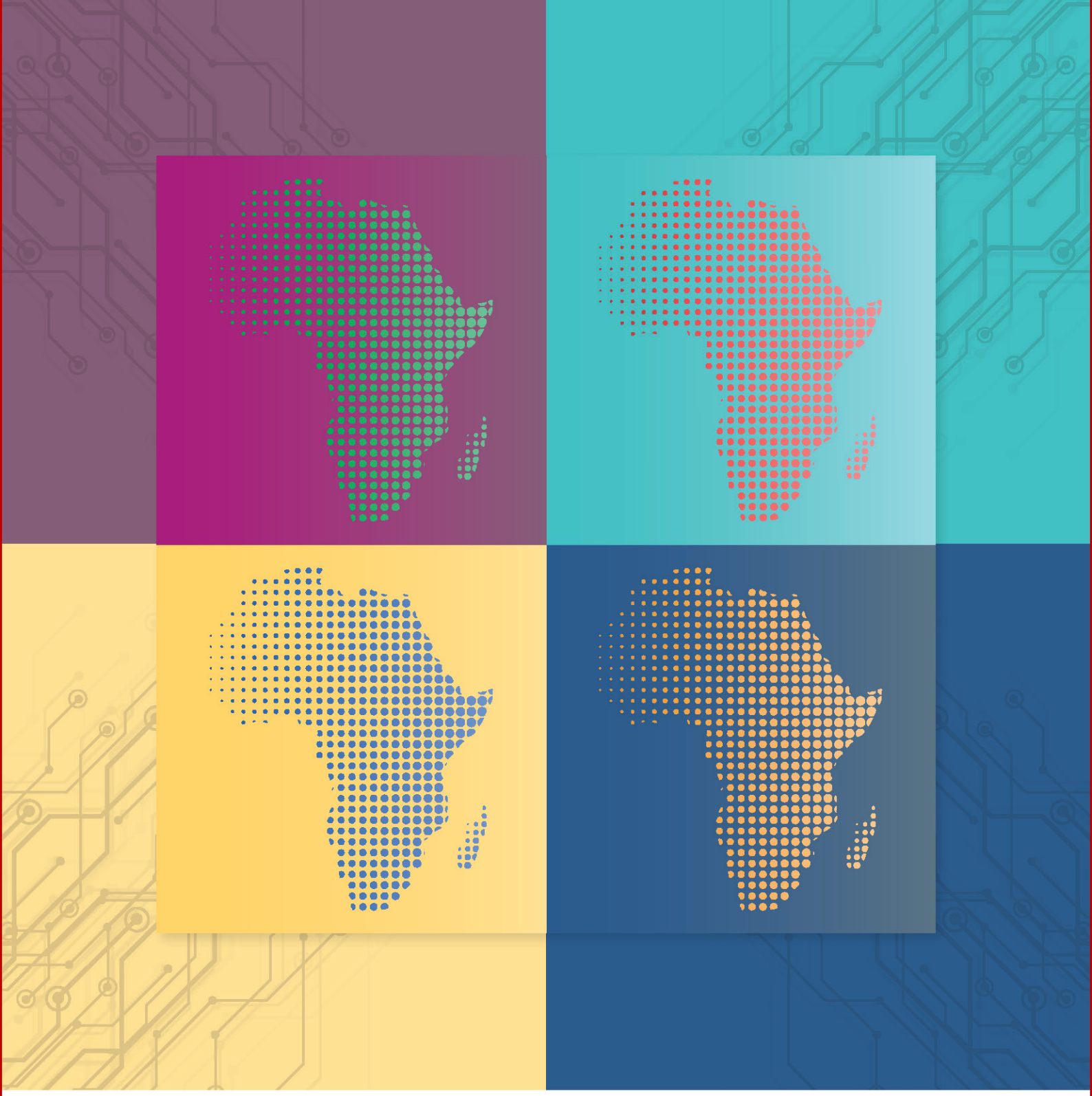

Digital Policy Studies

Digital Policy Studies is an open-access, peer-reviewed interdisciplinary academic journal focused on the empirical, critical and intersectoral study of subjects related to digital policy and the fourth industrial revolution, cybersecurity, the digitalisation of politics, the digital economy, information and communication technology, the convergence of technology and society, new media and related topics. The Journal publishes research articles, review articles and policy commentary in designated sections.

Published by the Department of Politics and International Relations at the University of Johannesburg.

Volume 1 ⊙ Number 2: 2022

UNIVERSITY OF JOHANNESBURG

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EDITORIAL SECTION

Digital policy entails theorising and regulating a dynamic sector domestically and globally

Bhaso Ndzendze
Editor in Chief: DPS and
Department of Politics and International Relations
University of Johannesburg
bndzendze@uj.ac.za

2022 has been a landmark year in the development of digital technologies and decisions whose consequences will be with us for decades to come. The year has likewise seen government responses in the form of policies aimed at enhancing as well as regulating these innovations and trends, and at times appearing to be barely keeping up. Officials and legislators are increasingly learning-by-doing amid the rapid pace of digital change (thereby demonstrating the need for structural and theoretical thinking vis-à-vis digital technologies).

The most notable developments in this regard came in the latter half of the year: the completion of the purchase and privatisation of social media giant Twitter by Elon Musk in October, the bankruptcy of blockchain-reliant cryptocurrency company FTX in November (Otte and Skopeliti, 2022), and the entry of natural language processing (NLP) and machine learning (ML) – key artificial intelligence (AI) disciplines and commercial sectors – into the mainstream in the form of ChatGPT (https://chat.openai.com/chat) in December.

In South Africa, the government has sought to implement the recommendations of its 2020-concluded Presidential Commission on the Fourth Industrial Revolution (PC4IR), including by introducing the National AI Institute. Strides in the private sector also continue to be made, with ShopriteX investing aggressively in the future of AI-enabled (cashierless) retail in the country, with some R1-billion (roughly US$59.1-million) designated by the company for digital research and development (Moodley, 2022).

The domestic is also international, however. On the geopolitical front, therefore, the promulgation of the United States CHIPS Act, meant to incentivise development of cutting-edge US tech and science industries by the Biden Administration, has the secondary (or perhaps indeed primary) effect of prohibiting funding by US citizens and companies of any entities expanding the semiconductor market in China and in other countries deemed threats to US national security for at least the next 10 years. This will no doubt set back China's fledgling semiconductor industry (currently valued at US$29.6-billion in 2022), and perpetuate the US-China rivalry. In reconfiguring global supply chains (still reeling from the effects of COVID-19), it will have implications for the world beyond the bilateral relationship. This is indicative of a broader trend we are observing: 4IR technologies are becoming ever more securitised and militarised. Indeed the perceived uptake of cutting edge technologies in the Russia-Ukraine War has been one of the key lessons taken away from the showdown by many countries, including the constitutionally passive nation of Japan (Kurumada, 2023). The country has broken nearly 80 years of postwar military policy of having only defensive capabilities by issuing a revised *National Security Strategy*, the country's guiding defence policy document, that pronounces its intentions of having counter-strike capabilities. A crucial aspect of the document is its declaration of a strategy of 'active cybersecurity,' which

will see it attempt to neutralise cyberattacks before they occur. This new strategy also entails recruiting thousands of personnel and growing its Self Defense Force cyber division staff from 700 to 4000 by 2027 (Johnson and Dominguez, 2022).

Apart from the more obvious cynicism read into it by many, including its protectionism (*Xinhua*, 2022), America's CHIPS and Science Act displays an underlying optimism pertaining to a country's ability to revamp its scientific prospects. It is no longer safe to presume a still straightforward relationship between government expenditure on research development (GERD) and actual innovation. Studies show that we are at a time when the payoff from R&D expenditure is at its lowest (Callaghan, 2019). Perhaps the message here is nuance – as Miyagawa sums it up: "R&D spending is not enough to foster growth [...] countries need do more to support innovation and collaboration in carefully chosen sectors" (Miyagawa, 2019). The message resonates for governments across the globe, South Africa's included, having failed to grow, and instead decreased, its expenditure on R&D as a proportion of GDP for the second consecutive year (Mzekandaba, 2022).

All these episodes, only the most notable in a year of innumerable digital events and milestones, require reflection, critique and theorisation to extract their significance as we look towards the future. Among the above-listed developments, questions arise about the power of platforms and the degree to which their ownership should be at the apparent whim of individuals and corporations; whether we are entering a new era of AI dependency, towards the critical threshold of mainstream use, and new ways of working and consuming; the balance of risks and potential gains towards cryptocurrency and their reversibility. Of principal concern is the question of whether states have the capacity to regulate emerging technologies at their rapid pace of emergence. At scale, this in turn raises the question of whether the international community can collectively regulate competitiveness among nations and restrain it from becoming destructive.

In this issue, the contributors tackle these and related questions head-on. These include value-creation (Caroline Azionya), armed drones and humanitarian international law (Eric Blanco Niyitunga), the uses of social media by political parties in elections (Samuel Umoh Uwem), preparing African youths for work (Adio-Adet Tichafara Dinika), 'techenodism' and the metaverse in Africa (Philip Ademola Olayoku), the threats and opportunities presented by the 4IR for women in Zimbabwe (Valerie Rumbidzai Jeche), and the educational potential held by digital technologies (Freeman Munisi Mateko and Bernard Chingwanangwana). Book reviews in this edition look at the important issues of legal education in the wake of the 4IR (Edmund Terem Ugar) and Nigeria's development (Lesego Motsage).

I would like to express gratitude towards Dr Tinuade Ojo, the managing editor, and Wikus van Zyl, our publisher, for championing such an important and interesting installation of the journal. I also wish to thank the contributors for trusting us with carrying their intellectual work and congratulate them on the exceptional exertions demonstrated by their papers! Dr Ojo and I also appreciate the inputs made by the anonymous peer reviewers. They have ensured that all articles accepted adhered to the highest standards possible. As always, the Editorial Board and the team at the 4IR and Digital Policy Research Unit (4DPRU) have been integral to the production of this volume.

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Value creation in the 4IR

Millennials and Digital Multisided Platforms (MSPs)

Caroline Azionya
Department of Strategic Communication
University of Johannesburg
carolinea@uj.ac.za

Abstract

Value creation in the 4IR is customer-centric, interactive and hyper-personalised. Real-time consumer brand experiences, interactions and relations can be transformed into quantifiable data that can be monitored and tracked ('datafication'). This study theorises that platform ecosystems, including millennials, converge on digital multisided platforms (MSPs), which are sociotechnical constructs that foment and generate significant value for platform owners and users. As value creation has risen as a digital economy business imperative, and a subject for academic research, the importance of millennials to brands warrants further investigation. This study aims to show how the interplay of social relations between millennials and brands, along with technology, are used to create value from the millennials' perspective. To this end, it uses a consumer-dominant logic to explain and predict novel connections between key value creation constructs by millennial prosumers, including sole-creation, co-creation, collaboration, value destruction, value depreciation and value co-destruction. It presents three propositions that reimagine fit-for-purpose brands as interoperable constructs which exhibit complementarity, as well as the social dynamics of millennial interaction on digital MSPs. Findings indicate a cyclical value-interdependent relational system between millennials and brands, where millennial interaction leads to the creation or destruction of value. It also demonstrates how brands and platform owners can collaborate with millennials as an important and technologically savvy generation to co-create, capture and communicate value on digital MSPs.

Keywords: Consumer-dominant logic, customer experience, digital multisided platforms, millennials, brands, value creation

1. Introduction

Since the emergence of the digital economy, brands have found themselves navigating exponential disruptions that necessitate a rethink of assumptions about the nature of their business, consumers, and value creation. The Fourth Industrial Revolution (4IR) is value-creating and customer-centric. Value is created from the interactions, relationships and integration of systems inside and outside of brands. Therefore, 'the locus of value creation moves from inside the brand to outside' (Parker, Van Alstyne and Jiang 2017: 255), and primarily occurs on digital multisided platforms (MSPs). Digital MSPs are defined as digital technologies and market mechanisms that rely on the massive interactions of key actors for their survival. They are digitally distributed systems (components that communicate with each other in order to achieve a goal), and are decomposable into components (interdependent

consumers). Digital MSPs are also sociotechnical constructs that generate significant value for platform owners and users. The sociotechnical concept represents the complex interactions between people, technology and brands (Kapoor et al 2021). Prominent digital MSPs include Jumia, Naspers, Apple and Amazon.

Since 2015, Apple, Google and Microsoft have been among the world's most valuable brands, known for their developer ecosystems. Ecosystems are distinctive features of digital platforms (Parker, Van Alstyne and Jiang 2017) and interdependent networks of firms that collaborate, compete and benefit from value creation (Kapoor et al 2021). For that reason, a digital platform is a fundamental structure underlying a system of both social and marketplace interactions (Glimsteddt 2017) for the creation of value in an ecosystem.

Brands and consumers can initiate the process of value creation in an ecosystem. Value creation can begin with the brand and end up with consumers, and vice versa. Value creation ends only when it is appropriated. In the era of 4IR, value appropriation can feed back into value creation, and the process starts all over again, thereby initiating a circular flow of value creation.

Digitally empowered millennials have the finances, devices and digital skills for constant connection on digital MSPs. The millennial cohort is connected through the formation of social bonds amplified by their massive presence on various digital MSPs and signifies the importance they attach to digital interactions. Their digital presence makes them a unique block of interdependent (co-dependent) consumers. Consequently, millennials' vast presence on various digital MSPs underpins the platform's existence, and plays a dominant role in the digital economy.

Prior studies of value creation on digital MSPs focus on competition (Casadesus-Masanell and Zhu 2013), strategy (Subramaniam 2020), network effects (Staykova and Damsgaard 2015), and co-creation (Karippacheril et al 2013), to name a few. Furthermore, sociotechnical research tends to focus on technology and neglects the social aspects of platform ecosystems (Kapoor et al 2021). Researchers still need to investigate markets as platforms where individuals exchange goods and services, interact, build relationships, and create value for themselves and other key actors (Gallagher, Mastrogiorgio & Petracca 2019). Gaps still exist about how the digital interactions of South African millennial prosumers create value on digital MSPs from a platform-agnostic and consumer-dominant logic. The framework set out in this study seeks to address this gap in our knowledge.

Before presenting the framework designed to explain how millennial interaction on digital MSPs creates value for their cohort and brands, I will discuss digital MSPs and the connections and types of dependencies exhibited in platform ecosystems. I will then examine 4IR-related interoperability and complementarity, before turning to millennials as prosumers.

2. Digital Multisided Platforms (MSPs)

The sociotechnical aspects of digital MSPs are expressed as the merger of social interaction with technology that accelerates the pace of human interaction with digital technologies. This has greatly increased the rate at which human beings and automated systems create, communicate, share, and store information and content of all categories across time and space (Couldry et al 2018). The value creation, delivery and capture mechanisms of digital MSPs (Teece 2018) highlight the logic of these interactions.

Some interactional activities include payments, online marketplaces, communication, social media, financial exchanges, creative content outlets, advertising-supported media, app stores, operating systems, price comparison websites, search engines, and collaboration and sharing platforms (Evans & Schmalensee 2017). These platforms continue to expand consumer choice, civil participation, and the efficiency and competitiveness of industries (OECD 2018).

The principle of a digital MSP is that the viability of one side of the market makes the other side attractive for interactions and value creation. Platform viability depends on achieving a critical mass of members on both sides to create enough value to attract more members on each side (Evans 2017). Fundamentally, participants in these platforms need each other, and strive to create value for each other. Value creation, therefore, becomes the defining goal of digital MSP business models and strategies which centre on how to create, communicate and capture value. The propositions and suppositions underpinning this framework are set out in the following sections.

2.1 Connection and interconnection, dependence and interdependence on digital MSPs

Digital MSPs are digitally distributed systems that can be separated into components. These components consist of interdependent consumers who are connected and interconnected and engage in interactions by forming social relations that result in component networks. Therefore, a component network refers to key actors connected and interconnected within a system and between systems in a relationship (Ramaswamy & Kerimcan 2018).

Connection is the relationship or link within a component of a system. Interconnection refers to the mutual connection or relations between two or more components of a system. Interconnection in social relations is a mechanism where interdependent (components) consumers interact to create and co-create value for themselves.

An interconnection in network systems transports and delivers information from one element to another, while interconnections in social relations facilitate interaction and the creation and delivery of value between key actors. The interconnections between the system networks and social relations bring about dependencies and interdependencies.

Dependence (one-sided reliance) and interdependence (mutual reliance) imply some sort of correspondence of interests among the key actors. In such a scenario, what happens in one system, directly and indirectly, affects other systems that connect and interconnect. For instance, a power outage in one system can affect the other interconnected systems. The interconnections of digital modules enable communication devices at the one end to communicate or share value with another at the other.

Analogously, the interconnections of interdependent consumers allow the sharing of value created on one side with the other side of the platform. For example, trusted devices like the subscriber identity module (SIM) card interconnect or matchmake devices like smartphones and a network. This is similar to the way in which digital intermediaries treat interdependent consumers on the different sides of digital MSPs by matchmaking and enabling interactions between them. The interconnection between the sides of a platform increase collaboration, data sharing and interaction. Accordingly, value creation and flows are characterised by the dependence and interdependence, connections and interconnections of components and sides of digital MSPs. This leads us to the following proposition:

Proposition #1: A state of dependence on digital MSPs exists when the value creation competence of a key actor relies on the action or inaction of a second key actor.

Failure to support or receive help from the second key actor it is connected to impedes the value creation capabilities of the first key actor. Simply put, the outcome (success or failure) of any value creation effort of a key actor relies solely on the assistance, help and support (actions/inactions) received from the second key actor connected with it. Dependence can be a nexus of unidirectional and bidirectional connections. In terms of communication networks, 'sources utilise symbolic systems to encode messages and deliver them to receivers, and receivers acquire information by decoding the received messages' (Oh & Monge, 2016). In particular, the direction of value is from point to point in a communication network.

However, most dependent relations that are unidirectional are one-sided dominant communication patterns. Information flow is at the dictate of the source, and only sounds logical in one direction. We can have one-to-one, one-to-many, many-to-one, and many-to-many unidirectional relations. One-to-many unidirectional relations, for instance, could be a corporate brand with many subsidiaries or branches. These subsidiaries are controlled and linked with the corporate headquarters of the parent company in question, but none of those subsidiaries can be controlled by or share links with other independent companies.

In addition, there can be mutually dependent bidirectional connections on digital MSPs, consisting of reciprocal, asymmetric and symmetric interactions between key actors on one side of a digital MSP. In terms of interpersonal communication, interaction is dialogic, involving at least two key actors exchanging data, information or value that are beneficial to each other or have damaging effects on both parties. Thus value creation is a mutually dependent relation when key actors are bi-directionally connected and create and exchange value asymmetrically and symmetrically. Relying on this supposition, we arrive at our second proposition:

Proposition #2: Interdependence relations exist when all the key actors are interconnected and mutually dependent on one another during value creation on a digital MSP.

Interdependence on digital MSPs is defined by how interconnected, mutually related and intertwined key actors are on both sides of the platform. Data, influence, information, messages and value can flow from one side of the platform to the other, and start concurrently (Khamfroush et al 2019). Hence, digital platforms serve to convey meaningful value by facilitating the interconnection of products and services with the flow of data between key actors (Ruutu, Casey & Kotovirta 2017).

Interdependence relations on digital MSP are bi-directionally connected, and are only valid in two directions. For example, there can be one-to-one, one-to-many, many-to-one, and many-to-many bidirectional relationships in an interdependent relation or network. Such a relationship can exist between consumers, or between consumers and products or services. Moreover, the actions of key actors can bi-directionally affect one another positively or negatively (Agostinho & Jardim-Goncalves 2015).

Furthermore, the outcome (success/failure) of the value creation efforts of key actors who are interdependent consumers on one side of the system depends on the value creation activities (success/failure) of the key actors on the other side when they are cooperating. but are inversely related when they are competing against each other. When the sides collaborate, they will all succeed, and vice versa. When they compete, the winner takes all. Therefore,

competition in interdependent relations can create asymmetric networks where one actor dominates. Additionally, in a value creation process where the interdependent consumers cooperate, the behaviours of key actors can create a feedback loop. Hence, the actions of one or many sides can ignite responses and reactions, which can cause a reflexive impact that feeds back into the system. Consequently, our third proposition is as follows:

Proposition #3: Key actors can be independently connected and create value autonomously on digital MSPs.

Independence refers to a situation where the value created by key actors is unaffected by the actions and inactions of other key actors. This implies that some interdependent consumers are autonomous agents who do not rely on the other side of the platform. Accordingly, the value created on one side unaffected by the activities taking place on the others. Consequently, autonomy is defined as the lack of causal connections between components in a system that do not depend on the value creation abilities of each other for survival. At the individual level, it means that the interaction leading up to the creation of value is generated by individual efforts, without any form of cooperation.

To summarise, the three propositions illustrate that value can be created and co-created by key actors within and among component units of a system through a process of interaction. Digital MSPs are thus the domains of interaction between interdependent consumers, or between autonomous key actors.

2.2 Platform ecosystem

An ecosystem is an element of interlinkages and interdependencies (Subramaniam 2020) of social relations. It is a network formed by the connections and interconnections, dependence and interdependence, and relations of the modular architecture of a distributed system (digital MSPs). A modular architecture encompasses the autonomous agents, components, elements, or modules that are connected and interconnected in a network. Modules or components can be created independently, connected, and replaced without upsetting the entire system. Modularity lowers the costs of redesigning, linking and merging components in networks (Kiesling 2021). These networks can be machine-to-machine networks (computer networks, telecommunications networks, the internet), a network of things (railway networks, road networks, geospatial networks), social networks (networks of individuals, networks of business and people, socio-political networks), or economic networks (global logistics supply networks, international bilateral agreements, transnational credit, and foreign direct investments) (Caschili, Medda & Wilson 2015) constituting an ecosystem of interacting elements.

Notably, the key actors that constitute the components in an ecosystem are united or held together by their interactions. This common unity (community) formed from interactions between components in the network creates value. Each interacting actor benefits from the social relations existing within the community of an ecosystem.

On digital MSPs, diverse kinds of value are produced in different types of ecosystems. The creation and co-creation of meaningful value in an ecosystem often involves prolonged and repeated interactions on the online and offline continuum. In order to manage and continue the creation of benefits in a dynamic ecosystem, components of the networks frequently alter. The key actors that constitute the components enter and leave the system. The rate at which they enter or exit, namely churn, can also be high or low. These social dynamics taking place within the system either aid robustness or worsen fragility, resulting in system failure.

Additionally, the robustness and resilience of an ecosystem strengthen the tendency to create and co-create value on the digital MSP (Hein et al 2020). In contrast, frailty in an ecosystem may lead to the insubstantial creation and co-creation of value within and between components of a digital MSP. Furthermore, on digital MSPs, the components are the sides added in stages to enhance and facilitate interactivity, interdependence and interconnectivity. In particular, a digital MSP ecosystem constitutes the building of digital infrastructure for interaction and exchange of value, which does not require much ownership of physical assets or physical systems. As interaction is the backbone for forming an ecosystem, participants place a premium on the level of adoption by other participants. When more actors adopt a platform, it becomes more viable.

Related to the above, components of digital MSP are interdependent consumers. It is the convergence and interaction of the interdependent consumers to create value on digital MSPs that form an ecosystem. Interdependent consumers interact on their own side and with other sides of digital MSPs. The extent of these interactions within and between components of digital MSPs is rising exponentially as a result of the merger of 4IR technologies and social interaction (Ardolino et al 2020). The components of digital MSP are dynamically aligned through the process of coupling (Isckia, De Reuver & Lescop 2020), resulting from interactions.

Moreover, the coupling and dependencies within components are regarded as interactions within, whereas couplings and dependencies between components are considered as interactions across. The degree of coupling and dependence within and across components depends on how connected and interconnected key actors are on digital MSPs. Therefore, coupling and dependence can be viewed as the degree of fit or strength of connectedness between key actors during the interaction process, or the degree of compatibility between the interacting components of key actors in a system. Technically, components are created through scalability. Scalability is the ability to change the size and scope of a corporate brand in terms of efficiency and performance. This capacity can be on vertical and horizontal scales (Tiwana 2014), responding to the changing demands in an agile and dynamic business environment.

Several strategies can be employed to create an ecosystem and orchestrate interactions that result in meaningful value creation on digital MSPs. Firstly, the orchestrators of digital MSPs must facilitate the attraction of key actors based on common interests. The digital MSP must be conceptualised in a way that the benefits which accrue from the interactions of the key actors draw them together, thereby avoiding the 'circular conundrum' (Spulber 2010). A circular conundrum simply means that a seller must attract a buyer, and a buyer must attract a seller. This leads to the so-called chicken-and-egg dilemma where consumers on one side will not participate without consumers on the other side of the platform, and vice versa (Ardolino et al 2020). To solve the problem of the circular conundrum and enhance adoption, digital MSP owners must incentivise to attract key actors and reduce the anticipated risks involved in participation to the barest minimum (Spulber 2010). The adoption thresholds increase when more key actors join a platform, and fewer leave the platform. The usefulness of a platform depends on the adoption by participants with common or complementary interests (Veisdal 2020). Although conflicts of interest can occasionally arise due to key actors' varying interests, digital MSP owners must bring their managerial acumen to bear to sustain interactions and keep the ecosystem's momentum going (Panda & Leepsa 2017). Thus, the floaters of digital MSPs must coordinate their self-interest as risk-takers and align it with the interests of other risk-averse actors to enable an ecosystem of creating rich value environments. To maximise the creation and utilisation of value in an ecosystem for the

benefit of all key actors, digital MSP owners must ensure proper coordination, control and better governance mechanisms (ibid). Schreieck et al (2018) insist that platform governance is a significant way to mastermind interaction and facilitate value creation on digital MSPs.

Another way of building an ecosystem is first to make one side of the platform viable. Since digital MSPs are based on the principle that the viability of one side of the platform makes the other side attractive for interactions and value creation, facilitators of digital MSPs can concentrate their efforts on wooing anchor complementors, especially on one side of the platform. Anchor complementors refer to interdependent consumers whose presence attracts other key actors to the platform. They enhance the utility derived from platforms by creating complementary products (Eckhardt, Ciuchta & Carp 2018) that create value for other actors. As part of a strategy to lure anchor complementors and make the digital MSP viable, the value proposition of the digital MSPs must correspond with the interests of anchor complementors. This will force a shift towards a platform which attracts key actors that are collaborative and interdependent by nature, involving business models that create value for participants (Yablonsky 2020).

Similarly, digital MSP owners can incentivise a platform by subsidising one side – in other words, by making one side free and making the other side pay. This strategy is known as a non-neutral price mechanism. It allows digital MSP owners to set prices on one side of an MSP below a marginal cost. When price mechanisms are non-neutral, it portrays a scenario where 'optimal prices can be below the marginal cost of provision on one market side while being above on the other side(s); end-users with lower price elasticities will typically be overcharged and vice versa' (OECD 2018).

However, such a strategy can enable digital MSPs to quickly create a critical mass of ecosystems that can grow monotonically as more actors join the system (Oh & Monge 2016). Critical mass is the point at which the sheer size of a network triggers further exponential growth, as more actors join the network. It is a saturation point in the growth path of a digital MSP – even if some members of the network are quitting or dropping, and this will have little or no effect on the existence of the platform. This critical mass of consumers/users ignites and heightens interactions on the digital MSP. Nevertheless, achieving such a critical mass depends crucially upon the creation of network effects and externalities. Therefore, the digital MSP becomes viable when a critical mass is reached due to network effects - when masses of people are joining, interacting and creating value on the platform.

2.3 Network effects

Network effects can be described as a phenomenon that depends on the number of consumers or users and adopters of a digital platform. Network effects or externalities refer to the value and utility accruing to key actors as more and more join the digital MSP. This phenomenon ultimately creates a feedback loop that significantly influences the digital MSP ecosystem.

Direct network (same-side) effects are the value users derive from buying or using free products, as more consumers purchase and use those products. However, direct network effects on digital MSPs occur as more and more users join the platform from the same side. In other words, it is the value a key actor on one side of a platform enjoys as more key actors join the same side, interact, and create value. For example, a direct network effect may refer to the utility a millennial derives from a network as more millennials join the network. There is a positive direct network effect when the size of the network on the same side of a platform increases, resulting in more utility for users and vice versa.

By contrast, an indirect (cross-side) network effect is enabled when more users on one side and complementary producers on the other side are attracted to a MSP as a result of the interaction taking place on the platform (OECD 2018) -- for example, when millennials on one side of a platform benefit from interactions with advertisers on the other side, and vice versa. Another way of expressing an indirect network effect is to consider it as a situation where the actions or behaviour of key actors on both sides of the platform either have a positive or negative effect on each of the sides (Isckia, De Reuver & Lescop 2020).

However, as people continue to join a digital MSP, and interactions heighten, network externalities (effects) are established and value creation increases, this can lead to market-tipping, or excess inertia. Tipping is the rise of a domineering brand through the process of positive feedback, or what economists refer to as multiple equilibria (Dubé, Hitsch & Chintagunta 2010). Market-tipping occurs when there are few or no benefits accruing to end-users from product differentiation, and a high cost of switching and multihoming (Hagiu & Yoffie 2016).

Multihoming occurs when users subscribe to and use multiple platforms concurrently, which is common for social media users (Belleflamme 2020). Additionally, there is little or no space for competition in a market with strong positive network effects. The incumbents may monopolise and dominate the space and use their position to crowd out small competitors. They can grow and inevitably reach a situation where they can no longer be price-takers. 'Not-a-price-taker' phenomenon is where a few brands can become prominent and influential enough to influence or manipulate market prices in their favour (OECD 2018).

3 Brands and digital MSPs

3.1 Interoperable brands

Brands are organisations of networks of people or products. They are the symbolic representation of value creation and co-creation in the mind of the users of digital MSPs. Therefore, value is a perception. Perceived value includes meaningful value and experiences associated with a particular brand. Brands are also used as symbols of identity and interaction between key actors on digital MSPs.

Consumer relationships are not only based on the functionalities of a brand, but also through symbolic and perceived value. Brands have symbolic value for consumers that is influenced by associated socio-cultural meanings linked to the ownership and use of brands (Ravasi & Rindova 2008). Brands are also interactive symbols in the minds of users. As part of an ecosystem, brands enable the formation of value networks on digital MSPs.

For the purposes of this study, brand is defined as advertisers, complementors, suppliers of products, and firms (corporate brands) who use boundary resources to create and exchange meaningful value on digital MSPs. They produce, supply, and complete digital MSP owners' efforts in the creation and sharing of value. Brands occupy one or more component sides of digital MSP because of their sheer size and distinctive characteristics. The brands on digital MSPs are interoperable (compatible), and are also interdependent (co-dependent) consumers with the users on the other sides (components) of the platform.

Interoperability is the basis for effective and efficient communication of component sides of digital MSPs. Interoperability enables brands to perform their functionalities with precision

and speed, and helps meet the yearning of users for the symbolic creation and co-creation of value that fulfils their dreams, hopes, statuses, and social standings. Interoperability is the ability of two or more systems to transmit meaningful data or essential information seamlessly from component to component and use the exchanged data (Gasser 2016).

In the same vein, (Kerber & Schweitzer 2017) describe interoperability as the attributes embedded in a system or product that enable it to communicate optimally with other technically different systems or products. In 4IR, the composite of value creation in a system requires the components to work together and to be seamlessly compatible with each other. Compatibility refers to the 'ability of two or more systems or components to perform their required functions while sharing the same hardware or software environment' (IEEE 1990).

In distributed systems, including digital MSPs, modularity, namely where elements or components of a digital system interact and talk, plays a key role in their interoperability. Modularity permits digital MSPs to efficiently connect disparate technologies, and quickly adapt to 'changing conditions' (Kiesling 2021). These interconnections of digital modules allow for seamless interactions and exchange across components of digital MSPs. Hence interoperability can be described as a shift in connectivity, enabling the interconnections and interdependencies of components of digital systems.

However, within the ambit of value creation, interoperability can be regarded as the ability of two or more components of a system comprising interconnected and interdependent consumers to create, share, and consume value at an accelerated speed and pace. Interoperability accelerates consumer centricity, which aims to put the consumer first, find a solution to the consumer's problem, and create value for the consumer. It enables consumers to obtain a seamless user experience at every touchpoint. Interoperability is thus enabled if the interdependent consumers or key actors operating on the various sides of digital MSPs can seamlessly create, co-create, collaborate and consume value. When interoperability is enabled on digital MSPs, key actors use boundary resources such as Application Programming Interfaces (APIs), application (app) stores, and software development kits (SDKs) to create and co-create value.

However, allowing the interplay of demand and supply on digital MSPs to determine interoperability can be subject to 'severe market failures when the degree of interoperability is determined unilaterally by a dominant firm, or when the market gravitates towards a uniform technical standard with natural monopoly characteristics' (Kerber & Schweitzer 2017). This can give rise to a 'monopoly-like pricing structure' that primarily benefits the dominant platform owners (Mattila & Seppälä 2018).

3.2 Complementarity of a brand on digital MSPs

Complementarity is a phenomenon in social relations whereby actors involved in social interactions are attracted to other actors who possess the character, skills, and qualities they lack, and will fill the void existing in their own lives, thereby making them 'complete'. According to Wang and Busemeyer (2015), 'phenomena are complementary when (a) they are mutually exclusive, and only one can be applied at any time; and (b) they are all necessary for a comprehensive account of these phenomena'. This implies that complementarity exists when phenomena are incompatible.

Each of these phenomena exists independently, yet they need each other to achieve a comprehensive outcome. In other words, two brands can be produced independently of each

other, yet buying or using one alone is less valuable, and they become more meaningful or useful when purchased or used together.

Similarly, the demand for such complementary brands is affected by their price and the price of their complementors. Thus such brands provide greater value and enduring user experience when consumed together than separately. Therefore 'complementary products or services are utilised in combination with one another' (Avgeropoulos et al 2015:1).

In digital MSP parlance, complementarity exists in such a way that the value creation activities of third party producers like software and application developers, suppliers, and advertisers help to complete the value creation efforts of platform owners. Specifically, many third party producers specialise in providing value and services that will act as complementary products and services to those already offered by digital platform owners. Attracting them to digital MSPs will create an ecosystem of complementors on one side and interdependent consumers on the other side(s). Complementors are a group of suppliers that offer complementary products or services for the purpose of interactions or transactions on the component sides of digital MSPs. Their extensive presence or ecosystem leads to network effects as interactions heighten between the interdependent consumers. Thus, it is in the interest of digital MSP owners to attract these key actors in order to enable the formation of an ecosystem and to coordinate, manage, and govern them to ensure that the value associated with economies of scale and network effects will benefit all actors.

4 Millennial prosumers

4.1 The concept of prosumption behaviours

The advent of 4IR technologies enables the meaningful participation of consumers in all dimensions of production processes, including design, manufacturing and distribution (Cohen 2013). These digital technologies have successfully removed the barriers separating production from consumption, and blurred the consumer and producer boundary. They enable hitherto passive consumers to become active participants in the production, consumption and storage of value. They participate on multiple sides of digital MSPs as both consumers and producers, and thus play the role of prosumers.

The massive presence of these key actors has changed the social and economic dynamic on digital platforms (Alderete 2017). Consumers are not passive consumers of products and services, but are increasingly getting involved in creating and co-creating value from concept to outcome. They possess surprising knowledge and skills that play an active role in the process of value creation (Tian, Shen & Chen 2017). Brands should no longer regard consumers as passive recipients but as creative individuals, because the production process is part of the users' consumption experience (Shen, Qin & Luo 2020).

The term prosumption was coined by Alvin Toffler in 1980 and is related to a combination of production and consumption (Ritzer, Dean & Jurgenson 2012). Prosumption represents a situation where consumers can produce products for their use (Tian, Shen & Chen 2017). Therefore, it becomes a fusion of production and consumption, which makes the consumer the maker. Prosumption involves some form of participation by key actors (consumers) in the act of value creation. Of particular importance is the idea of creating 'use-value' and re-orientating 'exchange value' (Bond et al 2020).

According to Shen, Qin and Luo (2020), the difference between the consumer and producer lies only in the difference between 'value in use' and 'value in exchange'. For instance, the brand can make a product with a view to exchanging it for money, while a consumer may consume it partly within his or her household and exchange the remainder with others for money. In the context of communication, information flow is both unidirectional and bidirectional -- in prosumption behaviours, the sender/source can be the receiver, and the receiver can also be the sender/source. It is where an individual can seamlessly move from being a consumer of information to a contributor or creator (Bond et al 2020).

Hence prosumption is so inseparably and interchangeably linked to the consumer and producer that it seems difficult to distinguish between them visually. Therefore, for the purposes of this study, prosumption is defined as sole creation, co-creation, collaboration, and the consumption of value made possible by the interoperability of the components on digital MSPs. Thus, value is a series of dynamic social and economic activities created, communicated, exchanged, consumed and prosumed on digital platforms.

3.1 The prosumption behaviours of millennials

The prosumption behaviours and practices of millennials on digital MSPs have been rising appreciably over the years. The growth in prosumption practices, or user-generated content, signals that the 'consumers have arguably taken over the creation and distribution of content' (Rayna & Striukova 2016: 218). However, millennial interactions on digital MSPs mainly revolve around prosumption practices of content creation, exchange and the online sharing economy. Content can be defined as 'units or bundles of symbolic communication, fixed in some material form, and shared in the context of some medium' (Burgess & Woodford 2015). Content creation includes blogging, online reputation management, editing, online community management, commentary, updating websites, podcasts and videos, and distribution. Content represents symbolic interaction that helps in facilitating the digital transformation of communication networks. Burgess and Woodford (2015) ascribe the transformation of communication systems, practices, and the emergence of global media brands to the rise in diverse kinds of content creation. On the other hand, (Cohen 2013) contends that consumers/users do not just create value for digital MSP owners through content creation, but also 'generate a new commodity form: the cybernetic commodity'. Cybernetic commodity includes the information or feedback generated from the actions and interactions online (Cohen 2013) that create meaningful value.

5 The framework

For value creation to exist and thrive on digital MSPs, the formation of interests and social relations must be formidable. Key actors must see some pecuniary/nonpecuniary benefits that will likely benefit them or benefit others they represent as agents. Interests on digital MSPs can be congruent, common, divergent or conflicting. Given that these co-variations of multiple interests represent value created and appropriated in variable proportions on the digital MSPs, it affects the interactions and relations between the key actors or interdependent consumers.

Thus the vital element for value creation on digital MSPs is the coming together of complementary interests, or the realignment of interests. Digital platforms that turn the drivers of value creation and realign divergent and possibly unrelated interests thrive and overtake rivals (Pesce, Neirotti & Paolucci 2019).

This framework elucidates the propositions made above. It demonstrates how millennials can interact with themselves and co-create value, and how brands can collaborate with millennials on digital MSPs and create value. It also specifies how millennials can sole-create value independently. In this framework, the millennials and the brands are prominent actors who actively and proactively interact with each other, based on shared interests. Both millennials and the brands are interdependent consumers who reside on the different components of the digital MSPs. The millennials can form dependent and independent relationships with their fellow millennials, and develop interdependent relations with brands. Interactions on digital MSPs involve communication (unidirectional or bidirectional), exchange (distribution, price, demand, supply, payment), consumption Staykova and Damsgaard (2018) and prosumption.

Nonetheless, when millennials interact with other millennials or brands, they frequently exchange big data such as animations, text, video, graphics and audio represented as the ones and zero number system (Liu et al 2021). The use and exchange of these symbols as modes of interaction help to create, communicate and share value. The interactions of millennials and brands leading to the process of value creation exert both unidirectional and bidirectional influences on one another. There are one-to-one, one-to-many, many-to-one, and many to many relations among millennials, and interrelations with brands.

For example, in a bidirectional, many-to-many relationship, millennials are in an interdependent relationship with brands. Millennials and brands can be the source of any interaction. Interaction can originate from the millennials and flow directly to the other millennials, or flow indirectly to the brands, and vice versa. Therefore, they can be the source of information (sender/proposer) and receiver (responder/reciprocator) synchronously or asynchronously.

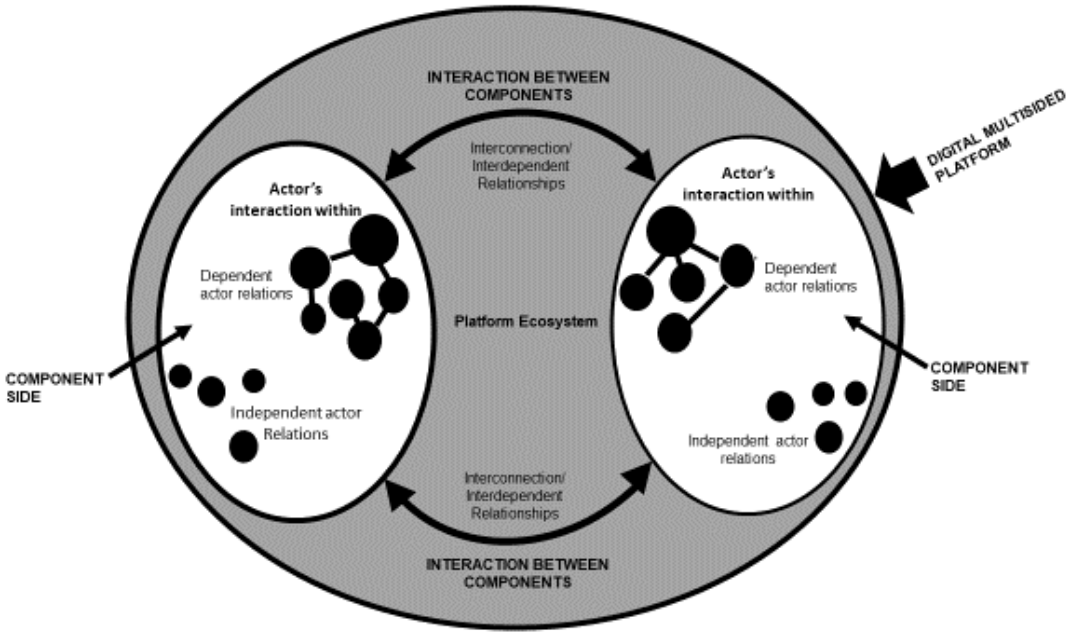

Figure 1: A Framework of millennial Interaction on Digital MSPs.

In the context of value creation, heterogeneous groups like millennials can create value on a one-to-one, one-to-many, many-to-one and many-to-many basis when associations are in one direction. On the other hand, when associations are in two directions, they can also create value on a one-to-one, one-to-many, many-to-one, and a concurrent many-to-many basis.

When the millennials form dependent relations, they either cooperate or rely on each other to create value. In this regard, the millennials are altogether engaged in a shared interest. Their joint efforts, cooperation and partnerships result in value co-creation.

When millennials are in independent relations, they are engaging in value creation by employing their talents, skills and ingenuity only in the value creation process. They are not relying on one another for this sole or self-help value creation effort. The sole-creation approach to value creation is an approach where the individual or agent seeking the means to create value undertakes the task alone without involving others. Thus, when millennials want to create content, they can either alone (sole or self-creation) or with other millennials (co-creation).

6 Findings

The framework posited in this study suggests a cyclical or non-linear value-interdependent relation between millennials and brands. A non-linear relation is a condition whereby a slight change on one side of the system can significantly impact the whole network, and vice versa. A high positive size effect of interdependent relations between millennials and brands instigates an enormous proportion of value creation. Consequently, there is an invariable feedback loop in the system, which benefits all key actors in this dynamic ecosystem. The activities, data, insights, and value resulting from the circular flow are plugged into the value creation process to create additional value for key actors.

The basic system architecture of digital MSPs automatically places value creation under the firm control of their owners. Also, since the power to control, coordinate and govern digital MSPs rests with the platform owners, it gives them an excessive edge over the appropriation and sharing of value by brand owners, unlike Arvidsson's prediction in his seminal piece 'The Logic of the Brand' (2014). Moreover, value flows from a centrally held source to interdependent consumers. Nevertheless, for satisfactory social relations to exist, the basis of value distribution must meet the basic requirements of demand for value. Therefore, the intermediating role of digital MSP owners is vitally important. They matchmake the commonalities of interests existing among interdependent consumers, and ensure that the demand for value matches the supply of value.

Holding the digital MSP owners constant, it is the commonalities of interest shared by the millennials and brands that bring them together. Both the millennials and the brands need each other and endeavour to create value independently with and interdependently across all sides of platform ecosystems. Dependence and independence capture the creation and co-creational activities within the components (sides) of digital MSPs.

However, interdependence encapsulates the logic behind the collaboration between the millennials and brands in the value creation process across the sides of digital MSPs. When the value is created or generated dependently/independently, value creation activities are co-created or sole-created and concentrated on one side. In contrast, when value is interdependently created, there is synergy, partnership and collaboration between the sides of the digital MSPs.

7 Conclusion

Interoperability determines the degree of interdependent relations. How interoperable the brand and the components of digital MSPs are, is a function of business interoperability and scalability. Value exchange is based on the choice, wants and needs of either the millennials or the brands. Value flows from both sides, and any side can be the source or receiver at any interactive moment. While the needs and wants of both millennials and brands are diverse, choices depend on the preferences of these key actors. Although the decision to create, exchange, or consume value resides with these key actors (millennials and the brands) in this dynamic social relation framework, there can be multiple ways of creating brands by complementors, suppliers (prosumers). These multiple equilibria, in most situations, make it difficult for users to differentiate brands in choice-making.

Finally, this framework has shown that bringing together complementary interests to form an ecosystem depends mainly on the degree of interoperability or compatibility enabled by digital MSPs. If the components of digital MSP are incompatible and inflexible, it indicates how difficult it will be to bring complementary interests together, or to realign divergent interests and inform an interdependent relation. The study also shows that a consumer is no longer a passive role player but a proactive and vibrant one who can, through self-help, create value, collaborate with others to create value, and who can consume the value created.

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Armed drones and international humanitarian law

Eric Blanco Niyitunga
School of Public Management, Governance and Public Policy
University of Johannesburg
ericn@uj.ac.za

Abstract

The militarisation of Artificial Intelligence Diplomacy has resulted in the development of heavy weapons that are more powerful than traditional weaponry, fail to distinguish between civilians and combatants, and cause unnecessary suffering. Superpowers and middle powers have made significant investments in digital technologies, resulting in the production of digital weapons that violate international humanitarian law and human rights standards, and complicate the achievement of global peace. Armed drones and militarised robots cause unnecessary pain and suffering to helpless civilians. These weapons have been used to combat terrorism, but, surprisingly, have not addressed issues of terrorism that affect post-Cold War international relations. As a result, the use of armed drones is causing more harm than is necessary to achieve the objective of war. There is a call for international artificial intelligence (AI) governance, as well as a need to understand the effects and serious threats that armed drones pose to international humanitarian law (IHL), as well as to peace processes in international relations and global cooperation. Scholars, policy-makers, human rights activists and peace practitioners should participate more actively in debates about the military application of AI diplomacy, in order to develop effective AI diplomacy rules and regulations. This serves to mitigate the risks and threats associated with armed drones on IHL and international human rights standards, which are the foundations of the post-modern world.

Keywords: 4IR, Artificial Intelligence diplomacy, Warfare, International relations, International humanitarian law, Armed Drones

1 Introduction

The digital age, or Fourth Industrial Revolution (4IR), has also ushered in the artificial intelligence (AI) revolution, with significant and growing impacts on the contemporary world. The rise of AI brings with it enormous opportunities, but also unpredictable and difficult-to-manage threats to peace processes. The Russian president, Vladimir Putin, has stated openly that whoever becomes the leader in this field will become the ruler of the world (RT News 2017). AI and its sister technologies (blockchain, big data, internet of things, and 3D technologies, among others) power 4IR in the conduct of modern international relations between states (Wan 2018). Digital technologies have been relentless in capturing people's attention, but we are still unsure about the full impact of AI diplomacy on the future of warfare and peace processes. Clancy (2016) submits that the conduct of armed conflicts in post-modern militaries has involved hybrid warfare, which combines traditional battle elements associated with non-state actors with digital weapons such as armed drones.

AI and its sister technologies have environmental, social, physical, political and security implications, worsening existing threats while introducing new threats and changing the character and nature of modern warfare (Mallick 2017). These changes include social engineering attack automation, vulnerability discovery, influence campaigns, terrorist repurposing of commercial AI systems, increased attack scale, and information availability manipulation (ibid). While contemporary technology is only the beginning of a promising future, many academics and AI practitioners believe that military technology will eventually lead to fully automated armed robots (ibid). The use of AI diplomacy in modern-day warfare has resulted in a significant shift from the 'human' role in warfare towards autonomous digital technology (Clancy 2016). The application of AI diplomacy in the field of military research, as well as the development of autonomous weaponry, has created new forms of uncertainty in respect of peace processes, thereby complicating the maintenance of international peace and security.

The use of automated, non-humanoid robots in warfare could jeopardise the protection of human rights. Scholars have maintained that while robots provide many benefits to humanity, their use in the form of military drones provides cause for serious public concern (Sharkey 2008), and many experts and robotic scientists are calling for them to be classified as killer robots and banned from military warfare altogether (Open Letter 2015, 2017). While the first and second revolutions in warfare were triggered by gunpowder and the development of nuclear weapons respectively (Altmann and Sauer 2017), robotic warfare has ushered in the third and most lethal revolution to date (Open Letter 2017). Robotic warfare poses a grim threat to the observance and implementation of International Humanitarian Law (IHL), and complicates the conduct of peace processes.

According to Ancelin (2016), the application of AI to military operations and weaponry endangers people's lives as well as international peace and security in general. If, one day, digital technologies come to decide the fate of human beings on their own, this will redefine the very nature of warfare as we know it. There are extensive debates in the literature about the use of lethal autonomous systems in warfare, with some scholars supporting it and others advancing opposing arguments (Larkin 2011; Tonkens 2012; Goodman 2014; Sterio 2012). All these debates demonstrate a high level of concern about the use of digital technologies and/or lethal autonomous weapon systems in warfare, necessitating the need for sound and binding rules and regulations in this regard. These autonomous weapons make use of armed drones, also known as Armed Unmanned Aerial Vehicles (AUAVs) and robotic warfare, necessitating laws and regulations to control their use and impacts during military engagement or warfare. In order for these regulations to be effective, ways of restricting their capacities should be considered. This will allow more efficient monitoring. Unlimited capacities for destruction are a cause for great concern, and weapons with such capacities may be difficult to contain once they have been automated.

However, rather than focusing on the laws that govern the use of autonomous weapons during warfare, the purpose of this study is to determine whether the use of these weapons in warfare violates existing laws on armed conflicts. This includes the principles of *jus in bello*, or 'the just conduct of war', namely the distinction between civilians and combatants; the prohibition against attacking those *hors de combat*; the prohibition against inflicting unnecessary suffering; the principle of necessity; and the principle of proportionality). This study does not assess the effects of armed drones on all these principles, but focuses instead on the prohibition of attacking those who are not armed and the use of excessive force; the need to distinguish between civilians and combatants; and the prohibition on inflicting

unnecessary suffering. While numerous studies have been conducted on the application of AI technology to military activity and warfare, fewer studies have been conducted to determine whether contemporary armed drones adhere to IHL and the laws of armed conflicts. As a result, the question that arises is whether the present use of armed drones accords with IHL, or the laws of armed conflict.

Therefore, this study seeks to answer the following research question: Does the use of armed drones conform to the laws of armed conflicts and IHL that require the protection of civilians or innocent people? Therefore, its purpose is to investigate the effects of the use of armed drones on the observance of IHL.

The study is divided into six sections. The first section provided an introduction. The second defines the key concepts that will be used in the course of this study. The third offers a brief explanation of the basic principles of IHL. The fourth describes the research methodology, including methods used for gathering and interpreting data. The fourth section contains a literature review on the use of armed drones in warfare, aimed at determining whether they involve perceived or real threats to humanity. This section also explains the types of armed drones used in modern warfare. The fifth section explains the effects of armed drones on the IHL. The sixth section consists of a conclusion and offers recommendations for regulating the use of armed drones during armed conflicts.

2 Definitions of terms

2.1 Peace process

Contemporary peace process also entails the use of digital technologies to either halt armed conflicts, or assist the combatants to reach a negotiated settlement. Because diplomacy can continue while warfare is ongoing, the peace process can also refer to the conduct of warfare using digital warfare technologies. Berridge and James (2003) define the peace process as 'a popular synonym for negotiation or diplomacy aimed at the resolution of a major conflict'. The concept of a 'peace process' has been applied to much longer and less promising negotiations, more in the hope of achieving peace than on the basis of genuine progress in that direction (ibid. However, while the concept of the 'peace process' is well-intended, its use is ill-advised because it may lead to a bogus belief that peace is being made or reached when it is not.

2.2 AI diplomacy

The notion of AI diplomacy combines two concepts, namely AI and diplomacy. Therefore, it implies diplomacy conducted or practised through the use of AI technologies. Diplomacy has a long history as a process of communication and negotiation during times of disagreement or tension. It has existed as long as political entities have competed with one another, and has been characterised by constant change. Put differently, the notion of diplomacy has been adapted to various political environments and situations while maintaining its significance (Neumann 2015). According to Kļaviņš (2021:124), 'old sites of diplomacy have assumed new characteristics, while new sites are physically and virtually emerging'. AI is transforming the concept of diplomacy and is causing fundamental shifts in both theory and practice, as well as the nature of inter-state competition (ibid. However, because AI provides governments with long-term competitive advantages, rivalry encourages states and other political actors to use diplomatic capabilities to achieve their objectives (Shapiro and Rakov 2020).

As AI-powered technologies reshuffle winners and losers in global markets, thereby affecting the balance of power, it is unsurprising that digital technologies are becoming a focal point for diplomats and diplomatic institutions in today's digital society (Kļaviņš 2021:124). According to Scott, Heumann and Lorenz (2018:7), these technologies intersect with conventional foreign policy issues in fundamental ways. At the highest level, there is the impact on the global power balance. The potential for AI to advance national economic and security interests has sparked fierce competition among governments to gain a strategic advantage; simply establishing a special office for AI will not suffice (Scott, Heumann & Lorenz 2018:7).

AI is a nebulous term, not least because its definition has evolved over time. According to Franke (2021:9-10), AI refers to 'efforts to build computers and machines capable of performing actions that one would expect to require human intelligence'. Weisgerber (2017) suggests that AI is any artificial system that can learn from experience and improve performance when exposed to datasets, or that can perform tasks under varying and unpredictable conditions without significant human oversight. Konerta and Balcerzak (2021:293) submit that AI is an artificial system 'designed to think or act like a human, including cognitive architectures and neural networks'. To that end, AI is designed to act rationally through the aid of an intelligent software agent or embodied robot that achieves goals through 'perception, planning, reasoning, learning, communicating, decision-making, and acting' (ibid).

According to Buchanan and Miller (2017), once something works, we no longer refer to it as AI but as software. Despite ongoing discussions about possible superintelligence, today's AI applications are narrow, in the sense that they have mastered a single task; and brittle, in the sense that they fail when confronted with tasks that differ slightly from its training (Buchanan and Miller 2017). Franke (2021:9-10), argues that Artificial General Intelligence (AGI), meant to be capable of reproducing human-level intelligence across various tasks, remains in the realm of science fiction, and considerable disagreement exists among experts about the possibility of AGI actually emerging, and when it will emerge (ibid).

While Clark (2019) refers to AI as 'omni-use' or general-purpose technology, Bai (2019) and Vincent (2018) argue that it can be used in a variety of ways, including assisting healthcare workers to interpret X-ray readings, making warehouses run more efficiently, enabling military systems, and supporting data analysis. Given the breadth of applications of AI, Franke (2021:10-11) posits that it is 'preferable to think of AI not as a single technology, but as an enabler' which fosters AI-enabled systems. AI is widely grouped with other emerging digital technologies such as 5G, quantum computing, biotechnology, cyber, blockchain, and many others. Franke contends that it would be difficult to keep these apart, as they 'interact and feed off each other'. 5G helps connect AI-enabled devices, quantum computing could make AI significantly more powerful, and AI could enable biotechnology research (ibid). Machine learning techniques, particularly deep learning and neural networks, are currently making the most significant advances in AI (ibid). For example, it has been argued that machine learning systems use computing power to execute algorithms that learn from data (Buchanan 2020).

2.3 International humanitarian law

IHL, also known as the law of armed conflicts, is a major component of public international law. It consists of laws and rules aimed at protecting people who are not or are no longer involved in armed conflicts, as well as limiting the methods and means of warfare used (ICRC 2002). According to the International Committee of the Red Cross (ICRC), IHL is an international treaty or set of customary rules ratified to resolve humanitarian issues arising directly from armed conflicts. Whether the nature of the conflict is international or non-

international, humanitarian laws are used to restrict the use of heavy lethal weapons, and protect people and property from the effects of warfare (ibid). In the case of open armed conflicts, humanitarian law is almost always more detailed and comprehensive than human rights law (ICJ Reports 1996:226). The International Court of Justice (ICJ) has stated that 'humanitarian law has evolved highly detailed and technical provisions to govern soldiers' and civilians' conduct in such situations, and it continues to be the primary body of law applicable in all situations of armed conflict' (ibid).

Humanitarian law requires all parties to an armed conflict to distinguish between civilians who are not fighting and combatants who are fighting, and to protect the property of civilians at all times. The ICRC (2002) has maintained that neither civilians nor individual property may be attacked during times of armed conflict. IHL does not end warfare; rather, it mandates combatants to follow the rules that protect civilians and their property. That is, any military attacks should not be directed at civilians, but rather at combatants. IHL maintains that any combatant who has ceased fighting and no longer participates in armed conflicts must be spared and protected. The ICRC also dictates that those special people who are not participating in the warfare must be protected with mercy and empathy, and must be treated with humanity without discrimination.

IHL further requires that if a combatant is injured or sick and no longer poses a threat, he or she must be protected, collected, and cared for by the party to the conflict that has control over them (ibid). Furthermore, the same law protects belligerents who have surrendered and are no longer involved in the armed conflict. The law also prohibits the use of sophisticated weapons and any other means that are likely to result in unneeded losses or excessive suffering. During an open armed conflict, medical personnel, establishments, transports, and equipment must also be protected from harm or attack (ibid).

3 The Basic Principles of IHL

The core principles of IHL are:

- The distinction between civilians and combatants;
- The prohibition against attacking those hors de combat (that is, those who are not directly engaged in or participating in hostilities);
- The prohibition against inflicting unnecessary suffering;
- The principle of necessity; and
- The principle of proportionality (ICRC 2004).

In terms of its objectives, underlying principles, and related challenges, IHL is both simple and complex. David (2002:921-922) explains:

> To put things as simply as possible, these rules can be summed up in four precepts: do not attack non-combatants, attack combatants only by legal means, treat persons in your power humanely, and protect the victims ... At the same time, the law of armed conflicts is complex since it does apply only in certain situations, those situations are not always easily definable in concrete terms and, depending on the situation, one and the same act can be lawful or unlawful, not merely unlawful but a criminal offence, or neither lawful nor unlawful.

In summary, the purpose of IHL is to:

- Minimise the suffering, loss, and damage caused by armed conflict to the greatest extent possible;
- protect people who are not directly involved in the conflict, such as the wounded, sick, and shipwrecked; people deprived of their liberty, such as prisoners of war (PW), retained personnel, internees and detainees; as well as civilians; and
- facilitate the restoration of peace.

However, IHL does not oblige or request combatants to stop fighting each other; or stop people from suffering during times of war.

The intentions of IHL are to permit armed conflicts, provided the combatants promise to adhere to the law of armed conflicts and allow humanitarian efforts to take place during the fighting with the aim of ensuring that the adverse effects of warfare are kept to a minimum. IHL protects those who have ceased fighting and those who are not engaged in combat, and manages conflicts by limiting the means and methods of warfare, as well as military tactics permissible (ICRC 2004). IHL forbids the use of any means or methods of warfare that:

- fail to distinguish between those who are fighting and those who are not, such as civilians, with the goal of protecting the civilian population, individual civilians, and civilian property;
- cause superfluous injury or unnecessary suffering; or
- cause severe or long-term damage to the environment (ibid).

IHL has banned the use of sophisticated weapons such as exploding bullets, chemical and biological weapons, blinding laser weapons and anti-personnel mines (ibid).

'Armed drone', 'combat drone', or 'AUAV' are terms that refer 'to a remotely operated unmanned aircraft or robot that is colloquially referred to as a "drone" and which is often used in modern day state-to-state warfare' (Meltzer 2013:7). The concept is made up of two terms, namely armed and drone. The term 'drone' is traditionally understood as the humming sound made by a male honeybee while flying. As a result of the similarity between the sound of a flying drone and that of a flying bee, the term 'drone' was coined to refer to AUAVs (Uddin 2020). According to Meltzer (ibid), a AUAV is an 'unmanned aircraft or ship guided by remote control or on-board computers'. It is a flying robot that can be controlled remotely or autonomously using software-controlled flight plans in their embedded systems in conjunction with on-board sensors and GPS. Unmanned aerial vehicles (UAVs) or drones are aircrafts that do not have a crew or passengers on board. They can either be automated drones or remotely piloted vehicles (Uddin 2020).

4 Methodology

Qualitative data was gathered and analysed in order to aid an understanding of the effects of armed drones on IHL. 'Qualitative research investigates how people make sense of their own concrete, real-life experiences in their own minds and in their own words' (Woodman 2014: 465). Qualitative research is a type of 'social action that focuses on how people interpret and make sense of their experiences in order to understand individuals' social realities' (Haradhan 2018:2). The paper's goal of understanding people's reactions to distressing situations, and

how they interpret their experiences in order to construct meaning, made qualitative research appropriate for this study (Brink 1993:37).

The paper seeks to comprehend people's perspectives and experiences, as well as how they interpret the world around them in order to construct the foundation of their interactions. Both analytical and exploratory approaches were employed, aimed at 'explaining how and why a specific social phenomenon or program operates as it does in a specific context' (Woodman 2014: 465), and to 'understand the social world in which people live, the experiences they have, and why things are done the way they are done' (Polkinghorne 2005:140).

This method allowed the study to describe and explore the effects of armed drones on IHL, international relations and global cooperation. It enabled the presentation of an in-depth analysis of the use of armed drones in modern warfare, as well as the effects of the use of digital technologies, particularly drones, in modern-day warfare. The effects of these digital technologies on IHL, as well as their impact on peace processes and the maintenance of international peace and security are also investigated. The methodology was also influenced by the anti-positivist ontological paradigm. The subjectivist epistemological approach adopted in this study aided in the analysis of AI diplomacy and peace processes, as well as the effects of armed drones on IHL in global politics. This provided an in-depth understanding of how modern warfare is conducted, the weapons used, and how armed drone weapons violate armed conflict laws, thereby posing serious threats to peace.

5 Literature Review

The end of the Cold War resulted in massive changes in the nature of wars as well as international relations. Warfare shifted from interstate to intrastate conflicts, as mostly third-world countries began to face deadly civil wars, also known as inter-communal conflicts. Furthermore, since 9/11, the world has witnessed the rise and spread of terrorism and terror groups in various regions, significantly altering the nature of wars. The shifts in international relations have also complicated the means by which armed conflicts are fought. International relations have featured the existence of internal conflicts as well as international conflicts involving more than two states. They have also been defined by the US-led 'war on terror', which has resulted in numerous conflicts that have become international in nature.

These developments have prompted the development and use of new and more sophisticated weapons, including digital weapons used from afar. The use of advanced technology in the conduct of armed conflicts and the fight against terrorist groups has shaped global stability, and has had a direct impact on peace and stability in third-world countries. AI is at the heart of advanced technology, and plays a vital role in the conduct of modern wars. It is important to recognise that AI is at the epicentre of modern-day wars against terror, and influences state-to-state relations.

That being said, the use of armed drones in warfare has sparked numerous international relations debates. These centre on whether armed drones or non-human objects used in warfare violate or follow the principles and laws of war as codified in the 1949 Geneva Conventions. AI has evolved into a tool of power politics and a component of state diplomacy, and it is increasingly being used by rich and powerful states to conduct international warfare. The militarisation of AI diplomacy has a massive impact on global politics and peace processes, particularly in the global South. Strategists and military advisers frequently assert that the

militarisation of AI is unstoppable (Kolton 2016). The application of AI to military activity is reshaping the character of international security (Brose 2019:128).

According to Buchanan (2020), the triad of data, talent (to develop algorithms), and computing power are vital inputs for AI. Technology has transformed economies and societies throughout history, redistributed (military) power among states, and empowered new actors (Franke 2021). It has been claimed that the militarisation of AI impacts on the conduct of wars and the global laws of war enshrined in the IHL conventions. AI is frequently grouped with other emerging technologies such as 5G, quantum computing, biotechnology, and cyber (ibid:13). It can be difficult to separate these technologies because they interact with and feed off of one another. 5G helps to connect AI-enabled devices, quantum computing could make AI significantly more powerful, and AI could enable biotechnology research, as well as cryptocurrency (ibid).

The application of AI in warfare extends far beyond gun-toting androids (Garcia 2019:3). Their use in warfare has surpassed human capabilities, 'unsettling all five domains of warfare (land, sea, air, outer space, and cyberspace), as well as multiple dimensions pertaining to command, control, communications, computers, intelligence, surveillance, and reconnaissance' (ibid). The United States has launched a drone strike against al-Qaeda and defended American troops from drone attacks in Afghanistan, Iraq, Israel, Yemen, Libya, Mali, Pakistan, the Philippines, Somalia, and Syria for example (Reisner 2019:69-70). The US has also conducted special operations raids against ISIS. If this is what not being at war looks like, it is difficult to imagine global peace in the modern world.

6 AI Diplomacy in Military Defence

AI militarisation has become a feature of military defence against external forces. It is reshaping military warfare, and today, military command and control are centred on digital technologies. It has been argued that the use of AI diplomacy in warfare aids in the linking and fusion of information from various sensors, resulting in a single source of information (US Congressional Research Service 2020). (Franke 2021: 24-25) also remarks that AI diplomacy in warfare enables the discovery of alternative means of disseminating information even when military communication links are severed It can also support joint military operations, particularly those involving multiple armed forces, such as NATO or EU operations in Libya. The Defense Advanced Research Projects Agency's Mosaic Warfare program (DARPA) is an example of this, as it coordinates autonomous forces and generates multi-domain command and control nodes, resulting in a mosaic battle plan (Hitchens 2021). During military warfare or military operations, AI diplomacy is presented as 'capable of providing commanders with a menu of possible courses of action based on real-time analysis of all available information, potentially improving the quality and speed of decision making' (Franke 2021:26; DARPA 2019).

According to the UNIDIR (2018), more intelligent machines are taking on more difficult tasks in more complex environments that humans cannot handle. Because digital devices are faster than humans at analysing data, making major decisions, and conducting warfare operations, the use of AI diplomacy allows militaries to explore their autonomy. AI diplomacy enables military autonomous drones to fly to specific locations, conduct operations, and kill without the assistance of a remote human operator (Konerta and Balcerzak 2022:293). Autonomy has been made possible by AI diplomacy, which has been 'particularly appealing for defensive systems, such as those that provide protection against rockets or missiles' (Franke 2021: 26).

It is argued that AI diplomacy in warfare provides 'unmanned systems with more autonomy can also help to make them stealthier, as autonomous systems do not need communications uplinks or downlinks to an operator, making them harder for enemy defences to detect' (ibid). Importantly, autonomous systems in warfare will generally reduce and/or eliminate militaries' reliance on humans. While the use of AI diplomacy in warfare can reduce human dependence, human error, and costs, as well as alleviate physical or cognitive strain on soldiers, it can also go beyond/out of technology control, wreaking havoc on the world. This argument is supported by Altmann and Sauer (2017), who argue that AI diplomacy used in warfare has advantages, but also carries deadly risks.

7 AI Diplomacy in Warfare

Armed drones have been used in warfare all over the world. It is estimated that nearly 100 countries use military drones (Karyoti 2021). They are equipped with the latest-generation cameras, provide accurate topographies, and are used in combat and rescue missions (Konerta and Tomasz 2021:294). Armed drones with AI technologies communicate with soldiers on a continuous basis and provide them with information about enemy movements (ibid). Azerbaijan used armed drones to gain a significant advantage over Armenia in recent fighting for control of the Nagorno-Karabakh region (ibid). In 2021, the Israeli Defence Forces allegedly used drones to drop tear gas on protesters in the occupied West Bank, while Hamas launched loitering munitions-carrying drones into Israel (Hernandez 2021).

Furthermore, Mizokami (2021) claimed that during the Second Libyan Civil War, Libyan forces used Turkish-made drones to track and jam retreating enemy forces, preventing them from using their own drones. The US in particular has extensively used drones to kill militants and destroy physical targets (Hernandez 2021). It is also stated that 'since the 1950s, the US Department of Defense has used drones in nearly every military operation to provide reconnaissance, surveillance, and intelligence for enemy forces' (Konerta and Tomasz 2021:294). As digital technology advances, many states continue to use AI to develop more sophisticated swarms of armed drones made possible by the Chinese Electronics Technology Group's swarm technology (Liu 2018:61-67). Drone swarms are being researched in the US (Konaev 2019), Russia (Bendett, 2021), India, and China (Trevithick 2020). Spain, Italy, and the United Kingdom, among others, are investigating swarms for their armed forces (Boguslavsky 2021). Swarm research was also supported by the EU's Horizon 2020 funding, specifically 'Roborder' – an 'autonomous border surveillance system with unmanned mobile robots including aerial, water surface, underwater, and ground vehicles, capable of functioning both as standalone and in swarms' (Franke 2021: 27).

It has been claimed that 'AI diplomacy is being integrated into nuclear weapons, such as AI-enabled nuclear defense automation or AI-enabled autonomous systems carrying nuclear weapons' (Lowther and McGiffin 2019). Because nuclear weapons pose such grave dangers, attempts have been made to integrate them with AI technologies. According to Favaro (2021), AI diplomacy has the potential to have an indirect impact on nuclear deterrence and the global nuclear order, and can also lead to disinformation, undermining trust and confidence in intelligence received by political leaders. Favaro goes on to argue that AI technologies can have an impact on military decision-makers because their intelligence-gathering methods are compromised, resulting in them striking blindly and putting the entire operation in jeopardy.

Moreover, there have been discussions about whether the use of AI technologies in warfare has the potential to undermine states' second-strike capability (Boulanin et al 2020). It is argued, for

example, that the use of AI technologies in warfare can make the oceans transparent through the use of sensors and AI-enabled data analysis, undermining maritime deterrence (ibid). As a result, coastal states may be rendered defenceless against external attacks. Similarly, applying AI technologies in warfare has the potential to improve defence against nuclear attack while also undermining the current nuclear deterrence system (Franke 2021:27). While the use of armed drones resulting from digital technologies may improve the international security architecture, it may also weaken its foundations, leading to a world of chaos in which robots have more value than humans. According to Boulanin et al (2020), applying AI diplomacy to warfare may increase surveillance, which in turn may help improve information availability. It will also improve early warning detective systems, lowering the risk of erroneous decisions (ibid). It may also improve and provide digital technology monitoring and verification of nuclear arms control regimes (ibid).

Hezbollah, for example, is said to have used UAVs equipped with explosives to attack Israeli targets in 2006, as well as to spy on Israeli nuclear facilities and probe Israeli defences (*The Independent* 2012). It is said to have a fleet of 200 unmanned aerial vehicles, or UAVs (YNet News 2013). Similarly, Iraqi insurgents are said to have planned to outfit UAVs with chemical weapons (BBC 2013). The Syrian regime has used Iranian UAVs to track insurgents in densely populated areas and to monitor targets (Zwijnenburg and Van Hoorn 2015).

8 Types of Armed Drones

Different types of armed drones are used in warfare. They include UAVs and unmanned robots.

8.1 Unmanned aerial vehicles

Meltzer (2013:7) states that the use of armed drones in military warfare can be traced back to World War II and beyond, 'becoming increasingly significant in the course of the second half of the 20th century'. The US Department of Defense (2011:21) reports that 'military drones were used primarily for aerial surveillance' and their functions gradually expanded to areas such as 'search and rescue, communications systems relay, suppression of hostile air defense, and direct attacks against selected targets'. Meltzer (2013:7) adds that the use of armed drones 'has increased since the Second Intifada in the Israeli-occupied areas (from the year 2000), continuing in the Second Gulf War (2003-2011)'.

The use of armed drones reached its peak in the course of the US combat with Al-Qaeda and 'affiliate groups in Afghanistan, Pakistan, Yemen and Somalia (from the year 2001)' (ibid). Melzer (2013:8) also notes that the 'usual and current use of armed drones is for the targeted killing of pre-identified individuals in the territories of other states'. The US Department of Defense (2011:22) reports that 'by 2012, the US disposed of some 7 000 drones flying roughly 20,000 sorties per year, with a total of 1 million armed hours achieved already in 2010'. Melzer estimates that, between 2004 and 2012, drones operated by the CIA 'carried out approximately 350 attacks in Pakistan alone, killing between 2 000 and 3 000 individuals' (2011:22).

While some states, such as Israel, the UK, Australia and Germany are already known to have conducted or contributed to armed drone attacks (Alston 2011:436), others including Russia, Turkey, China, India, Iran, and France, are reported either to have or to be seeking to 'acquire drones capable of being armed with laser-guided missiles' (ibid: 27). He asserts that drone technology has spread all over the world, has been obtained by many states, groups and

individuals, and is being used by non-state armed groups. For example, Hezbollah claimed responsibility 'for the launch of an Iranian manufactured Shahed-129 reconnaissance and armed drone' which was shot down by Israel after flying 25 miles into its territory (Melzer 2013:8).

8.2 Armed robot drones

Armed robot drones, also known as military robotics, have been used in warfare and are known to be deadly. Armed robot drones can be categorised as either ground, aerial, or maritime (Sapaty 2015).

Aerial robotics

A number of aerial robotics aircraft known as UAVs have been developed by the US Army, Air Force and Navy. These aerial robotics can be used for reconnaissance without endangering human pilots, and can also be used to carry missiles and other weapons of warfare (Lin, Bekey & Abney 2008). The aerial robotics aircraft that is best known is the semi-autonomous Predator Unmanned Combat Air Vehicles (UCAV)' built by General Atomics which can be equipped with Hellfire missiles (Sapaty 2015:10). Aerial robotics have served a number of roles in warfare such carrying weapons and participating in actual combat. According to Sapaty (ibid), the Northrop Grumman X-47B is an example of a UCAV designed for carrier-based operations. It has also been reported that 'it can fly as fast and has the ability to gather intelligence, conduct surveillance and reconnaissance, and launch combat strikes at an unprecedented speed' (ibid:11).

Land-based robots

Land-based robots have been applied to military warfare. They have been weaponised and used in various incidents of warfare in remote-controlled, semi-autonomous and full-automatic mode. The widely known, ground-based robotic weapons that are in use modern-day warfare are 'automatic weapons defence systems' (Melzer 2013:7). It has been held that these robotics are made to 'detect and intercept incoming missiles, artillery shells or mortar grenades, these systems must complete their detection, evaluation and response process within a matter of seconds, thus rendering any meaningful supervision by human operators impossible' (ibid). They have been used in the US and the Germany armed with machine guns, and the Israeli Iron Dome armed with interceptor missiles' (Human Rights Watch 2012:10-11).

The land-based robotic weapons used in warfare are called 'sentry robots'. Sentry robots have previously been used by South Korea along the demilitarised zone in 2010 (Weinberger 2012:13-15). Melzer states that those sentry robots came equipped with 'daylight and infrared cameras, heat and motion sensors, and pattern recognition software to spot humans up to a distance of 3 kilometres during the day and 1.5 kilometres during the night' (2013:8). For example, the SGR-1 associated with sentry robots is built with a microphone and speakers, 'so that it can ask and verify passwords from detected humans and, if necessary, sound an alarm' (Weinberger 2012:13-15). During combat, the SGR-1 sentry robot can fire rubber bullets or a 5.56 mm machine gun, and can be used in places with limited surveillance because it is 'equipped with an automatic mode that decides to fire its weapons against detected persons' (ibid).

Sentry robots can be used in border control to protect the state from any external threats that enter through its borders. For example, in guarding its borders along the Gaza Strip, 'Israel uses not only stationary sentry robots similar to the SGR-1, but also the Guardium' (Human Rights Watch 2012:15-16). The 'Guardium' is a remotely operated robotic vehicle which can be armed with lethal and non-lethal weapon systems (ibid). This robotic vehicle is designed to perform routine missions such as programmed patrols along border routes (ibid). However, it can also autonomously react to unscheduled events 'in line with a set of guidelines specifically programmed for the site characteristics and security doctrine' (ibid).

Maritime robots

Sea-based robots are generally known as Unmanned Maritime Systems (UMS). These can be either free-swimming or tethered to a surface vessel, submarine, or a larger robot (Berkowitz 2015). The US Department of Defense (2011:24-26) categorises them either as Unmanned Surface Vehicles (USVs) and/or Unmanned Underwater Vehicles (UUVs), and they are mainly used for mine detection and neutralisation. They are also used in submarine warfare (US Department of Defense 2011:24-26). The most widely used maritime weaponised robot is the Phalanx – an automatic weapons defence system. According to the US Department of Defense (2011:24-27), the Phalanx is designed to 'detect and neutralise hostile anti-ship missiles and fixed-wing aircraft through machine gun fire before they reach the defended ship … and is the only deployed, close-in weapons system capable of autonomously performing its own search, detect, evaluation, track, engage and kill assessment functions' It has the ability to counter 'asymmetric threats' such as speed boats, helicopters, and drones.

9 The Effects of Armed Drones on IHL

The operators of armed drones are far removed from terrains of warfare, and drones, which do not have any semblance of humanity, are unleashed into these terrains. These drones do not entertain the fear of getting injured or killed, nor do they have any understanding of the humanitarian laws and the principles that govern armed conflicts. As a result, inflicting harm to civilians and causing unnecessary suffering may be 'easy for them' (Caymaz and Demir 2017). Humanitarian laws 'limit the use of violence in armed conflicts to spare those who do not or who no longer directly participate in hostilities', while at the same time limit violence to the extent necessary to weaken the military potential of the enemy (UN 2011:14-15). These laws also limit violence and specify conditions that regulate the treatments of persons affected by armed conflicts, and attempt to strike a balance between humanity and military necessity (ibid:15). Quintana (2008) claims that the use of armed drones has resulted in an increase in ethical violations and causes grave human suffering. Finn and Wright (2012) also report that military drone strikes have resulted in an increase in loss of human lives and are unpopular with the public.

Scholars have argued that the use of armed drones in warfare has created numerous ethical challenges (Karppi, Böhlen & Granata 2016; Demir, Cicibas & Arica 2015). Moreover, as noted by the UN Special Rapporteur on extrajudicial, summary or arbitrary executions, the use of drones for intelligence, surveillance and reconnaissance, as well as for military strikes, has created tremendous legal and political challenges (UNHRC 2014). Pejic (2015) states that their use in military warfare conflicts with IHL, human rights law, and even the laws about state neutrality in war. Thus, these military drones pose real threats to the vitality of the

international legal framework. The use of AI technologies in military warfare has increased the manufacture of heavy and sophisticated weapons that are responsible for brazenly violating rules and principles of distinction between combatants and non-combatants. Although these weapons are vital in defending the state from external threats, they have not led to democratic governance to date. Despite this, it has been argued that the use of armed drones has the benefit of enabling military commanders to take more precise decisions (Meltzer 2013).

9.1 Armed drones and the prohibition of the use of force

The prohibition of the use of force is one of the rules of IHL and regulations for armed conflicts. Armed drones are being used in armed conflicts and in the war against terror. They have been used to carry out a range of warfare missions that have included targeted killings. Quintana (2008) posits that their use, particularly for targeted killings outside areas of combat, terrains or battlefields, have conflicted with the IHL rules and the international human rights standards. This means that the use of armed drones violate the IHL rules and other international human rights principles that are established to enable peace processes and ensure global peace and security. The UN Charter prohibits the 'threat or use of force against the territorial integrity or political independence of any state, or in any other manner inconsistent with the Purposes of the United Nations' (UN Charter 1945). The main aim of this prohibition is to protect state sovereignty (General Assembly resolution 3314, 194: XXIX), and to preserve and maintain the 'right not to be subject to coercion by any other sovereign state' (Corten 2010:169).

This prohibition is globally accepted as a norm of customary international law. Moreover, the concept of force in this study means armed force, and does not include political or economic coercion. Ruys (2014:167) notes that 'armed force may take various forms including incursions of military forces into another state's territory, or even cross-border shooting into foreign territory, regardless of whether armed confrontation results, and even if troops withdraw immediately' (ibid). General Assembly resolution 2625 (1970: XXV) and the ICJ Report (1986: para.228) add that:

> … the prohibition of use of force includes indirect force which is typically manifested by a State's participation in organised armed groups' or allied States' use of force on another State's territory, such as arming and training armed groups that actually use or threaten force against that State.

Furthermore, in the event that a state permits another state to use its territory to host armed drones, in order to commit acts of force against another state and control that state's infrastructure, this amounts to an indirect use of force (Schmitt and Wall 2014). Similarly, the use of force lowers the threshold for waging conflict and the use of armed UAVs provides incentives for other types of attacks, 'with negative effects both for civilian protection and for constraining the extent of a conflict' (UN 2015:43). The application of AI diplomacy to military fields has ignited the development of heavy weapons that has brought about strong incentives for armed forces to apply force beyond what is required by the IHL regulations.

The operators of armed drones have sought the legal reinterpretation of previous legal understandings to justify attacks under broader circumstances (UN 2015:44). Attacks by armed drones raise various issues, including discrimination and proportionality during warfare. Many armed drone attacks have reportedly been carried out with the permission of the state on whose territory the attack occurs. Such states, however, were barred from waiving

the targeted person's right to life (ibid:45). This was true in Somalia, Libya, and Pakistan. As a result, these armed drones operate without the full permission of states, constituting a violation of IHL and international human rights standards.

9.2 Armed drones and the distinction between civilians and combatants

The principle of distinction between civilians and combatants is the backbone and cardinal rule of the IHL (Corn 2012:437). This principle is highlighted in Article 51(2) of the First Additional Protocol (API), which provides that 'the civilian population as such, as well as individual civilians, shall not be the object of attack'. According to Henckaerts and Doswald-Beck (2009), this rule must be applied in all types of armed conflicts and warfare. Attacks by armed drones in Pakistan, Yemen, and Somalia are examples of 'wars on terror', a major issue that has emerged in the context of non-international armed conflict. The challenge now is to recognise and identify who is considered a legal target for lethal strikes. It is also difficult to determine which person is a member of an organised armed group located on the territory of a non-belligerent state in cases of non-international armed conflicts. It is also difficult to determine who moves into such territory after taking direct part in an ongoing conflict. The International Committee of the Red Cross (ICRC:2014) postulates that in the above situations, a person should not be considered a lawful target.

The IHL rules state that 'the Parties to the conflict shall at all times distinguish between the civilian population and combatants, and between civilian objects and military objectives' during armed conflicts or hostilities (Articles 48 and 51(2) of Protocol I; ICRC, *Customary Humanitarian Law*, Rule 1). The parties must also limit their military operations to 'military objectives' only, and the civilian population as a whole, as well as individual civilians, should not be targets of attack' (Articles 48 and 51(2) of Protocol I; ICRC, *Customary Humanitarian Law*, Rule 1).

This implies that the use of armed drones in warfare must be capable of distinguishing between innocent civilians who are not participating in the warfare and members of armed forces or/organised armed groups who are participating in the warfare. According to the Protocol, civilians may lose their legitimate protection only if they are involved in warfare. However, in cases of asymmetric confrontations with organised armed groups that shield themselves from civilians in the community, this is difficult to know and determine. This has been the case in Somalia where armed groups, responsible for terror attacks, take refuge among civilians. The use of armed drones, however, makes no distinction between who is a civilian and who is not, demonstrating a complete lack of consideration for this distinction in IHL (Melzer 2013).

This has also been the case with the US policy of 'signature strikes,' namely drone attacks against unidentified individuals suspected of being 'terrorists,' 'militants,' or 'jihadists' based on their personal behaviour, contacts, or other characteristics – legally undefined notions that are strictly irrelevant for lawful targeting (Heller 2013). According to Melzer (2013), this policy undermines the principle of distinction between innocent civilians and combatants enshrined in IHL rules, and fails to adhere to the precautions and presumptions that must be used in doubtful situations. Even when used from afar, the ability of drones to distinguish between civilians and combatants cannot be adequately controlled or assessed (ibid:7).

It has also been argued that armed robots, for example, do not need to protect themselves when the target is unclear or indistinguishable from innocent civilians (Konerta and Tomasz 2021). Armed robots, as autonomous weapon systems, are free of human emotions that drive

them to commit war crimes (ibid). It is also argued that autonomous weapons systems are incapable of distinguishing between combatants and non-combatants, whereas this is not difficult for humans to do (ibid:295), and thus violate the laws of armed conflicts. Similarly, Arkin (2020) argues that the use of digital technologies in warfare, such as autonomous UAVs, has made it difficult to distinguish between innocent civilians and combatants. Humans on the battlefield, on the other hand, can act within the ethical boundaries of war as defined by IHL (ibid). As a result, having fully autonomous weapon systems is risky, at least at the current level of AI technologies (Konerta and Tomasz 2021:296). Because of the current limitations of computer technology, the military would be foolhardy to implement fully autonomous weapon systems (ibid).

Iran has developed armed drones and supplies them to other states such as Hezbollah and Hamas, Sudan, and Syria (*The Guardian* 2013). For example, the Syrian regime has used armed drones to locate insurgents in densely populated areas and to monitor targets (CNN 2012). It is reported that the use of armed drones resulted in the deaths of many innocent civilians during these operations (ibid). Sudan has likely used the armed drones acquired from Iran to target innocent civilians in villages in Darfur and Kurdufan (Dorrie 2014). Furthermore, it is argued that 'the precision and discrimination narrative in the use of armed drones is largely a myth', and the diminishing distinction between civilians and combatants in 'current complex conflict situations actually increases the potential for civilian casualties' (Zwijnenburg and Van Hoorn 2015:16). Armed drones have repeatedly failed to distinguish between civilians and combatants, resulting in the deaths of several local people, tribesmen, and rescue workers, as well as injuries in follow-up strikes (Woods 2012).

9.3 Armed drones and the prohibition on inflicting unnecessary suffering

The use of armed drones in modern warfare causes unnecessary suffering to innocent civilians such as mental health, disorders, and anxiety, which is prohibited by IHL rules. The International Court of Justice (1996:238) defined unnecessary suffering as 'harm greater than that which is unavoidable in order to achieve legitimate military objectives'. Since 2014, the UN has been discussing a ban on armed drones and/or lethal autonomous weapons in warfare, with limited success (Sauer 2020). Armed drones have caused many deaths in Pakistan, and people continue to die helplessly because no one will come near them for fear of being victim to yet another air drone strike (Woods 2012a). It has been claimed that those who came to the aid of the injured and children were targeted by a second and subsequent drone strikes (ibid). According to a father of four children who lost one of his legs in a drone strike, many people are scared of drone attacks and refrain from offering assistance because they are afraid of being hit by another drone strike (Woods 2012b). As a result, they die painful deaths.

The suffering is exacerbated by the fact that there is a policy not to respond immediately to a reported drone strike due to follow-up strikes, and that six hours must pass before running to rescue the wounded or injured (Roggio 2009). It is also alleged that no medical personnel are permitted even after six hours have passed, and that only the locals, the poor, must pick up the bodies of loved ones (ibid). This means that even health professionals, including those from the Red Cross, fear for their lives and are not permitted to rush to the injured in order to provide first aid and possibly save lives. As a result, the effects of these drone attacks raise serious moral and legal concerns, constituting a violation of IHL. Armed drones then violate the law of armed conflict because they do not spare the lives of humanitarian personnel or the injured, let alone those of civilians (Henckaerts and Doswald-Beck 2006). Serle (2012)

contends that intentionally using armed drones in warfare violates IHL, and ultimately constitutes a war crime.

Armed drones that kill civilians inflict unnecessary suffering on survivors in times of need and saddle them with the responsibility to support incapacitated people who are no longer able to work to support their families. This is because armed drones generally deprive victims' families of key sources of income (Roggio 2009). Their families go through many struggles and sufferings to compensate for the lost income, often forcing children or other younger relatives to drop out of school in order to look for work at a young age (ibid). Living under drones has been likened to experiencing 'hell on Earth' and causes people to live in constant fear for their lives and safety (Rohde 2022). According to the International Human Rights and Conflict Resolution Clinic, or IHRCRC (2012:79), the constant presence of US drones overhead causes significant levels of fear and stress in civilian communities. Armed drones used in warfare have been described as a 'wave of terror' sweeping through the community. Children, adults, and women are terrified because no one knows when the next armed drone will strike. This situation causes anyone who lives in a state where armed drones are in use to live in constant terror (ibid: 81). The terror and fear drones instil in people will, for the most part, initiate trauma and mental health issues, posing threats to human security and well-being.

According to Minas (2014), mental health has remained a major public health issue, resulting in insecurity in many communities. Melzer (2013) captures this sentiment by arguing that people are scared because they do not know when the next strike will be, and when they hear it sounding in the sky, it is difficult to know where it ends, so they live in constant fear for their lives. It is also reported that armed drone victims suffer from mental disorders, anticipatory anxiety, and post-traumatic stress disorder as a result of their constant fear of drone strikes (IHRCRC 2012:82). This has resulted in emotional breakdowns, fleeing indoors, or hiding when drones appear above. Others report having experienced fainting, having nightmares and other intrusive thoughts, hypersensitive reactions to loud noises, outbursts of anger or irritability as a result of trauma caused by exposure to drone attacks (ibid).

10 Conclusion and Recommendations

The study has examined AI diplomacy and peace processes, focusing on the effects of armed drones on IHL. It has found that armed drones have far-reaching effects on the observance of IHL and pose threats to global peace, complicating global order in the post-Cold War era of international relations. The application of AI diplomacy to military warfare has caused significant pain to innocent civilians, and poses grave environmental threats. Armed drones fail to distinguish between innocent civilians and combatants, cause and trigger mental health and other disorders in people, and cause human insecurity. If traditional weaponry such as serrated-edge bayonets, bullets, poison and poisoned weapons such as projectiles smeared with substances that inflame wounds, biological and chemical weapons, and others used by humans on battlefields are taken to inflict unnecessary suffering on innocent civilians, the more so armed drones and militarised robots that are insensitive to the presence of humans on battlefields.

The 1949 Geneva Conventions, which established IHL rules to govern armed conflicts and were accepted by almost every UN member state, should be upheld and adhered to. The challenge is how to control armed drones or armed robots used in warfare while adhering to IHL principles. This study has found that armed drones and militarised robots inflict unnecessary pain and suffering on civilians, and that despite being used to combat terrorism,

they have not been very successful. Despite the use of armed drones and armed robots, terrorism and terror attacks remain a problem in the post-Cold War era. There is a need for an international call for AI governance, as well as an understanding of the effects and serious threats that armed drones pose to IHL and thus to peace processes in international relations and cooperation among world states.

States should evaluate new or modified weapons to ensure that they do not violate IHL, and should survey digital weapons early in the manufacturing process. Given how the digital revolution is reshaping the world, the application of AI diplomacy to military operations should be approached with greater caution in terms of its effects on IHL and the threats armed drones pose to international peace and security. This study points to the need for more engagement from scholars, policy-makers, human rights activists, and peace practitioners in the ongoing debates about AI diplomacy, aimed at developing effective rules and regulations. These rules should serve to mitigate the risks and threats associated with armed drones on IHL and international human rights standards, which are the foundations of the post-modern world.

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The use of social media by three political parties during South Africa's 2014 general election

Samuel Umoh Uwem
Department of International Affairs & Public Cluster
University of KwaZulu–Natal Howard College Campus, Durban, South Africa
samumo800@gmail.com

Abstract

Since the first democratic election in South Africa in 1994, electoral campaigns have changed significantly, largely due to social media, which now play a vital role in influencing voters throughout the world. This study examines the social media campaigns of three major South African political parties, namely the African National Congress (ANC), the Democratic Alliance (DA) and the Economic Freedom Fighters (EFF), prior to the 2014 general election. Data comprised interviews with members of Parliament (MPs) of all three parties, and an analysis of their Facebook pages, Twitter feeds and YouTube channels. The study finds that, while all three parties made active use of social media, the full potential of this form of communication was not exploited, as they continued to disseminate traditional political messages instead of interacting actively with voters.

1. Background

South Africa is a constitutional democracy, with a five-year electoral cycle. Among others, politicians campaign via social media platforms. Election campaigns comprise the efforts of politicians and political parties to influence and gain the support of voters prior to elections. Given the digital revolution, social media play a growing role in political campaigns and political communication (David 2022, John 2018).

Social media are computer-mediated interactive technologies that encourage the creating or sharing of information, ideas, and other forms of communication (David 2022: 10). Social media comprise resources such as online blogs, audio/video tools (YouTube), internet chat rooms, cellular and computer messaging, and social networking sites (Suleiman 2019, Chepkemoi, Situma and Murung 2018, Sharive 2018, Oyetunde, 2017). Social media are also taken to include all technologies that promote social interaction, collaboration, discussion and debates (Fatimayin 2018; Chepkemoi, Situma and Murung 2018). Social media such as Facebook, YouTube, Twitter, WhatsApp, LinkedIn, Myspace YouTube, Pinterest, Google+, Tumblr, and Instagram are prevalent in contemporary society, including politics (Ngonso 2019; Adeniji and Anyanwu 2019; Talatu and Murja 2018).

Social media usage is growing because of the information revolution (Johnson 2021). Social media also change the way in which people communicate and share knowledge (Oubibi et al 2018; Farjana, Priyanka and Dipti 2020; Fatimayin 2018, Oyetunde 2017). Globally, 3.6 billion people use social media, up from 3.4 billion in 2019 (Johnson 2021), and they are projected to grow to 4.41 billion in 2025 (Johnson 2022). Today, social media influence nearly every aspect of social life, including politics. They enable politicians to communicate with

unlimited audiences of potential voters (Yolisa and Osunkunle 2017:149). Citizens also use social media to access political information, stay up to date on current political events, and participate in the political process (Yang and DeHart 2016). Social media amplify the political campaigns and messages of political candidates (Duncan 2014,153). Social media can also be used by political parties to present their agenda to voters, and mobilise a larger support base. Given the availability of free blog and video sharing platforms and social media, the cost of communicating with voters through social media is significantly lower than through broadcast media.

Social media amplify the political campaigns and messages of political candidates (Duncan 2014: 153). The value of social media campaigns was apparent in America's 2008 presidential election when Barack Obama's campaign team widely employed Facebook, MySpace and YouTube, together with other social media such as podcasting and mobile messaging. In what was termed the 'Facebook election', Obama won nearly 70 per cent of the vote among Americans aged 18-25. His Facebook and Twitter followers increased daily, and were also able to share their views and send messages to one another (Lauren 2013).

By 2011, Obama's Twitter account, @BarackObama, which he used to promote legislation and garner support for his policies, was the third most followed in the world (Lauren 2013). In Europe, Twitter is widely used during EU elections, which are regarded as 'second order' elections to national elections (Daniel, Obholzer and Hurka 2019, William and Lukas 2020). Social media such as Twitter expand the possibilities for individual-centred campaigning by broadcasting positions, creating and sharing content, and increasing voter turnout outside political party gatekeeping (William and Lukas 2020; Braun and Schwarzbözl 2019). Twitter provides a preliminary online electoral connection with voters, leading to more organic forms of two-way interactions (Kessel and Castelein 2016; Ridge-Newman and Mitchell 2016).

Social media enable four emergent campaign techniques: voters micro targeting, personalisation, interactivity, and sustained engagement (Yolisa and Oluyinka 2017: 152). Voter micro targeting allows campaigners to target specific people in respect of specific issues, thereby appealing to different voters in different ways. Social media also allow the personalisation of politics, accompanied by its depoliticisation. Candidates use niche media such as biographies and comedy talk shows to promote information about their personalities. This fosters a bond between voters and candidates, increasing political support and participation (Yolisa and Oluyinka 2017: 152). Interactivity involves voters communicating directly with campaigns, and fosters a sense of community. Sustained engagement occurs when candidates maintain contact with their supporters or party members through social networking sites (Yolisa and Oluyinka 2017, 152). This allows politicians to remain in contact with supporters both during and between elections.

Social media played a vital role in South Africa's fifth general electionin 2014. Popular social media were Twitter, Facebook, YouTube and Mxit (Lauren 2013). Mxit (pronounced 'mix it') was a free instant messaging application that ran on more than 8 000 devices, including feature phones, Symbian S60, Android, BlackBerry, iPhone, iPad, Windows Phone, and tablets (Atagana 2011). Social media are particularly attractive to younger voters. In July 2013, Mxit had 7.4 million monthly subscribers, including 6.3 million South Africans (Atagana 2011). At the time of the election, 88 per cent of young people (in the 15-34 age group) in South Africa were living in homes with access to a cellular phone (Lauren 2013). In 2014, there were 11.8 million Facebook users in South Africa, with 9.2 million accessing Facebook by mobile phone (BusinessTech 2014).

2. South African general elections

Elections allow citizens in democratic countries to cast their votes for candidates of their choice. In South Africa, general elections are held every five years. The Constitution of South Africa (1996) provides for three branches of government, namely the executive, the legislature and the judiciary. It recognises the doctrine of the separation of powers by providing a range of mechanisms designed to distribute power among the different spheres and levels of government, and introducing various institutional checks and balances to prevent the abuse of state power.

The separation of powers originates from Principle 5 of the Interim Constitution of 1993, which stated that 'there shall be a separation of powers between the legislature, executive and judiciary with appropriate checks and balances to ensure accountability, responsiveness and openness Thus, the final Constitution adopted in 1996 had to give effect to this principle. It empowers parliament, and prescribes the duties of MPs, including oversight, formulating legislation, and holding the executive to account.

South Africa operates a parliamentary system of government. The National Assembly consists of 400 members elected by proportional representation, with a closed list approach. Two hundred members are elected from national party lists; the other 200 are elected from provincial party lists in each of the nine provinces. The fifth general election in South Africa was held on 7 May 2014 to elect MPs to the National Assembly and the nine provincial legislatures (News24: 2014). The South African Electoral Commission (IEC) registered more than 150 political parties that contested the national and provincial elections. The 2014 election was also the first time South African citizens were allowed to vote outside the country (Baksh 2014).

The IEC launched a social media campaign to encourage young people to register and vote. Social media platforms like Facebook, Twitter, and Mxit were utilised to address enquiries from young voters (Lauren 2013). The IEC's Facebook page received over 60 000 'likes' and followers in advance of the voter registration drive.

The South African parliament and provincial legislatures are established in terms of the 1996 Constitution. The legislature functions autonomously and co-operatively within the framework provided by the Constitution. The Constitution also provides for a bicameral parliament comprising the National Assembly (NA) and the National Council of Provinces (NCOP), set up in 1996 to replace the Senate that existed under the interim constitution from 1994 to 1996. The National Assembly is the House directly elected by voters, while the NCOP is elected by the provinces and represents them to ensure that provincial interests are considered in the national sphere of government.

This study will examine the social media campaign strategies of three political parties, namely the African National Congress (ANC), Democratic Alliance (DA) and Economic Freedom Fighters (EFF). The EFF, led by the former ANC Youth League leader Julius Malema, recognised the significance of social media in electoral campaigning. The EFF received 56 396 Facebook 'likes', compared with the ANC's 54 315 and the DA's 41 812.

Surprisingly, the picture on Twitter was quite different. The ANC had 81 368 followers, followed by the DA (@DA News) with 44 602, and the EFF (@EconFreedomZA) with 28 198 (Lauren 2013). The next section examines the social media strategies utilised by these three

parties. The MPs who were eventually elected comprised 249 ANC MPs, 89 DA MPs and 25 EFF MPs (IEC 2014).

3. The ANC's social media strategy

The ANC was founded on 8 January 1912 as the South African Native Congress, whose name was changed in 1923 (Inman and Rubinfeld 2013; Butler 2011; Francis 2011; Lodge and Ursula 2006). The party was formed by political figures such as John Dube, Pixley ka Isaka Seme, Sol Plaatje, and other prominent members of the chieftaincy. Its goal was to eradicate apartheid in all its manifestations and to create a united, democratic and non-racial country. Following increasingly militant protest action, it was banned in 1960, and went into exile. In the years of growing political conflict up to the early 1990s, its members were in prison, in exile, active in the Mass Democratic Movement, and also in some Patriotic Front organisations.

According to an ANC respondent, the ANC's ideology is strongly influenced by socialism, Marxism and Leninism (ANC MP 2, personal interview). In terms of Marxist ideology, Marxism-Leninism is the primary force organising society into a socialist state, a giant leap toward an egalitarian society (Terence, Dagger, and O'Neill 2014). The ANC's 'political mansion has many ideological rooms' and is therefore an ideological hybrid, implying that it has a 'broad church' ideology (Booysen 2012).

Before the 2014 election, its then spokesperson, Jackson Mthembu, stated that the party 'appreciates the significance of social media on domestic and international affairs, as well as its relevance as a platform or voice to all/for all South Africans'. He also stated that the party would use social media to engage in a discussion of vital political issues, and to allow ordinary South Africans to communicate directly with the party. During the campaign, the ANC's Twitter followers rose to more than 120 000 (@MyANC). The ANC issued more than 11 100 tweets, and also followed 6 570 accounts. Its active use of social media was illustrated when it provided free Wi Fi at its #Siyanqoba rally in the FNB Stadium in Johannesburg. As a result, its Facebook and Twitter support bases grew significantly during the weekend prior to election day.

4. The DA's social media strategy

The DA's philosophy is underpinned by liberalism, a political philosophy or world view founded on ideas of liberty and equality of opportunity. According to a DA respondent, the party's ideology is underpinned by liberalism (Personal Interview, DA MP 3). Liberalism is a political philosophy or world view founded on ideas of liberty and equality (Kanazawa 2010, Dunn 1993). The operationalisation of the concept of liberalism is attributed to John Locke who believed that each person has a natural right to life, liberty and property, and that governments should not violate these rights based on the social contract (Terence, Dagger & O'Neill 2014). According to Kanazawa (2010:38), liberalism comprises a genuine concern for the welfare of genetically unrelated others and a willingness to contribute large proportions of private resources for the welfare of such others.

Liberals typically support ideas and programmes such as freedom of speech, freedom of the press, freedom of religion, free markets, civil rights, democratic societies, secular governments, gender equality and international cooperation (Huntington 2002). Another DA

respondent stated: 'I am a liberal thinker and a member of the liberal school... I believe in freedom of speech ...'

The modern-day DA emerged from white parliamentary opposition to the ruling National Party. The party's origins can be traced back to the mid-1950s when some younger members of the United Party felt they were not providing strong enough opposition to the National Party and its apartheid policy, prompting them to break away and form the Progressive Party in 1959. For a period of 13 years, the party was represented by a sole MP. From 1974 onwards, the party experienced a resurgence of white voter support. It also absorbed breakaways from the disintegrating United Party, becoming the Progressive Reform Party and Progressive Federal Party in the process. After the 1987 elections, the PFP merged with the IP and NDM to form the Democratic Party (DP), which became the official opposition after the 1999 general election. In 2000, the New National Party (NNP) and Federal Alliance joined the DP to form the Democratic Alliance (Umoh 2021). While the NNP later broke away, the DP remained the official opposition.

During the 2014 election campaign, the DA (@DA News) had 77 300 twitter followers, tweeted 26 900 times, and followed 26 100 accounts (BusinessTech 2014). It also had the strongest and most effective presence on Facebook. Following an initial ban by the South African Broadcasting Corporation (SABC), it also launched a powerful YouTube campaign, with its #Ayisafani commercial garnering more than 700 000 views. This advertisement depicted Mmusi Maimane, the DA's spokesperson and candidate for the Gauteng premiership, standing in front of a mirror discussing the state of the country. The caption encouraged supporters to 'Help the DA fight corruption, eTolls, and Nkandla' and provided a donation link.

The DA also used Twitter and Facebook to share images of alleged election transgressions, such as reports of their posters being removed and replaced with ANC posters. South Africans also shared their political views on personal social networks.

5. The EFF's social media strategy

The EFF's ideology is underpinned by the principle of economic emancipation. The party had its origins when Julius Malema and Floyd Shivambu met with politically like-minded individuals in Soweto in July 2013 (Robinson 2014, Horwitz 2016). Malema, Sindiso Magaqand and Shivambu eventually founded the EFF on 17 August 2013. In the 2014 election, the party managed to garner 1 169 259 votes, amounting to a 6.35 per cent share. Its 25 seats made it the third largest party in the South African Parliament (Umoh 2021).

Julius Malema, the EFF's leader, served as president of the ANC Youth League from April 2008 to April 2012, when he was expelled after being found guilty of sowing divisions within the party.

According to EFF respondents, its ideology is inspired by the broader Marxist-Leninist tradition and Franconian schools of thought (personal interviews, EFF MP1 and MP4). Another respondent stated that Malema was driven by his 'strong Marxist beliefs', which informed the party and its programme. Therefore, the EFF has a broadly anti-capitalist foundation, informed by Marxism-Leninism. Its slogan is 'Economic freedom in our lifetime'.

Malema and the EFF make vigorous use of social media. During the 2014 election campaign, Malema (@Julius S Malema), the EFF commander-in-chief, had 447,000 followers, released 6

600 tweets, and followed 169 other accounts (BusinessTech 2014). The EFF had 83 900 likes on Facebook, against the DA's 97 500, the ANC's 28 600 and MyANC's 141 000.

These figures show that their online followers grew significantly. However, their messages were restricted to traditional political messages, such as political leaders' addresses, public meetings, and political slogans. Duncan (2014:153) notes that parties contesting the 2014 election made poor use of social media by broadcasting existing political messages rather than interacting with potential supporters. Therefore, he concludes that they did not use social media effectively as they merely carried their analog strategies to their digital strategies (Duncan 2014: 153).

6. Conclusion

This paper has discussed the use of social media by the three major parties contesting the South African general election in 2014. Worldwide, social media have become a powerful political tool which is widely used by political parties to influence voters prior to elections. Given their relative ease of use, social media are particularly useful for smaller political parties as well as independent candidates. Social media provide a rational public sphere for politicians to communicate directly with voters. Voters can easily participate in political debate, influence political decisions, and have their voices heard, whereas politicians can share their manifestos.

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Preparing African youths for the future of work

The case of Rwanda

Adio-Adet Tichafara Dinika
Bremen International Graduate School of Social Sciences (BIGSSS)
Centre for Labour and Politics (ZAP) University of Bremen (Germany)
adinika@uni-bremen.de

Abstract

This study explores the far-reaching changes in the world of work due to the emergence of the digital economy against a background of rising income inequality, concerns about job losses and high levels of unemployment, particularly in Sub-Saharan Africa,

More specifically, it explores the issue of how African governments and other stakeholders are preparing young people for the future of work. It comprises a case study of Rwanda. Data was collected from documents and in-depth semi-structured interviews, and analysed with MaxQDA. Rwanda has sought to become a knowledge economy, and has therefore developed a comprehensive policy framework and several programmes for equipping young people with digital skills. There are also more than 20 incubators and hubs fostering digital start-ups in Kigali. Several international organisations have started training programmes in support of the Rwandan government's vision.

The study finds that digitalisation could help to resolve sub-Saharan Africa's employment problems through freelancing, labour outsourcing, and start-ups. However, there is a need for deliberate policies and programmes to prepare young people for the future of work. Rwanda is doing well in this regard, and other SSA countries should evaluate its model.

Keywords: Digitalisation, Gig Economy, Future of Work, Youth, Sub-Saharan Africa, Rwanda, Qualitative analysis, Government.

1 Introduction

The world of work is changing rapidly -- digitalisation, globalisation, and demographic changes are profoundly affecting the labour markets and the well-being of individuals, families, and societies across the globe, but with varying impacts in different regions. Headline-grabbing assessments of the Future of Work oscillate between optimism and pessimism. That digitalisation is already having a far-reaching effect on labour markets is beyond question. Given the bulging youth population in Sub-Saharan Africa (SSA), it stands to reason that the youth labour markets are affected most by these technological advancements, and that this is where governments and other stakeholders should focus their attention.

More than 60 per cent of SSA's population is below the age of 25 (UN 2019; Rocca and Schultes 2020; Kariba 2020), and experts estimate that by 2030 this region will be home to more than a quarter of the world's population under 35 (UN 2015). All those people will need

jobs. According to Altenburg et al (2018), in order to accommodate labour market entrants, SSA will need to create 18 million jobs every year until 2035. Abdychev et al (2018) also posit that the working age population in SSA will increase by 20 million a year for the next 20 years. The central question is: how to create jobs for all those people?

In his preface to the 2018 World Economic Forum (WEF) report, Klaus Schwab, WEF founder and executive chairman, wrote:

> The emerging contours of the new world of work in the Fourth Industrial Revolution are rapidly becoming a lived reality for millions of workers and companies worldwide. The inherent opportunities for economic prosperity, societal progress, and individual flourishing in this new world of work are enormous, yet depend crucially on the ability of all concerned stakeholders to instigate reform in education and training systems, labour market policies, business approaches to developing skills, employment arrangements and existing social contracts. Catalysing positive outcomes and a future of good work for all will require bold leadership and an entrepreneurial spirit from businesses and governments, and an agile mindset of lifelong learning from employees (WEF 2018).

Schwab (2016) notes that skills development has to be a shared effort among businesses, governments and employees themselves. Any programme to create employment for young people in the digital economy has to be closely aligned with digital skills capacity-building. In this context, Rwanda has emerged as a leading country in training and capacitating its young people with the digital and other skills that will make them an able workforce of the future.

This article addresses the question: what are African governments and other stakeholders, notably development partners, doing to ensure the participation of young people in formal and informal employment in the digital economy? It builds on the existing literature which shows that despite digitalisation having adverse effects on some forms of employment, as highlighted by Frey & Osborne (2017), it can also create new jobs, and that this is the case in SSA as well (Manyika et al 2013; Altenburg et al 2018; Melia 2019).

African governments and experts like the WEF president, Borge Brende, believe Africa can leapfrog into the Fourth Industrial Revolution (4IR). Given that by 2030 Africa will house the world's youngest population, African governments, development partners, and other stakeholders both inside and outside Africa must commit themselves to financial and material investments in education and skills development that will have real value in the evolving labour markets, and prime African youths for the future of work. Given the ageing populations in other world regions, it is vital for SSA governments and other stakeholders to join forces in addressing this challenge.

Against this background, this study examines the case of how Rwanda is preparing its young people for the future of work – or, in the words of Paula Ingabire, the Rwandan minister of ICT and innovation, how 'Rwanda is not just preparing Rwandan youth for the future of work, but is creating solutions for the entire African continent'.

It is inspired by the frequently quoted McKinsey Global Institute (MGI) report titled *Lions Go Digital* which states that 'If (Sub-Saharan) governments and the private sector continue to build the right foundations, the Internet could transform sectors as diverse as agriculture, retail, and health care, and contribute as much as $300 billion a year to Africa's GDP by 2025' (Manyika et al 2013), as well as the African Union's pinpointing of digitalisation as

the solution supporting employment creation and new socio-economic opportunities for the continent's young people (Bellucci and Otenyo 2019).

Furthermore, Professor Emmanuel Nnadozie, executive secretary of the African Capacity Building Foundation (ACBF), has stated that the lack of progress in defeating youth unemployment is due to a mismatch between higher education and the needs of the African labour market, which requires a sustainable policy direction, especially in terms of effective program design and intervention (AfDB 2018).

The following section will review the literature on the impact of digitalisation[1] on labour markets and the implications for preparing African youths for the future of work. Section 3 describes the methodology, and section 4 traces the various ways in which Rwanda is preparing its youth for the Future of Work. Conclusions and recommendations are presented in section 5.

2 Overview of the SSA labour market

Since the turn of the millennium, SSA has shown remarkable economic growth (McKay and Thorbecke 2015). Following a contraction in 2020 primarily due to the Covid-19 pandemic, the IMF predicted that the sub-Saharan economy was set to grow by 3.7 per cent in 2021, and 3.8 per cent in 2022 (IMF 2021). If this trajectory continues, the sub-Saharan economy will double by 2030. According to the WEF, income levels as well as the diversification and complexity of economic activity have increased, notably in Nigeria, Ethiopia, Tanzania, Kenya, Uganda and South Africa, which also happen to be among the most populous countries in the region (WEF 2017).

Despite the impressive growth in the SSA economy, levels of unemployment remain high according to the ILO, in 2019, the unemployment rate in SSA was 6.8 per cent (or almost 34 million of an active labour force of 489.7 million people) which was higher than the global average rate of 5% (ILO 2020).

Of this number, 12,2 million (36%) were young people between 15 and 24 years (ILO 2020). About 11 million youths enter the SSA workforce each year, but only 3.1 million jobs are created, leaving more than 70 per cent unemployed. Furthermore, of Africa's nearly 420 million youths in the 15-35 age range, a third are unemployed; another third are vulnerably employed (i.e., employed but in non-permanent jobs); and only one in every six is in wage employment (AfDB). According to the International Labour Office (2017), 95 per cent of young people are employed informally.[2]

The ILO also states that more than half of African youths are underemployed (2012), and the World Bank (2013) estimates that by 2030 about 263 million young people in Africa will not have a stake in the economic system. Filmer and Fox (2014) argue that Africa should move beyond simple unemployment and take rapid steps to address underemployment, which affects African youths particularly badly. A lack of adequate social safety nets in Africa will compel youths to work at abysmal wages, and face even more impoverished working conditions in order to survive. Of the 73 million new jobs created in Africa between 2000 and 2008, only 16 million, or just 22 per cent, went to people aged 24 years and below (Dalberg 2013). A 2015 UNECA report found that employment in Africa grew between the years 1991 and 2001, but at a lower rate than population growth (UNECA 2015).

Indeed, the ILO's Africa Bureau has claimed that much of the economic growth in Africa has been jobless (ILO 2015). Scholars like McAfee (2012) have argued that this mismatch between labour and economic growth is a result of labour decoupling, a phenomenon seen in the United States in the 1990s and early 2000s, in terms of which economic growth was accompanied by declining employment (Friederici, Ojanperä and Graham 2017).

Accurate and up-to-date data on skills and sectoral employment of youths in SSA are also lacking. However, in its 2020 report on employment in Africa, the ILO claims that most young people in Africa are employed in agriculture, followed by construction. It further notes that employment has grown in the services sector. Unfortunately, jobs in the digital economy are lumped with other services jobs, which makes it difficult to determine how many young people are employed in the digital economy.

However, according to the WEF, the SSA exhibits a high-skilled employment rate of just 6 per cent, against a world average of 24 per cent (WEF 2017) This finding supports the notion that the region has an untapped high-skilled employment potential, which could be taken to include digital skills. All this points to the need to equip African youths with the skills to access jobs in the digital economy.

Moreover, given the reality that SAA is facing a significant youth unemployment crisis, and scholars such as Altenburg et al. (2018) postulate that SSA has to create at least 18 million jobs annually until 2035 in order to accommodate all the youths entering the labour market, any conversation about economic growth has to revolve around employment creation. Abdychev et al. (2018) echo these sentiments, noting that, that in the next two decades, about 20 million African youths will enter the labour market.

3 The impact of digitalisation on SSA

It is widely agreed that digitalisation has a profound impact on jobs and the job market, both positively and negatively (Schwab 2016; Chui, Manyika and Miremadi 2017). Opinions are divided on the actual impact of digitalisation on jobs, with some (Chang et al 2016; Frey & Osborne 2017; Frey & Rahbari 2016; Krueger 1998; Ugura & Mitra 2017) arguing that this will result in low-skilled employees being replaced by machines. Indeed, Frey & Osborne (2017) suggest that 70 per cent of jobs in the global economy are susceptible to automation.

As far back as 1995, Jeremy Rifkin predicted, in his acclaimed book titled *The End of Work*, that the advance of robots and technology in the United States would lead to a jobless future (Rifkin 1995). Other scholars such as Acemoglu and Restrepo (2019) have also argued that at the current rate of digital advancement, especially Artificial Intelligence (AI) and machine learning, even middle to high-skilled jobs are not safe. Most of these studies have not been conducted in SSA, but in other regions.

Friederici et al (2017) argue that most African governments are overly optimistic about the economic potential of digitalisation. Gaus & Hoxtell (2022) observe that most African jobs are in the agricultural sector and may therefore remain largely unaffected by technology. However, the wider use of tractors and other agritech may threaten this. Due to Africa's low industrial base and high levels of subsistence and informal work, the threats of automation and job replacement by machines remain very low.

Melia (2019) disputes the pessimistic findings by Friederici et al. (2017), arguing that of the 27 studies used, 15 had positive outcomes, some relied on outdated data, and others were not empirical. In a comprehensive review of the available literature on Africa, Melia argues that there is much evidence to support a positive view of the impact of digitalisation on Africa's labour markets. These findings are also consistent with Dalberg (2013), World Bank (2016), and the WEF (2017, 2018).

The 2017 WEF report on 'The Future of Jobs Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution' forecasts that digitalisation will create jobs in computer science, data analysis and many other STEM Fields. This echoes the findings by Page and Shimeles (2015) and Ramalingam (2016) that there would be growing demand in Africa for personnel with the ability to combine digital skills and traditional skills. Others have also argued that the Future of Work will require abstract thinking, creativity and analytical skills, which can only be provided by humans and not by computers (Wilson and Daugherty 2018; Agrawal et al 2019). According to Diamandis and Kotler (2020), digitalisation will permeate all economic sectors, even agriculture and the informal sector Also, technology can simultaneously replace labour and create new jobs (Acemoglu and Restrepo 2019). This corresponds with Baldwin (2019) who argues that digitalisation will even lead to the creation of new and more productive and fulfilling jobs than previously. He also points to the building of skills that allow for survival in a world where 'tele-migrants sitting in one country can do tasks in another country'.

3.1 What digitalisation means for Africa's labour market

Digitalisation means that employees of the future will need new skills sets (Ambrose et al 2010). This means that African governments and other stakeholders will have to rapidly figure out a way to capacitate youths with the relevant skills sets. In his seminal work on *Educating for the Fourth Industrial Revolution* (2019), Peters argues that traditional forms of education are no longer adequate for doing so. One vital need of the Future of Work is close collaboration between industry and training institutions (Aoun 2017). Drawing on examples in Asia, Lewis & Rupp (2016) have suggested liberal arts education as a viable way of preparing young people for the Future of Work. Erik Brynjolfsson and Andrew McAfee contend that there is a need to create employees capable of creative thinking, who could therefore be described as 'valuable knowledge workers' (Brynjolfsson and McAfee 2014).

In a 2017 report, Accenture argued that the digitalised workspace would require a versatile workforce that was not limited to rigid titular roles and functions, but could rapidly adapt to the needs of the market. Clearly, this will require substantial investment in providing such a workforce with the necessary knowledge and skills. Numerous scholars have argued that workers of the future need to be creative and adaptive critical thinkers (Barrett and Moore 2010; Ambrose et al 3010; Drake and Long 2009). By contrast, traditional education systems fall victim to what Paulo Freire Freire (1993) famously described as 'the banking concept of education', in terms of which teachers assume students are blank slates which need to be filled with education.

This approach falls short of the demands of the Future of Work, in which problem-solving skills and adaptability will be more important than 'crammed' knowledge – the more so because automation is taking over most 'memorisation' functions (Brynjolfsson and McAfee 2014). Commenting on Asian higher education institutions, Hussain et al. (2007) extolled the benefits of problem-based learning in preparing workers for the digitalised workplace.

In March 2022, speaking to CNBC at the launch of the Centre for the Fourth Industrial Revolution, Paula Ingabire, the Rwandan minister of ICT and innovation, stated that due to the 4IR there was a huge demand for talent, and therefore the need for the creation of a Pan-African talent development system. This talent gap also existed beyond Rwanda. As a country that intended to be a leader in the knowledge economy, it was essential to bridge the talent gap with local solutions developed with a global focus.

In the decade to 2019, economic growth averaged 7.2% a year, far more than the average for SSA, while per capita gross domestic product (GDP) grew at 5%.However, this has still not led to adequate job creation for the young people entering its labour market. At just 4 per cent, the formal youth unemployment rate is lower than those of most or all other SSA countries. However, underemployment remains a serious problem, especially among the 65 per cent of informally employed people (UNCDF 2016). As a result, the Rwandan government is emphasising the need to create decent employment for young people, among others via skills training as well as the formalisation of the informal economy.

4 Methodology

Given its subject matter, this is a qualitative study, focused on the case of Rwanda. Primary and secondary research was conducted. Secondary research comprised a desktop review of documents published by influential organisations and experts on the subject of digitalisation and labour markets in SSA, as well as published material pertinent to the case study, namely Rwanda. This included policy documents and other material published by the Rwandan government. Most of the documents were available in the public domain, and others were available upon request from the relevant authorities. The primary research comprised 15 interviews conducted with key role players in Rwanda.

A coding system was used to capture claims and assumptions about the impact of digitalisation on labour markets in SSA; whether the impacts were positive or negative; the implications of those impacts; and methods used to prepare young people for the future of work. This system also captured whether those efforts were policies, agreements, or tangible and verifiable activities.

5 Rwanda's preparation for the Future of Work

Rwanda is making a concerted effort to prepare young people for the Future of Work.[3] The activities in the country are threefold: direct and indirect initiatives undertaken by the government itself; initiatives in partnership with private organisations and development agencies/organisations; and initiatives undertaken by private organisations and development agencies/organisations independent of the government.[4] According to the Rwandan minister of education, Valentin Uwamariya:

> Africa has reached a crossroads. Now we face a choice. Let us seize the moment and take advantage of the best chance we will ever have as a continent. That means waking up to the opportunity that ACFTA represents for all Africans. It means making the most of the fact that Africa has a dynamic, youthful, growing population - a real reservoir of human resources and talent. It means planning, cooperating and investing in technology-assisted learning and training so that we can spread the benefits of education and provide the new

> skills that are vital for the workforce of the Future. Failing to focus now on education, training, and technology would be unforgivable (eLearning 2022)

According to Kevine Bajeneza, founder of the Natcom Training Centre, a private institution in Kigali offering ICT skills to private individuals, organisations, and government personnel from various departments:

> With the advent of digitalisation and the Fourth Industrial Revolution, it is no longer business as usual in how young people are trained for the job market.

An outline follows of the multiple ways in which the Rwandan government as well as other stakeholders are working to create a future-ready workforce, not just for Rwanda but for the entire African continent and beyond.

5.1 A comprehensive policy framework

The Rwandan government has developed a comprehensive policy framework for bolstering youth employment, particularly in the digital economy. These policies all deal with the issue of job creation for young people, and emphasise skills development as a vital feature. They include:

- The Vision 2020 document, which outlines Rwanda's vision to transform Rwanda from an agrarian economy into a knowledge economy;
- The ICT-led Socio-Economic Development Policy and Plan 2001-2005 whose goal was to 'modernise the Rwandan economy and society using information and communication technologies (ICTs) as an engine for accelerated development and economic growth; national prosperity; and global competitiveness';
- The Economic Development and Poverty Reduction Strategy (EDPRS2) 2013-2018 with four thematic areas, one of them being focused on the development of appropriate skills among youths, with the aim of moving 50 per cent of the workforce away from farms and creating 200 000 new jobs annually;
- The Smart Rwanda Master Plan SRMP(2015-2020) which focuses on increasing Rwanda's ICT skills and to increase professional ICT certification courses;
- The National Youth Policy which had a several priority areas, one being to improve the access of young people to quality education and training so as to improve their employability;
- The National Strategy for Transformation (NST), 2017–2024, which outlines a vision for the transformation of the Rwandan economy into a knowledge-based economy capable of competing at the global level;
- The National Digital Talent Policy, which aims to increase the quantity and quality of digital literacy skills of Rwandans across the board, thereby setting the tone for the creation of a knowledge economy;
- The Revised National Employment Policy (NEP 2019), whose main objective is 'to create sufficient and productive jobs in order to reduce labour underutilisation and enhance productivity and competitiveness'; and
- The National Skills Strategy and Employment Promotion (NSSEP), 2019–2024) whose main thrust is to develop a workforce that has market-relevant skills in order to access quality employment.

All these policies build upon one another, and some, like the National Transformation Strategy, have clear targets such as ensuring that by 2024, 100 per cent of all youths and 60 per cent of adults will be digitally literate, and 1.5 million decent jobs will have been created. The National Digital Talent policy complements this by setting up four main policy areas, namely providing digital literacy for all; building a digitally savvy workforce; setting up an IT elite corps; and coordinating digital literacy initiatives.

The first policy area focuses on training five million Rwandans, starting with those in primary school, and with a specific focus on youths. The second focuses on retraining and upskilling to enhance digital adoption, focusing on secondary and tertiary education as well as those already in the workforce. The focus is on training one million Rwandans. The third focuses on developing 10 000 ICT experts in order to transform the country into an exporter of ICT services and products. The fourth focuses on creating digital literacy standards and providing coordination mechanisms for the implementation of the NDTP. These policies have also led to activities and programmes such as the Rwanda Coding Academy, the Digital Ambassadors Programme, the One Smartphone per Household programme, and the digitalisation of government services through the creation of the Irembo platform.

Besides the creation of a clear and comprehensive policy framework, a respondent from the Ministry of Labour also explained:

> In Rwanda there is a very clear policy coordination, every person either in government or non-government but who intends to work in Rwanda has to be aware of the policies in their area. This is important because the person or organisation then identifies where they fit in the policy framework and how they can help the government achieve its goals. The president also provides very strong leadership and as a result all the ministers are aware of all policies and hence find ways of making their different polices combine, for example most of our digitalisation projects focus on youth which means two ministries or even three if we include ministry of education. That means all these ministries have to collaborate.

5.2 Focus on education and training

The Rwandan government has made the education and training of young people a priority. This has played out through government-supported initiatives, mainly through the Ministry of ICT and Innovation and the participation of non-government institutions, ranging from small and local enterprises like Natcom and SolveIT to large and international ones like Carnegie Mellon University. The education and training is formal, informal and on the job, and involves incubators and hubs. Speaking to eLearning Africa, a global network of professionals working in ICT-supported education and training, Paula Ingabire, the Rwandan minister of ICT and Innovation, summarised what digitalisation means for Africa, and what Africa needs to do to prepare its young people for the Future of Work:

> Africa is now at a crucial moment in its development. The creation of ACFTA, the African single market, is an unprecedented opportunity to transform the fortunes of our continent and its people. We can leapfrog other countries and regions. We have a chance to bring real prosperity to Africa. But we have to take the necessary steps to prepare ourselves and our people. Above all, this means investing in the combination of Education and ICT. And in ensuring that our people have the skills necessary for the markets of the Future.

> Information and Communications technology can spread the benefits of education and training to the remotest parts of our continent. In the wake of the Covid pandemic and an economic downturn, every African Government should now focus relentlessly on its Education and ICT strategy. That is what will make the African Union's 2063 Vision a reality.' (eLearning Africa, 2022)

According to an official from the Ministry of Education, Rwanda has also signed a memorandum of understanding with Zimbabwe about importing Zimbabwean teachers, in a bid to boost Rwanda's education system:

> Following the President's request to President Mnangagwa of Zimbabwe that we need Zimbabwean teachers to come and teach English in our schools. The MOU has now been signed and as we speak about 300 teachers in English and STEM subjects have arrived in Rwanda. Actually we expect many more, who will teach in our health sector as well as TVET.

The Rwanda Coding Academy

The Rwanda Coding Academy is a specialised vocational coding school focused on training young people who have completed lower secondary school in software development, embedded systems and cybersecurity. The school is a Rwandan government initiative comprising a partnership among the Ministry of Education, Ministry of ICT & Innovation, Rwanda Information Society Authority, Rwanda Education Board, Workforce development Authority and Rwanda Polytechnic. The school was established in 2019 as a result of the Digital Talent Policy. The Rwanda Coding Academy is focused on producing highly skilled software developers who can fill this gap in the national economy.

Digital Ambassadors Programme

Also building on the National Digital Talent Policy, the Digital Ambassadors programme is an initiative by the Rwandan Ministry of ICT and Innovation aimed at increasing the number of digitally literate citizens and promoting citizens' use of e-Government and e-Business services. The programme is implemented by Digital Opportunity Trust (DOT) Rwanda, an organisation focusing on supporting youths to become innovators and apply digital solutions to serve their communities. The Digital Ambassadors programme focuses on training and deploying 4 900 young people as Digital Ambassadors by the year 2024, who will, in turn, train 8 460 000 citizens in digital literacy. Dr Emmanuel Nzeyimana from DOT Rwanda has explained that:

> We are more than confident that the DAP programme will be able to reach its target of equipping 8,5 million Rwandan citizens with digital skills while creating employment for 5 000 young people (Digital Ambassadors). This is because, in the pilot phase between 2017 and 2018, we trained and deployed 50 Digital Ambassadors to five districts, and they trained over 17 000 citizens in turn. We have refined the model and deployed even more ambassadors, and the evaluations we carry out keep showing us great results.

Carnegie Mellon University Africa

The Rwandan government invited Carnegie Mellon University, a top-ranked American university, to open a campus in Rwanda. The Carnegie Mellon University in Rwanda is focused on 'Educating the next generation of African tech leaders and innovators'. It offers masters programmes that are practical and oriented toward developing top talent in ICT skills and management relevant to Africa's digital transformation. According to a respondent, The Carnegie Mellon University was the result of an explicit invitation by President Paul Kagame, aimed at securing high-quality training for ICT leaders in industry and government not just for Rwanda but Africa as a whole.

Initiatives by the Mastercard Foundation

After consultations with the Rwandan government, CSOs, the private sector, and young people in Rwanda, the Mastercard Foundation launched the 'Young Africa Works' strategy in Rwanda in 2018. Its main objectives are to equip 30 000 young people with they skills they need to be employed in the hospitality industry, and to improve teaching and learning in secondary schools. To achieve these goals, the foundation set up two projects, namely Hanga Azaza and Leaders in Teaching. These two projects align with the Rwanda Vision 2020 document and the National Transformation Strategy.

Hanga Azaza

Hanga Azaza, which means 'creating the future' in Kinyarwanda, is a $50 million, five-year initiative focused on providing 30 000 young people with skills suited to the tourism and hospitality sector as well as to create small businesses that could employ other young people in the tourism sector in turn. The initiative will offer training in communication, customer service, business development skills for entrepreneurs, and ICT and digital literacy skills. The Mastercard Foundation will work with 13 other partners, namely the African Management Initiative, Cornell University, Dalberg Limited, EF Education First, ESPartners Ltd, GroFin SGB Fund, Harambee, Horwath HTL Interconsult Ltd, I&M Bank (Rwanda) Plc, Inkomoko, Question Coffee and Vatel Rwanda.

Leaders in Teaching

The Leaders in Teaching programme is premised on the fact that while African secondary school enrolment has been on the rise in the past couple of years, the quality of education remains low. Given the projection that by 2030 Africa's workforce will have grown to 375 million people, it must be prepared for the future now, starting with school-going children. The Mastercard Foundation argues that the poor quality of education in secondary schools means that millions of young people cannot progress to further training and education, or successfully transition into the workforce. The Leaders in Teaching project has two components, namely country-level programmes, and Pan-African Centres for Innovation.

The country-level programme is focused on improving the quality of secondary school teaching, thereby helping to ensure that learners are given the skills and competencies they need to access economic opportunities in the future. The initiative trains and supports

secondary school teachers throughout their careers and provides them with high-quality and high-tech equipment. The Pan African Centre for Innovation, also called the Centre for Innovative Teaching and Learning in ICT, is a five-year initiative focused on fuelling innovation in the use of ICT in secondary education. At its core, the Centre seeks to close the gap in access to quality education, evaluate the ICT for education methods, and create an active network of EdTech leaders across the African continent.

Initiatives by the German Agency for International Cooperation (GIZ)

Perhaps the most significant contributor to the Rwandan government's efforts to preparing its youths for the Future of work is the German government through its Agency for International Cooperation (GIZ). The GIZ has undertaken numerous initiatives in Rwanda, including the Digital Transformation Centre, the Make-IT in Africa project, the Special Initiative on Training and Job Creation: Job partnerships and SME promotion in Rwanda, Digitalization for sustainable development, the Centre of Excellence for Information and Communication Technology in East Africa,[5] and Equal Opportunities through Digital Learning with Atingi. For the purposes of this study, however, only the Digital Transformation Centre, Make-IT in Africa, and Equal Opportunities through Digital Learning with atingi were considered, as they specifically relate to the preparation of young people for the Future of work.

Equal opportunities through digital learning with Atingi

This project falls under the GIZ's Global Project on Digital Transformation. It focuses on providing innovative digital learning opportunities to people from different educational backgrounds in order to capacitate them with relevant skills that will enable them to find decent employment. The project uses the 'Atingi' digital learning platform to reach poor and disadvantaged people with high-quality learning and training. It focuses explicitly on girls, women, and people in rural areas. The high-quality learning material on Atingi are free for all. Through collaboration between government, the academic community, businesses, and the civil society, it is designed to equip leaners with skills relevant to their local labour markets.

The Digital Transformation Centre

Digital Transformation is a joint initiative between the GIZ and the Rwandan Ministry of ICT and Innovation to promote digital transformation in Rwanda. Through this project, GIZ supports the MINICT and the Rwanda Information Society Authority (RISA) in promoting the adoption of digitalisation as well as capacitating all Rwandans, particularly those in rural areas, with digital literacy skills. IT also supports technocrats in the MINICT to come up with digital solutions to challenges faced by Rwandans. The Digital Transformation Centre hosts events and training sessions for people in the digital space, particularly young people, and offers training courses to support Rwanda in carrying out the Smart Rwanda Master Plan vision. It supports tech start-ups by creating exchange platforms, relevant training and access to finance, and networking opportunities. It has also set up an innovation studio where young people work to produce impact-driven solutions closely aligned with the Sustainable Development Goals.

The Make-IT in Africa project

The Make-IT in Africa project is housed at the Rwanda Digital Transformation Centre, and is also funded by the European Commission. It seeks to strengthen African Innovation ecosystems in three main ways: 1) Supporting start-ups to align their business models with market conditions as well as creating regional and international partnerships; 2) Innovation promotion through capacitating hubs and incubators, aimed at offering high-quality services to entrepreneurs; and 3) Facilitating the cross-border sharing of innovation among African countries as well as establishing environments that are conducive to innovation. Make-IT in Africa also helps to connect digital ecosystem players in Rwanda with players in other African countries as well as with players from Europe. This is done through the African-European Digital Innovation Bridge (AEDIB), an initiative of the European Commission and several European Union member states.

While many Africans are seeking to develop digital solutions for African problems, they lack the access to financing, high-quality and relevant training, as well as conducive innovation policies they need to take these ideas to scale. The Make-IT in Africa project seeks to create this environment. According to a respondent from Make-IT in Africa:

> One of the most important aspect of our programming here is that we are Pan African in nature. While this organisation is located in Rwanda, it is focused on creating solutions for the entire African continent and not just Rwanda. In that case we are open to solutions to Africa from African people even located outside Africa, as long as they can prove that their solution is for Africa.

Tech entrepreneurship hubs and incubators

Rwanda has a very active Tech start-up ecosystem, with more than 20 hubs and incubators, most of them registered during the past five years. Hubs and incubators play vital roles in Rwanda's efforts to prepare young people for the Future of Work, as they provide young entrepreneurs in the digital space with the skills they need to develop viable businesses that can employ other young people. The hubs and incubators in Rwanda work with tech entrepreneurs at different stages from ideation to proof of concept to scaling. They also offer co-working spaces, private offices, internet connection and equipment such as computers, internet and 3d printing machines, advisory services, networking events, and seed funding. Prominent players in the Kigali ecosystem include Westerwelle Start-up Haus, Norrsken House, KLab, Impact Hub, 250StartUps, and StarAfrica. Some were established locally, and others are foreign entrants. However, the objectives of both are aligned with Rwanda's vision 2020 and National Strategy for Transformation.

Incubators like Westerwelle Start-up Haus operate on cohorts, with entrepreneurs joining for a particular period. However, if they fail to scale up, or need further training, extensions are possible on a case by case basis. Klabs, the oldest incubator in Rwanda, offers co-working spaces which are not dependent upon cohorts.

Huawei ICT Academies in Rwanda

In October 2021, 6he Ministry of ICT and Innovation, the University of Rwanda and Rwanda Polytechnic signed a memorandum of agreement with Huawei, a Chinese multinational technology corporation, about establishing Huawei ICT Academies at these two institutions. The Huawei ICT Academy aims to provide students with the latest ICT knowledge as well as skills that are relevant to industry needs. The agreement will result in Huawei delivering its training and certification programmes to the University of Rwanda, Rwanda Polytechnic through the Huawei ICT Academy programme. Huawei will also provide the Huawei Certification Academy Instructor (HCAI) training service for teachers at these two institutions.

Digital and Innovation promotion project

The Rwandan government, through its Ministry of ICT and Innovation, has also entered into a technical agreement with the Japan International Cooperation Agency (JICA) on a four-year Digital and Innovation Promotion Project. Its objective is to 'establish market creation for an innovation model for a vibrant ICT sector in Rwanda, and support Rwanda's journey of becoming an ICT hub in Africa'. The project is set to buttress the advances already made by Rwanda in creating an innovative ecosystem in the country as well contributing to the realisation of the Smart Rwanda Master Plan. This project will also result in continued support by JICA of youth hubs such as Fablab and KLab, thereby contributing to the capacitation of young people in the digital space.

GIGA Initiative

The GiGA initiative is a project between GIGA and the Rwandan government aimed at providing internet access to about 1 800 schools. This will enable them to benefit from digital initiatives. The unconnected schools are just 30 kilometres away from fibre, and the GIGA initiative is aimed at providing last mile connectivity

6 Discussion

Digitalisation has varying impacts on labour markets, which have not been sufficiently researched. This is true for the earlier forms of digitalisation as well as the more recent 4IR technologies. Despite the misgivings of some, analysts, policy-makers and planners remain optimistic that digitalisation will lead to employment creation for young people in SSA, which is set to have the world's youngest and largest workforce by 2030. Digitalisation in Africa has grown exponentially, especially during the COVID-19 pandemic. One thing that both optimists and pessimists agree on is that Africa has a severe skills shortage and a bulging youth population, and if young people are to be given decent work, investment in digital literacy skills is urgently needed.

The Rwandan government has prioritised the creation of a knowledge-based economy, and education is a vital pillar of this vision. The design of a conducive environment, particularly in respect of digitalisation, has attracted various development partners which are willing to work with the government in developing a future-ready workforce. Conversations with key

role players in the ICT sector, both in government and the private sector, highlights how Rwanda's tragic history has helped to create a sense of resilience, initiative, enterprise and eagerness to learn, all which are prime conditions for the creation of a populace equipped for a digital economic future.

Rwanda has emerged as a leading country in SSA in terms of preparing young people for the Future of Work. Its initiatives in this respect are all buttressed by a comprehensive policy framework and a strong culture of policy implementation. The National Digital Talent Policy has led to the attraction of numerous international organisations such as the GIZ, Mastercard Foundation, Carnegie Mellon University, African Leadership University, Westerwelle Haus and Norskken House which have invested in education initiatives to build a future-ready workforce. This conducive environment has also led to an increase in innovation and creativity by Rwandan youths, who have launched several start-ups as well as hubs and incubators like KLab and Fablab in order to support other young tech entrepreneurs. In his book *Robot-Proof: Higher Education in the Age of Artificial Intelligence* (2017), Joseph Aoun argues that universities should be utilised to develop valuable ecosystems for entrepreneurship, and the partnership between Rwandan universities and start-up incubators such as StarAfrica which is located at the University of Rwanda medical campus is one way of putting this into effect. This also true of the Huawei ICT academies at the University of Rwanda and Rwanda Polytechnic.

The revision of the National Employment Policy shows that the Rwandan government is learning and reacting to the changes in the world of work. Notably, it provides a more structured institutional and policy coordination framework for creating decent employment for young people. Rwanda's policies and programmes for preparing young people for the Future of Work are buttressed by extensive investment in its digital infrastructure – inter alia, the entire country is covered by Fibre Optic Internet.

Rwanda has been described as a competitive authoritarian state. This makes it a rather special environment, which eases the implementation of government strategies. Evaluation of the Rwandan political system falls outside the scope of this study. However, the fact that numerous respondents cited 'strong leadership' as a main driver of the country's recent developmental progress seems to acknowledge that the relative lack of political contestation and need to negotiate compromises allows faster policy formulation and implementation. As Kevine Bajeneza puts it:

> Strong leadership is indeed a key pillar behind the success of Rwanda. As a country recovering from a terrible tragedy (genocide against the Tutsis and moderate Hutus) there was a need for strong leadership, and President Kagame has provided this strong leadership. He has also inculcated strong values of independence and problem solving in the people, which explains why so many young people are opting to become start-up founders. Also products like Irembo are by local Rwandese finding solutions to their local problems.

A significant weakness is the lack of a clear framework to measure the efficacy of the different policies and programmes, both by government and non-government actors. Another area of concern is how most policies seem to focus on digital entrepreneurship rather than wage employment. While entrepreneurship is commendable, not all youths can be business owners. Unfortunately, information about the number of tech start-ups in existence was difficult to access, with only the success stories featuring.

Learning points produced by the Rwandan case study include the following:

- **The importance of political will**: All the policies and programmes referred to above enjoy high-level government support and commitment, among others from the president, the minister of ICT and Innovation, and other government role players.
- **A clear and focused vision:** Rwanda has declared that it seeks to become a knowledge economy and a proof-of-concept country for digital innovation. Government policies, programmes and statements show that this is clear vision, incorporating a close focus on its achievement. Periodic policy reviews, including turning Vision 2020 into Vision 2050, is a typical example.
- **Policy implementation and coordination**: Rwanda has a sophisticated system for harmonising and coordinating government policy, notably its policies for entering the digital economy. Therefore, all role players, in government and the private sector, are aware of the contents of the policy and what they need to do to help implement it.
- **A conducive environment**: The Rwandan experience demonstrates that creating a conducive environment for the participation of development partners plays a vital role. Thus the government has accompanied invitations to foreign companies to invest in Rwanda, by setting up start-up ecosystems, supporting young digital entrepreneurs, and investing in digital infrastructure. Another example is training all citizens in digital literacy through the Digital Ambassadors Programme, which not only empowers citizens but also widens the market for digital products.
- **Focusing on practical solutions**: Rwanda has identified practical needs and set up practical solutions, for example by offering ICT training to young people, as well inviting teachers from other countries such as Zimbabwe to improve the quality of its education.

7 Conclusion

It is common cause that digitalisation will have a profound impact on jobs and job creation. Authorities such as Klaus Schwab, who is credited with coining the term 'Fourth Industrial Revolution' have claimed that the new world of work is rapidly becoming a lived reality for employees and employers around the world. Therefore, the issue is no longer theoretical, but is already being experienced in organisations and society – in other words, the era of the 4IR has already begun. Given this, SSA needs to rapidly equip its young people with digital and problem-solving skills, and create an environment for lifelong learning.

Rwanda's efforts to prepare African youths for the future of work are commendable. It is too early to assess its success; however, it is clearly on the right path. SSA faces formidable challenges in respect of creating jobs for young people flooding on to the labour market. However, there is justified optimism that, if properly organised, SSA can leapfrog other world regions into the 4IR, and Rwanda seems to provide an excellent example which other SSA countries would be wise to study and seek to emulate.

8 References

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Endnotes

1 Scholars often use the terms Digitalisation and Digitisation interchangeably because both have similar effects at times, and it is difficult to ascertain where one ends and the other starts. According to Brennen & Daniel Kreiss (2016) and Fabunmi et al. (2009), digitisation is the first stage, followed by digitalisation. Hess (2016 argues that the introduction of digital technologies leads to socio-economic change, whether this is introduced for the first time, in the form of conversion (Digitisation), or it at a later stage, which is transformation (digitalisation).

2 This study uses the ILO (2013) definition of informal unemployment as 'all employment arrangements that do not provide individuals with legal or social protection through their work, thereby leaving them more exposed to economic risk.' This definition also includes jobs in the formal sector which lack social and legal protections

3 The Rwandan government, through consistent pronouncements by the president, Paul Kagame, the minister of ICT and Innovation, Paula Ingabire, and the minister of education, Valentin Uwamariya, have insisted that they are seeking to prepare not only Rwandan youths but all African youths for the Future of Work.

4 In Rwanda, as in many other countries, all organisations have to register with the government. Therefore, in this instance, independence means that their interaction with government is limited to licensing.

5 This project has been established in Tanzania. Information on how it benefits Rwanda is not currently available.

TecHedonism as metaverse in the future of Nigerian netizens' sociopolitics

Philip Ademola Olayoku
The West African Transitional Justice Centre
Abuja, Nigeria
philip.olayoku@gmail.com

Abstract

The hedonistic claim that the ultimate human motivation is the quest for pleasure and the avoidance of pain has been fundamental to philosophical discourses on human actions through different epochs. This reflects the fact that both pleasure and pain are central to existential realities. However, the contrasting nature of these phenomena reflects the need for coping mechanisms to overcome pain in order to attain pleasure. Therefore, this study applies the analytical method of critical discourse to explore Nigerian netizenship by creating a historical narrative of sociopolitical engagements through the comedy genre of entertainment. The study thus traces the transitions through different technological evolutions in the entertainment industry while positing that the Metaverse is the future of the sociopolitics of Nigerian netizens as a safer option for digital activism and for engaging in socioeconomic interactions.

Keywords: Philosophical hedonism, TecHedonism, Metaverse.

1. Introduction

Hedonism remains one of the most enduring and controversial concepts in philosophy, dating back to the Platonic tradition of equating the moral good with the pleasurable, in terms of which every action (even when initially painful) is undertaken in order to achieve pleasure (see Goodell 1921). This led to the Aristotelian ethics of interdependence in his conceptualisation of well-being as determined by the attainment of happiness, the end goal of all pleasure.[1] Virtue is thus an integral part of the latter as cultivated by intellectual contemplation, where the other becomes an extension of the moderate moral persona in aspiring towards a happy end (Aristotle 1893). As such, whether from a social, psychological, utilitarian or physical perspective, the central focus of hedonism is on the good life, one in which the balance of enjoyment over suffering is the greatest, thereby advancing a post-sensual argument (Roger 2006). However, the hedonist argument depends on the intrinsic value of experience in which the intrinsically good is considered as that from which pleasure is derived, while that which is intrinsically bad is that which gives displeasure (Dietz 2021). Following on this, some scholars consider hedonism as inferring that a pleasurable life determines a good life, in other words, that human behaviour is largely determined by pleasure-seeking, in contrast to ascetism, which involves an embrace of austere measures for living a disciplined life away from pleasure (Ruut 2003).

Some critics have also conceptualised hedonism as a key driver of consumerism, resulting in an addiction to things from which pleasure is derived, and ultimately the destruction of

the environment due to excessive exploitation. There have been some discourses around how hedonic lifestyles could destroy social bonds, as self-aggrandisement is prioritised at the expense of a commune, even though such sensory pleasure has fleeting value. Hedonism is often criticized for destroying critical thinking, societal morals, work ethics and health, which are fallouts of the momentary satisfaction derived from fleeting pleasure. Eventually, the concept of hedonism becomes a paradox, resulting in unhappiness in old age when these destructive attributes become manifest. As Dietz (2021) puts it, the desire for pleasure thus constitutes an obstacle to accessing it. This negates the expectation of 'happiness as enjoying one's life' (Ruut 2003) and devalues the quest of making it an ultimate goal for living.

Roger (2006: 619-620) uses the theory of internalism and externalism to deconstruct the concept of enjoyment. In this approach, hedonism is portrayed as a theory of well-being in which the contexts of accomplishment and enjoyment are compared and contrasted across different philosophical traditions to ascertain their essential value in contributing to well-being. He argues that the desire for enjoyment could constitute an end by contributing to individual well-being in and of itself, and this retains the relevance of the hedonist discourse today. This line of thought maintains that enjoyment increases tolerance of stress, makes individuals more sociable, and that the positive energy it radiates enhances rather than hinders health. Others deconstruct the concept of hedonism along two broad lines. The first is political utilitarianism, which places value on the greatest good, or that which is pleasurable to the majority in the commune. This is considered more enduring than the second, which is egotistic hedonism described as an enlightened choice for individual material good.

As noted previously, these positive strands of philosophical hedonism date back to Plato's generalist view of pleasure. Plato conceptualises its ideal form as the peak of morality derived from the satisfaction of doing one's duty. In line with this reasoning, the pleasant must thus aspire to the good as guided by philosophic virtue (see Goodell 1921: 29; 39). Taquet et al (2016), however, adopted the hedonic flexibility hypothesis that contrasting mood-dependent choices are based on short- and long-term ambitions. According to their analysis of daily decision-making processes, humans opt for pleasure-seeking activities to lighten their sad moods in the short term, while expectations of long-term pleasure could make them endure certain unpleasant moments. This hedonism of convenience thus provides a fluidity, as the pleasurable becomes dependent on spatio-temporal determinants of value. For the purposes of this analysis, this flexibility suits the use of technology for hedonic ends, as it accommodates both long-term and short-term aspirations to pleasure. The Heideggerian dialectics of technology about the interplay of control and freedom critiqued the deterministic conception of technology through numeric figures as farcical. For him, technology is best considered as a process of unravelling through which humans come to understand themselves and the universe as Being (Heidegger, 1977). He supports a more liberal view of technology as an unveiling, which, rather than leading to the destructive end of human life, contains in itself the solution to the challenges of human existence.

In this context, the degenerative label of a technology-savvy generation resulting from its hedonic value may be far-fetched, considering the many merits that technology offers the world today. For instance, Oza (2015) explored the shifting literary culture among Generation Z and Alpha within the psychodynamics of a preference for technologically supported literature (e-books/ audiobooks) as against the conventional print culture. While the reasoning for this is partly due to the convenience of pleasure reading, preschoolers have been observed in recent times to be exposed to technology before becoming acquainted with printed literature (Gottschalk 2019). Biologically, technology has also been discovered to elicit pleasurable

feelings. This was observed in the reactions of the *nucleus accumbens* -- a part of the brain which serves as an interface between emotion and action, especially when positive emotive feedbacks are derived in the use of technology (see Gottschalk 2019; Kool and Agrawal 2016). In terms of literary culture, deriving pleasure from reading is projected to increase across different generations of usage with a greater detachment from the older print culture and the embrace of emerging e-literature, as technology becomes a predominant determinant of personal and societal values (see Gottschalk 2019: 20; Anton, Camarero and Rodriguez 2017). On the other side of the value coin, Tanenbaum et al (2013) discuss the hedonistic value of technology from the initial stages of its production. This has been enabled by the democratisation of the materials, means, and technical know-how of production, leading to more accessibility and freedom in the do-it-yourself (DIY) age. The pleasure that such tech-creatives derive from the blend of fun, curiosity and relaxation results from the context of their creativity in a production adventure world, in contrast with solution-driven inventions which allow for less *playfulness*. Perhaps, such creatives serve to validate the importance of Marc Abrahams's Ig (Ignoble) Nobel Prize awards, suited to a blend of pleasure and science by proving that pleasure can generate value for our existence in the universe.

Suffice it to state that deriving pleasure from technological devices in the Internet of Things (IoT) age has come under scrutiny, especially in terms of abuses such as child pornography, because of the ease of access to victims by the perpetrators (see Thakor 2021: 118). Social media companies and others digital platforms, including Facebook, Twitter and YouTube, have attempted to deploy facial recognition and other AI tools to track and flag abusive content, in curbing this criminal practice and illicit means of deriving pleasure. Thakor (2021: 126-7), however, further explores the hedonistic value of voyeurism while attempting to track the link between child pornography offenders and their victims. He proposes that there is the hedonistic value of surveillance technology derived from the recognition of perpetrators and victims, as it produces greater efficiency in criminal investigation and digital vigilantism. Technology thus provides a multimodal hedonistic value, which this study seeks to unpack in conceptualising the intersections of hedonism and technology as TecHedonism while situating it in the Nigerian context.

2. Nigerian netizenship and the sociopolitics of TecHedonism

Measures for containing the coronavirus during the Covid-19 pandemic included lockdowns, and severe restrictions on social gatherings and freedom of movement. This adversely affected the potential for revenue generation by businesses, as many economies went into recession. Nigeria lost an estimated 34.1 per cent of its GDP, amounting to about $16 billion, as a result of the coronavirus (Andam 2020). Despite the downward turn in the global economy, the ICT sector was a major beneficiary of the lockdown measures, as people leveraged the ability to communicate, learn and self-entertain remotely. In Nigeria, internet music subscribers rose to about 154.3 million as of December 2020, with a ripple effect on the volume of digital song sales and online streaming (see ITA 2021). Global internet bandwidth reportedly rose by 35 per cent in 2020, with 80 per cent of traffic used for social media, gaming and videos. Big digital platforms in the US made a net income of about $192.4 billion, with a 21.1 per cent revenue increase in 2020, while those in China earned about $48 billion, amounting to about 98 per cent revenue increase, in the same year (see UNCTAD 2021: xv; 23).

The ICT sector is fast becoming the mainstay of the Nigerian economy, contributing almost 18 per cent of the country's GDP during the third quarter of 2022 (NBS 2021). Driven by technology, the Nigerian media and entertainment industry has become increasingly

relevant in its sociopolitical life as an emerging driver of its economy, especially with the need to diversify the oil-based mono-economy that has been subjected to pricing volatility (see Iyoboyi and Na-Allah 2014). The digitalisation of production in Nollywood started with the production of Video Compact Discs (VCDs) in the 1990s, and has since given it a competitive edge in the global entertainment industry with improved picture clarity and quality (Ebelebe 2017). With an annual growth rate of about 13.4 per cent, the industry has been projected by PwC to double its revenue to about $15 billion by 2025 (see Irenen 2021; Lawal 2021). The potential in the industry has also been recognized by Netflix with the investment of about $8 billion in Nollywood, and has entered into publishing and streaming deals with several Nigerian movie producers to target more than 6.9 million pay TV subscribers (Irenen 2021; ITA 2021).

Other internet-based distribution platforms that are expanding access to the Nigerian entertainment industry include YouTube, Amazon, Apple and Hulu, alongside indigenously owned platforms like Iroko TV, Ibaka TV, TV Nolly, Nollyland and Afrinolly (see Ebelebe 2017: 49). Exploring Nollywood's technological and cultural hybridity, Onuzulike (2009: 182, 185) postulates that the availability of different platforms allows for multiple cultures to air their independent or joint narratives, and that technology also drives the cultural connection between the continent and its diaspora (see also Iyoboyi and Na-Allah 2014: 262) with the availability of these narratives via video films, and in more recent times the online streaming platforms. The decentralisation of video production has also enhanced this connectivity, with the Tik Tok App[2] providing platforms for producing personal videos which could trend in a matter of seconds. Such accessibility has allowed for improved interactions among Nigerian netizens who use these platforms to build parasocial relationships for showcasing their personal lives to followers, at times to give a false sense of wealth – which has led to the coinage of the term 'audio money'. It has also become a propaganda medium with certain ethical redefinitions due to the misrepresentation of ill-gotten or pseudo-wealth to feed the hedonic desires of netizens. Such potential for misrepresentation aligns with Soukup's (2009) notion of derealization where technology aids the reversal of reality in virtual maneuvres that often evade moral valuation. The social media space has thus become the new platform for realising certain social mythic conventions -- a medium of placing technology at the service of communal memory as a way of representing and projecting shared experiences.

In advancing the discussion on the intersections between technology and entertainment in Nigeria, technology has facilitated an improvement in time management, quality and collaborative projects in the industry. However, it has also facilitated the infringement of copyright issues through piracy, which denies, or at the least, undermines the pleasure that creatives ought to derive from proper remuneration for their efforts (Maton 2018: 661). Nonetheless, the creation of digital cinema packages makes piracy more difficult, as it enables the encoding of digital files and sending them through restricted channels to the movie theatre (Ebelebe 2021). Similarly, Eberendu (2015:28) asserts that the misuse of technology, including its addictive use, has redirected the hedonistic turn of deriving pleasure from real life experiences to virtual content on various social media platforms. While she argues that this results in lower quality of knowledge production and professionalism due to uncensored interactions, technology has also brought out the prevalence of satirical culture among Nigerian Netizens who continue to explore the medium as a channel of escape from current sociopolitical challenges, as well as a platform for aspiring to a better future. The expressions of these are perceptible in different comedy skits that have become integral to technology-driven socialization processes among netizens in the country.

Political satire is a precolonial reality in Nigeria, with the presence of praise singers and court jesters in palaces as major actors in the performativity of the Yoruba Efe, Hausa Yan Kama and Wawan Sarki, Urhobo Ototа, and the Igbo Njakiri traditions, among others (see Nwankwo 2015; Omoko 2019). It continued in the post-colony of military dictatorship, with Fela's prominent Yabbis Nights at the Africa Shrine epitomizing a national satirical experience through which he called out the excesses of government and certain cultural practices that he considered neocolonial aberrations (see Olorunyomi 2003). Suffice to state that Fela is integral to the infusion of Nigerian Pidgin as the lingua franca in the performing arts, often delivered in alteration with English (see Adetunji 2013:3) and other indigenous languages.[3] Fela's adopted mode of call-response musical delivery also permeated his Yabbis nights with an active audience often dictating the topic for sociopolitical interventions through shared experiences. Post-Fela, the satirical tradition has been sustained with the emergence of several stand-up comedians, as this genre of the entertainment industry became institutionalized through the introduction of a 'Night of Thousand Laughs' by Opah Williams on 1 October 1995, in order to commemorate Independence Day. It is instructive that Williams birthed the idea in a hospital ward with the bid to create pleasure by instrumentalizing laughter as an anodyne for sociopolitical challenges. Stage names such as Ali Baba, AY, Basketmouth, Klint de Drunk, Teju Baby Face, Lasisi Elenu, Holly Mallam, Princess, Lepacious Bose and I Go Save among others have become household names associated with stand-up comedy in the country (see Ayakoroma 2013). Though comedy has often been associated with laughter, its satirical value lies in its didactic content, as jokes are told to make light of certain critical situations as subtle means of highlighting social political challenges in the country.

At present, the comedy space has been mediated by technology as evidenced in the development of short skits by popular online content creators who have continued to play important roles. Perhaps the most important recognition of this emerging genre of comedy is the introduction of the Best Online Social Content Creator category in the African Magic Viewers' Choice Awards. The accessibility of these contents has also been enhanced through the miniaturisation of consumer technologies, resulting in their availability on personal computers, smartphones, iPads and other Personal Digital Assistant devices (see Apeh 2016:168). Online video comedy skits thrive on the number of viewers to attract advert placements. This validates Soukup's (2009:23) proposition that the power of seeing is derived from the pleasure of seeing. The flexibility of production and the ability to repurpose user-generated contents as provided by technology (see Apeh 2016) with the incorporation of video editing tools have also created a level playing field for Nigerian creatives to build their way to stardom dependent on the receptibility of the audience. The growing number of notable skit makers within the Nigerian Netizen space include Mariam Adedoyin (Taaooma), Gloria Oloruntobi (Maraji), Ogechi Ukonu (Caramel Plug), Bukunmi Ilori (Kiekie), Samuel Perry (Broda Shaggi), Sydney Talker, Anita Asuoha (Real Warri piki), Chukwuemeka Amuzie (Brain Jotter), Abdulgafar Oluwatoyin (Cute Abiola), Nosa Afolabi (Lasisi Elenu), Kemi Ikuseedun (Mummy Wa) and Debo Adedayo (Mr Macaroni), to mention but a few. These comedians have leveraged social media platforms such as Facebook, Twitter, Instagram and YouTube to ply their trade, with viewership of their contents often running into millions.

Ojomo and Sodeinde (2021:9), among other discourses on the trends of interactivity between audiences and online video skit makers, noted that the parasocial relationships developed over time are important for the evolution and development of mobilisation for sociopolitical activism in the future. In 2021, the Africa Polling Institute noted that these comedy skits were embraced in Nigeria to cope with issues of unemployment, depression and other mental health issues aside from their economic, educative and entertainment values (see Ihua 2021).

Perhaps a good representation of the connection between online comedy skit makers and their audiences is Mr Macaroni, who has continued to garner popular support for both his online contents and his physical activism. The 30-year-old comedian, who has also featured in several Nollywood movies, plays two distinct characters in his comedy; as Mr Macaroni (also known as Daddy wa), an eccentric promiscuous spendthrift elite politician who claims to be a father figure in the society with an endless mission of getting a suitable suitor for his daughter, and has alliances with rich and famous personalities. The second major character is that of Professor Hardlife, a two-sided Nigerian professor with a glorified past who makes life difficult for students and stays aloof from their peculiar experiences, even if at times he is compromised of self-acclaimed values. The satirical themes of Debo's skits range from money rituals, adultery, marriage to political corruption, police corruption, ASUU strike, fake pastors, loan sharks, fraudsters, voter apathy amongst the myriads of other social ills. However, what stands out about Mr Macaroni is his sociopolitical activism, especially for consistently speaking out against police corruption and the lack of social consciousness among the new generation of netizens who would rather share videos and pictures on social media that speak up in defence of victims of police brutality.

While Debo may have enjoyed sufficient followership for his online creativity, his legitimacy among fans became stronger with his participation in the landmark #EndSARS protests[4] in Nigeria which took place in October 2020. Besides his presence at the site of the protests, he also had a well-publicized episode with the Nigerian police where he was assaulted alongside other protesters, and later joined other celebrities to commemorate the one-year anniversary. With the present political climate in the country derived from the build-up to the 2023 general elections, Mr Macaroni has become a leading voice for stimulating the consciousness of the citizenry towards effective political processes. The influence of Mr Macaroni is largely recognized, as with other online content producers, by betting platforms, real estate agents and other corporate organisations who leverage their platforms for the placement of their products for visibility. The expansion of his audience base has defined him as influential in setting the agenda for sociopolitical discourses, both in the context of digital activism and physical protests.

3. Emerging trends of TecHedonism in augmented reality

Augmented reality (AR) can be described as the use of technology to optically integrate virtual images with the real environment in order to facilitate real-time interactivity, involving active synchronized exchanges between users of AR-enabled communication interfaces (Javornik 2016: 9-10). While this term was coined in 1975 by two Boeing employees, Tom Caudell and David Mizell, its history can be traced back to the development of the Sensorama by Morton Heilig in 1962, having envisioned the need to integrate the five senses of members of the audience in maximizing pleasure at the cinema. This was followed by Ivan Sutherland's head-mounted display, Myron Krueger's Videoplace, and Louis Rosenberg's Virtual Fixtures (see Carmigniani et al 2011: 342-3; Mystakidis 2022: 489). The concept of interactivity is underscored by the power of control through virtuality, which infers the insertion of the virtual into physical reality. This experience entails the use of various devices and interfaces that could either be tangible (physical), collaborative (involving interactions between different display systems located in different spaces), hybrid (a combination of different interfaces), or multimodal (combining objects with natural features) (see Carmigniani et al 2011: 346). It has since been deployed to influence consumers, notably their cognitive, affective and behavioural responses (Javornik 2016: 24; Kool and Agrawal 2016).

Therefore, interrogating the hedonistic value of new technologies equipped with AR tools is vital to understanding techedonism today. For Filho and Dholakia (2013), an important starting point is to understand the technological convergence of devices, notably how multiple functionalities determine their hedonic value that influence their choice by users. Previously, Soukup (2009: 21-23) adopted the term 'techno-scopophilia' to describe a shift in how technology intersects with hitherto exclusive natural qualities such as pleasure and sexuality to produce romanticised filmic representations. This thrives especially in product placements for advertisements in audiovisuals, which have existed since the inception of the film industry. However, the focus on the commodity usually entails technology-aided hyperrealism that plays on the audience fantasy for desirability. The hedonic value of advertising is thus the conviction of end-users that the product will lead to their happiness. Javornik et al (2021) discusses this as brand hedonism through 'ephemeral elevation of reality' as deployed by luxury brands to give momentary sensory satisfaction to enhance intimacy between shoppers and advertised luxury brands. Beyond momentary satisfaction, Luo, Lam and Wang (2021) establish how hedonic attachments to entertainment destinations are significant for revisiting and repurchasing by tourists, where the experience of pleasurable moments determines choices of holiday sites and products.

The derivation of maximum pleasure from products have thus been driving innovations and inventions in terms of human interaction with technology. Technology has thus increasingly been deployed to bridge the spatio-temporal divide, with a shift from virtualisation to the augmentation of reality. As of January 2022, augmented reality (AR) has been estimated to have 3.5 billion users and a projected value of about $198 billion by 2025 (Makarov 2022). The miniaturisation of AR means it is easily accessible as well as affordable, using mobile phones enabled with applications developed from toolsets such as Apple ARKIT and Android ARCORE. These tools are handy for blurring the spatiotemporal divide by deploying virtual reality through the use of 3D environmental metadata (Makarov 2022). In terms of their utilitarian values, they provide remote assistance delivered in real time through navigation tools in order to detect location of entities for their valuation. They have thus enhanced interactive experiences in various endeavours, including online shopping, health care-surgery/telemedicine, engineering, and mental health; 3D video call assistance; vehicle safety and ease of use, as well as military training with AR glasses and headsets, notably Microsoft Hololens, Magic Leap and Google Glass; metaverse avatar experiences; the hybridization of telework and virtual meetings; and education through gaming/AR visualizations (Makarov 022; Carmigniani et al 2011; Mystakidis 2022). The innovation of AR is to blur the spatial divide of visualisation by eliminating intermediate devices and personalising the experience. This is exemplified in the development of virtual retina displays and other devices aimed at assisting the physically challenged (Carmigniani et al 2011: 370).

Suffice it to say that the augmentation of reality to enhance the viewing experience enhances the initial attempt to make technology natural or organic, which could result in a bioethical dilemma of interference with natural elements within the human body (Soukup 2009: 29; Carmigniani et al 2011: 371). It follows from the blurring of the hitherto exclusivity of human and machine qualities by filmic representations of emotive machines to the insertion of miniaturised contact lenses and the use of touch-sensitive haptic suits[5] to provide hedonic experience during viewership (see Mystakidis 2022:488). The techedonical logic is of the same pulsating experience with the placement of pace to overpower rationality while playing on the fetishisation of objects, which prioritises a maximisation of pleasure (Soukup 2009: 24).

4. Conclusion: Metaverse as the future of Nigerian netizens' sociopolitics

In its 2017 report *The Nigeria Gaming Industry*, PwC posited that increases in internet penetration would be proportional to the growth of subscribers and the number of gaming users as facilitated by telecommunications and e-payment companies. Furthermore, it projected that virtual fantasy sports betting platforms would be safer and more attractive to the youth population due its computerised nature that elongates betting activities from real life sports events to virtual fantasy football leagues. The technological consolidation of the IoT age populated by members of Generation Z and Generation Alpha indicates that the future of Nigerian netizens' sociopolitics is tied to AR. Already, online content creators are not only restricted to comedians displaying their creativity to provide hedonic value, but also animators who deploy fictive characters in viral contents to address the sociopolitical reality of netizens. Mirroring the convention of the previously mentioned stand-up comedy genre, a major animated character is Akpors, a truant street-smart kid extracted from Nigeria's South South and well versed in Nigerian pidgin, who navigates his existence amidst challenges within his immediate family and community. Apkors has since extended its reach of representation beyond the South South as an adopted avatar[6] for individuals who mirror themselves with a lens of street smartness.

Given the discourse around the realization of the Metaverse,[7] the shift towards a post-reality social arrangement is instructive for sociopolitical engagements of the future. The vision has garnered legitimacy over the years with the volume of trade transactions on the virtual platform put at $54 billion annually, and messaging activities put at $60 billion on a daily basis (see Moy and Gadgil 2022). As a platform that facilitates multisensory interactions between digital objects and people in immersive virtual environments across education, business, entertainment and work engagements, the drift towards mixed reality[8] as an advancement of augmented reality (see Mystakidis 2022: 486) foreshadows more integrative approaches of deploying technology for digital activism. The reliance on blockchain technology is important in the creation and protection of unique identities within a socioeconomy that also guarantees the ability to transact, with successes already recorded in dealings of Non Fungible Technologies. This also redefines the future of crowd-sourcing, the disbursements of funds, and accountability for social movements. The economy of protests in Nigeria for instance depends on donations, largely through crowd-sourcing, with the Feminist Coalition reporting that about N37.4 million was raised using the digital platform during the #EndSARS protests (see Adetona 2020). While the federal government, through a court order, weaponized the Terrorism Prevention Act 2013 in targeting the funding sources of the protests by freezing associated accounts (Adesomoju 2021), the Metaverse provides a supra-national platform for transactions that could evade certain oppressive tendencies of the state, especially with the workings of cryptocurrencies using the same blockchain technology. Also, with Metaverse platforms such as Decentraland, the Sandbox and Axie Infinity providing virtual real estate assets like NFTs, the future of digital activism will rely on the use of avatars as a safer remote option that mitigates the state's ability to physically assault protesters (see Lareeq 2022). Already, the creation of online identities via avatars would enhance digital mobilisation with interactivity through co-telepresence for virtual activist collaborations. It would be most beneficial for all if this was made an open accessible network and free of capitalist monopoly through collective control (Mystakidis 2022: 491; 493).

The Metaverse remains susceptible to the challenges of virtual activities, notably its susceptibility to data breaches, especially in countries like Nigeria, where internet governance

and data protection are not prioritised in terms of policy-making and implementations. As such, sensitive information, including account details, passwords and physical addresses, can be accessed to perpetuate fraud and other cyber-attacks during the transition period. Nonetheless, the future of governance with the increased presence of netizens in the Metaverse would be altered with new concerns about the protection of human rights, demands for social justice and accountability, even as there will be more opportunities for solidarities that defy borders. The future of Nigerian netizens' sociopolitics is therefore dependent on the development of virtual activism tools in advancing a consciousness within the global transition to the Metaverse. It is a Techedonic future in which technological pleasure dictates the approach to sociopolitical governance, while also containing the mechanism for its regulation as projected in the Heideggerian dialectics of technology.

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Endnotes

1 Pleasure is used here as a generic term for the satisfaction desired and/or derived from intentional human activities including health, accomplishment, wealth, and prestige, to mention but a few.

2 TikTok is a short-form video app developed in 2016 by Chinese techpreneurs with predominantly young female users and allows the creation of videos lasting for about 15 seconds (see Xu, Yan and Zhang 2019).

3 The comedy genre of entertainment has been popularising Nigerian English, especially with online content creators like Taaoma, Broda Shaggi and Mr Macaroni, whose work will serve as useful resources for codifying the corpus on the language version.

4 The #EndSARS protests were organized around cells of activists across the country to display their displeasure against and opposition to the impunity perpetrated by state agents – specifically the Special Anti-Robbery Squad (SARS), who victimize, extort and kill innocent Nigerians in the name of fighting crime. The protests are popular for the events that happened at the Lekki Toll Gate, where soldiers were deployed to enforce a state-imposed curfew and have been alleged to shoot at innocent Nigerians while the latter were waving the Nigerian flag and singing the national anthem

5 Mystakidis (2022) also confirms ongoing research on simulating the sensation of smell through digitalization.

6 Avatar is a Sanskrit word meaning a deity in human form.

7 The term 'Metaverse' is etymologically derived from the word Meta (beyond – often implying the ethereal) and Universe. It thus portrays an imagined future for the reality of the universe. It was coined by Neal Stevenson in his 1992 novel *Snow Crash*. More recently it has been powered by the Web 3.0 crypto networks, currently valued at about $1 trillion (see Grider 2021)

8 Mixed reality is a context of real-time interactivity between digital data and the physical environment.

The Fourth Industrial Revolution and Women in Zimbabwe

Threats and Opportunities

Valerie Rumbidzai Jeche
Midlands State University

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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Education, ICT, Teleconferencing, Networking and E-Learning

The Case of Zimbabwe

Freeman Munisi Mateko
North-West University, South Africa
Matekofreeman90@gmail.com

Bernard Chingwanangwana
Zimbabwe Ezekiel Guti University, Bindura, Zimbabwe
chingwanaben@gmail.com

Abstract

This paper seeks to examine Education, ICT, Teleconferencing, Networking And E-Learning with a specific focus on of Zimbabwe. The paper was based on qualitative research techniques. Challenges faced by women in their business in Zimbabwe were closure of business, exposure to rape, violence and robbery, financial losses, drop in their revenue, reduced remittances, reduced demand of goods and services, obstacles in logistics and shipping of products, challenges of acquiring raw materials, reduced worker productivity as well as technological challenges in the form of (limited e-banking and teleconferencing opportunities, huge data costs and lack of required technology. In terms of the effects of e-learning to women and girls in accessing education in Zimbabwe it was realised that, girls and women enjoyed benefits such as to exposure to online learning, reduced walking distances, exposure to educational opportunities such as scholarships. However, there were also adverse effects and these were limited access to online learning, lack of smartphones, lack of data, non- inclusive education, reduced long distance – learning via WhatsApp exposure to uncensored online material which exposed girls to online sexual predators. Policy recommendation wise, it was suggested that there is need for increased government funding towards ICT at all levels as well as prioritisation of all marginalised women.

Keywords: coronavirus; pedagogical; education; information and communication technology; e-learning, development; networking; poverty

1. Context and Statement of the Problem

The Zimbabwean economy has a high literacy rate of 88% (World Bank, 2022). However, there is a disconnect on the high educational literacy rates at national level versus the illiteracy rates at regional or community level in Zimbabwe (Phiri et al., 2020). It is pellucid that some communities in Zimbabwe still struggle to get high quality educational services due to a number of challenges (Garira, 2020).

In terms of information and communication technology usage which is measured using three proxies which are mobile phone usage, internet usage and fixed telephone usage, the Zimbabwean economy is still lagging behind (Makiwa and Steyn, 2016): (David andGrobler, 2020)frontier economy that is gradually becoming a gold miner of the fourth industrial revolution (industry 4.0. A World Bank (2022) report showed that only 29% of the total population in Zimbabwe have access to the internet. This indicates that the bulk of the citizens lack access to the internet and as such they do not enjoy the benefit that come from internet usage, such as online advertising, as well as other e-commerce activities.

The convergence and complementarity of the emerging technology disciplines such as nanotechnology, biotechnology, novel materials, and advanced digital production (ADP) technologies characterize the fourth industrial revolution (Enzmann and Moesli, 2022): (Rampersad, Quester, and Troshani, 2010). 3D printing, human-machine interfaces (HMIs), and artificial intelligence are among the technologies that are already reshaping the global industrial scene (Rampersad et al., 2010). However, in this fourth industrial revolution era, access to the internet and modern ICT devices is of paramount importance in so far as the attainment of economic development is concerned (Adedoyin, Bekun, Driha, and Balsalobre-Lorente, 2020). Lack of access to ICT, quality education as well as exposure to modern digital platforms in Zimbabwe affects all the citizens and this also limits the capacity of the nation to attain the sustainable development goals (SDGs). To be precise, the sustainable development goal number four (4) and nine (9) which aim to ensure that all economies achieve good quality education, as well as the building of resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation, may be achieved after a long time due to the challenges faced by Zimbabwe, as explained earlier, (Masuda, Kawakubo, Okitasari, and Morita, 2022). Thus, there is need for a solution to ensure that there are improved opportunities for all Zimbabwean citizens to use ICT, networking opportunities, teleconferencing facilities, compounded with e-learning for accessing high quality education.

However, in terms of mobile phone subscription, 89 in 100 people have access to mobile phones in Zimbabwe (World Bank, 2022). This shows a large number of people have mobile phones, but if such a population lacks access to the internet, then the chances of networking, using teleconference facilities and e-learning are very slim and next to nothing.

E-learning, also known as online learning or electronic learning, is defined as the process of acquiring knowledge via electronic technology and media (Bossman and Agyei, 2022). In terms of ICT usage in the educational sector, some higher learning institutions have developed e-learning platforms, though some are still lagging behind. Midlands State University, for example, uses an e-learning system, whereas the National University of Science and Technology posted student results on notice boards due to a lack of e-learning technology (Mabuwa, 2014). E-learning has emerged to be a powerful tool in the education sector especially when the coronavirus affected the global village at large (Al-smadi, Abugabah, & Al, 2022). From the time Zimbabwe was affected by the coronavirus, the use of online academic libraries increased, but this was only for those with ICT gadgets and those with some level of technology to use the facilities (Chisita, Chiparausha, Tsabetse, Olugbara, and Letseka, 2022).

The coronavirus has acted as a catalyst for advancement in the use of modern technology in diverse spheres of life, such as education and the corporate world, to mention just but a few (Bohak Adam and Metljak, 2022). In 2020, Zimbabwe had a total of 7.7 million women and they account for 51% of the total population (O' Neil, 2022). Women in Zimbabwe have been greatly affected due to lack of access to modern technology, key to note is the aspect of digital illiteracy. The bulk of the women in Zimbabwe are running small to medium enterprises. The

coronavirus pandemic presented torrid times in as far as access to education for women and girls are concerned. In the business sector, lack of access to information and communication technology, teleconferencing opportunities and networking affects women at large. This paper seeks to examine education, ICT, teleconferencing, networking and e-learning with a specific focus on Zimbabwean women and girls, given the chronicled background.

2. Objectives

To achieve the central aim of this study, the following objectives were formulated for this paper:

- To unearth the challenges faced by women in conducting business during the coronavirus in Zimbabwe.
- To determine the place of e-learning to women and girls in accessing education in Zimbabwe.
- To offer policy recommendations on ways of improving education, ICT, teleconferencing, networking and e-learning opportunities for women and girls in Zimbabwe.

3. Research Questions

- The following research questions are going to be answered in this paper.
- What are the challenges faced by women and girls in conducting business during the COVID 19 era in Zimbabwe?
- What are the effects of e-learning to women and girls in accessing education in Zimbabwe?
- What policy recommendations, emanating from the study, can be suggested for improving education, ICT, teleconferencing, networking and e-learning opportunities for women and girls in Zimbabwe?

4. Theoretical Literature Review

This section seeks to present the various theories that support the topic under study. This will be divided into education and ICT related theories.

4.1 Educational Theories

The discussion below is going to be based on three key educational theories and these are: Self-Determination Theory, Transformative Learning Theory and Experiential Learning Theory.

Self-Determination Theory (SLD)

The notion of self-determination is a psychological framework for analysing human motivation (M. Liu and Oga-Baldwin, 2022a). Autonomy, competence, and relatedness are three core requirements identified by self-determination theory as essential to psychological health and well-being (Coumans, Bolman, Oenema, and Lechner, 2022). Thus, in the context of this

paper, the use of e-learning or modern technology requires technological competence. Hence women or girls who do not possess such skills cannot use such technology. As such, since in Zimbabwe there is digital illiteracy and limited usage of ICT there is need for a panacea to that.

Apart from that, intrinsic and extrinsic drives represent opposite extremes of a spectrum. The Self-Determination Theory was created by Deci and Ryan to better comprehend the intrinsic end of the motivational spectrum (M. Liu and Oga-Baldwin, 2022b). The theory highlights the advantages of acting on internal motivations. It is assumed that the individual is capable of acting on their own ideals and goals (Tungaraza and Joho, 2022). Therefore, in as much as one can act on own ideas and goals, in the Zimbabwean context there is need to ascertain if the Zimbabwean women and girls are internally motivated and have the access to use ICT, teleconferencing, networking and e-learning both in the educational or business set up.

To add more, basic psychological needs are the foundation for personality growth and integration, well-being, and positive social development, according to the Self-Determination Theory (Chiu, 2021). Autonomy, competence, and relatedness are the three unique demands identified by the theory. In the context of this paper, this theory is very germane to the study because this paper seeks to unpack the challenges faced by women in doing business during the COVID 19 era in Zimbabwe, within the context of the ICT or fourth industrial revolution perspective.

Autonomy

Autonomy is the ability to feel self-sufficient and act in the world according to one's desires (C. K. J. Wang, Liu, Kee, and Chian, 2019). When a person lacks autonomy, he or she feels governed by factors that aren't in line with who they are, whether internal or external influences. Autonomy is the least regarded as a core psychological need among the three requirements of the Self-Determination Theory (Sheikholeslami & Arab-Moghaddam, 2010).

Competence

Competence is defined as the ability to feel effective in one's work (Sheikholeslami and Arab-Moghaddam, 2010). When someone feels competent, they have control over their surroundings and are confident in their talents. When people are given opportunities to practice their skills in tasks that are well-suited to their abilities, their competence grows (Wang et al., 2019). When jobs are too difficult or too simple, emotions of competence suffer. In terms of this paper, the competence of women and girls to use ICT, teleconferencing and e-learning determine their success in the educational or business set up. Lack of sufficient competence to use the aforementioned ICT tools can have adverse effects too.

Relatedness

The ability to feel linked to people and a sense of belonging is known as relatedness (Wang et al., 2019). This particular paper seeks to examine education, ICT, teleconferencing, networking and e-learning with a specific focus on Zimbabwean women and girls. For networking to be

successful there has to be a medium of communication, as such ICT has emerged as a tool that can be used for networking, especially in the use of online platforms such as LinkedIn, Facebook, Instagram to mention just but a few (Nedeljko, Bogataj, and Kaucic, 2021).

To have one's relatedness requirements met, one must feel significant to the other people in their orbit. This can be accomplished by one individual showing concern for another. For optimal psychological functioning, all three demands must be addressed, according to self-determination theory (Wang et al., 2019). So, even if one's environment fits some demands but not others, one's well-being is bound to suffer. Furthermore, even if people are unaware of these demands or they do not respect their culture, this has an impact on their well-being and relatedness (Banerjee and Halder, 2021).

Transformative Learning Theory

Jack Mezirow initially proposed the Transformative Learning Theory, which is based on the idea that anecdotal observation is an important aspect of the learning process (Thangrattana, Pathumcharoenwattana, and Ninlamot, 2014). It implies that a learner's interpretation of an event gives rise to meaning, which leads to a shift in Behavior, mentality, and beliefs (Von Buettner and Donaldson, 2021). A student may experience a "paradigm shift" as a result of transformational learning, which has a direct impact on future experiences. In the context of this paper, the COVID 19 pandemic resulted in educational institutions, globally, shifting to on line or e-learning. In the Zimbabwean context, the benefits of using such mode of learning needs to be explored focusing on women and girls.

Giving critical thinking chances - Teachers can provide critical thinking opportunities by providing information that exposes new ideas (V. X. Wang, 2018). Students must then be given the opportunity to interact with new material by writing, conversing with other students, and critically examining their own assumptions and ideas. However, for the Zimbabwean economy which is still lagging behind in as far as technological advancement us concerned it is unknown if these benefits accrued to women and girls especially from the time physical gatherings were restricted and bulk of educational and no –educational activities shifted into online mode. This paper will explore more on that.

Providing opportunities to connect with others who are going through similar transformations - Students typically transform 'in community' as they bounce off ideas one to another and are encouraged by the changes their friends and acquaintances go through (Von Buettner and Donaldson, 2021). This theory stresses an important point of networking, and in this paper the same aspect will be explored with regards to women and girls in Zimbabwe's educational and business set up.

Finally, research indicates that it is vital for teachers to create opportunities for students to act on their newly acquired beliefs (Thangrattana et al., 2014). It appears that meaningful transformation will not occur until students are able to actively take efforts to accept their new belief. However, if the majority of remote schools, especially in Zimbabwe, lack access to ICT, the chances of teachers creating meaningful opportunities for students to network and apply newly acquired concepts may be limited.

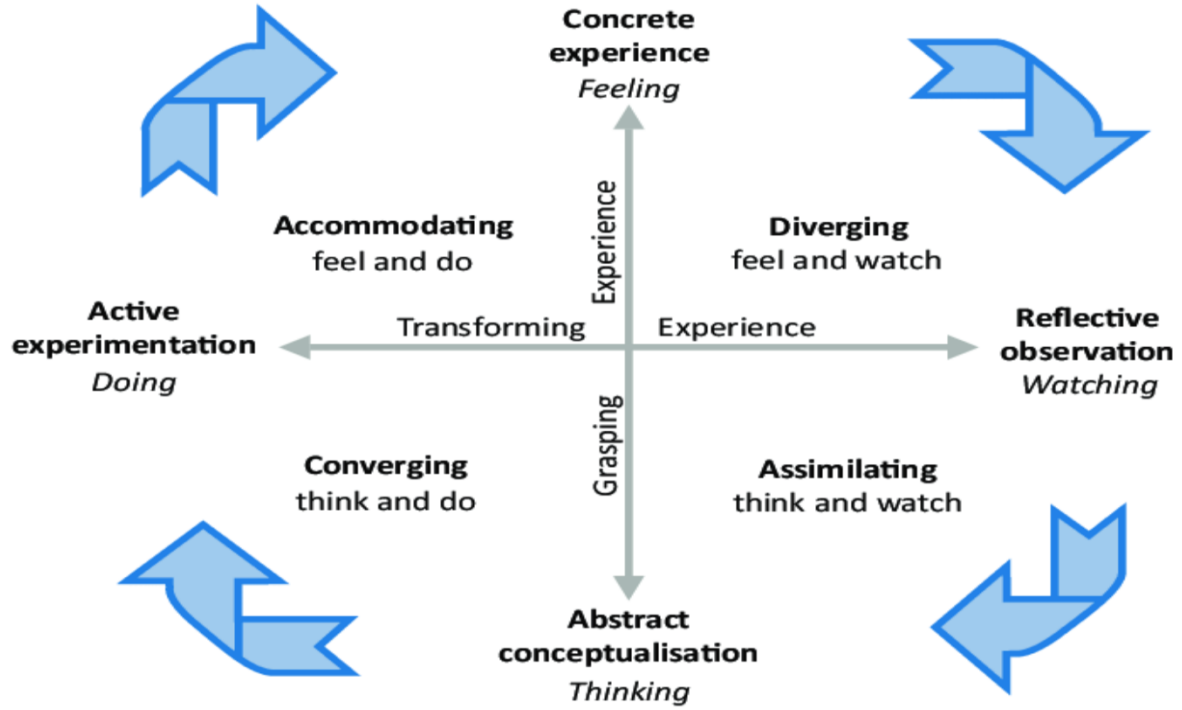
Experiential Learning Theory (ELT)

This type of learning, according to Kolb, is "the process by which knowledge is formed through the transformation of experience (Kolb, 2012)educational psychologists and researchers have posited many theories to explain how individuals learn, i.e. how they acquire, organize and deploy knowledge and skills.The 20th century can be considered the century of psychology on learning and related fields of interest (such as motivation, cognition, metacognition etc.. "The process of grasping and transforming an experience yields knowledge. The relevance of experience and its function in the learning process is emphasized in Experiential Learning Theory (ELT) (Kolb, 1984).

The theory's four basic concepts are having an experience, reflecting on it, thinking about it, and acting on it (Parahakaran, 2017). These ideas cover the stages of ELT, which begin with learners experiencing something new. After having a "genuine" experience, learners can reflect on it before moving on to the next step, which involves brainstorming methods to accommodate the experience (Kolb & Kolb, 2009).

Learners can transform their thoughts into activities that result in the construct of learning and/or generate new experiences after having the opportunity to reflect and think, prompting them to repeat the process (Kolb, 2012). In Zimbabwe, the outbreak of coronavirus led to bulk of activities to be carried out virtually with minimum or zero physical interaction. Thus, it can be assumed that the experience gained of using teleconferencing and e-learning facilities impacted women and girls in diverse ways. Thus, in this paper more on that will be explored with a specific focus on Zimbabwean women and girls. The figure below shows the Experiential Learning Theory.

Figure 1: Experiential Learning Theory



Source: Researcher's Construct (2022)

Figure 1 shows that when one makes observation through watching and thinking, he or she conceptualises some ideas and apply them (active experimentation) and this ultimately builds a certain level of experience. This suggests that, in line with this paper, there is a high likelihood that more women and girls adopted use of e-learning, teleconferencing and networking after they observed some who benefited on it. As such, the usage of such resulted in women and girls gaining experience in the business and educational sector especially in Zimbabwe. However, during that process, some women and girls could have faced challenges and maximised on some benefits, this will be explored further in this paper.

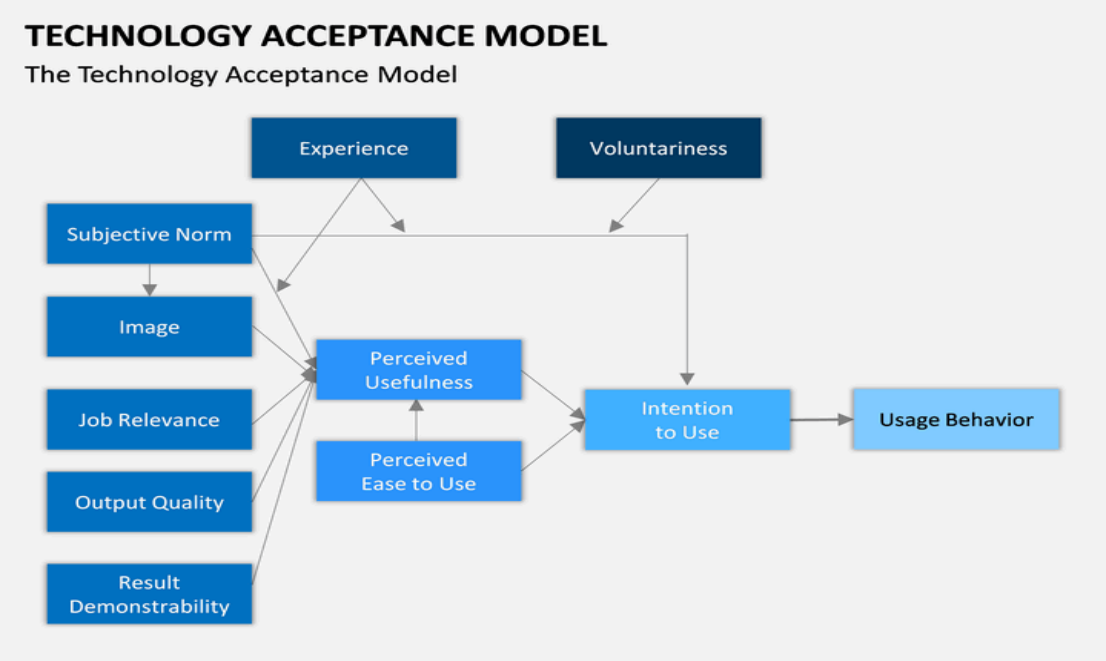
4.2 ICT Theories

Under this segment, the main thrust will be in discussing ICT related theories that support the topic under study. These theories are the Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology.

Technology Acceptance Model (TAM)

One of the most influential models of technology acceptance is the Technology Acceptance Model (TAM; Davis, 1989), which states that two key elements influence an intention of an individual to utilize new technology: perceived ease of use and perceived usefulness (Shanmugavel and Micheal, 2022). For example, an older person who believes that digital games are too difficult to play or a waste of time will be less likely to adopt this technology, whereas an older adult who believes that digital games provide needed mental stimulation and are simple to learn will be more likely to want to learn how to use them (Kabir et al., 2022)a google form was used to collect data from 131 sub-district level extension officers covering 48 (out of 64. Figure 2 below shows the Technology Acceptance Model.

Figure 2: Technology Acceptance Model



Source: Researcher's Construct (2022)

To add more, in terms of perceived usefulness, Davis (1989) defines perceived usefulness as "the extent to which a person believes that utilizing a certain system will improve their job performance. "It refers to whether or not a person considers a piece of technology to be appropriate for their needs (Natasia, Wiranti & Parastika, 2021). This theory is very important in this study on women and girls to use ICT, teleconferencing, networking and e-learning platforms. The primary assumption being that these facilities will be deemed useful, and as such the benefits that accrue to women and girls due to the use of the aforementioned platforms will be explored.

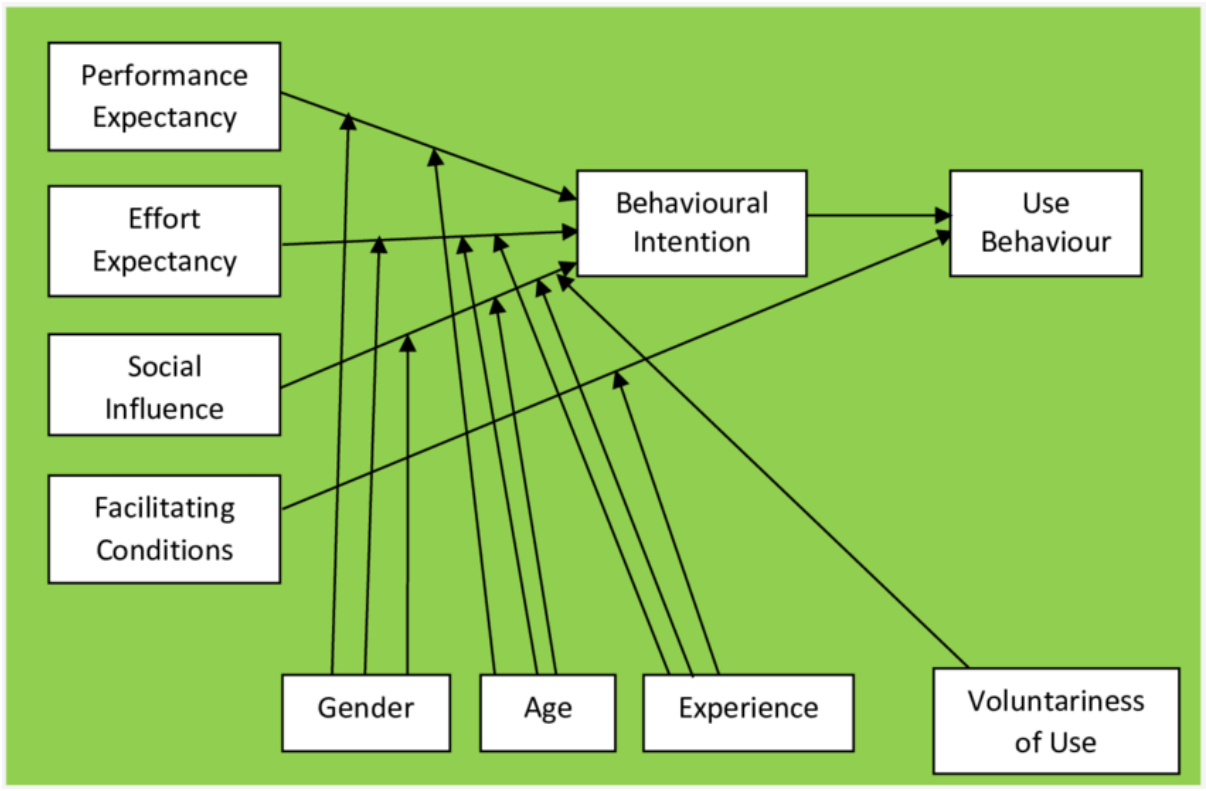
Apart from that, Davis (1989) defines perceived ease-of-use (PEOU) as "the degree to which a person believes that utilizing a given system would be effort-free" (Davis 1989). The hurdles will be overcome if the technology is simple to use. No one likes it if it's difficult to use and the UI is confusing (Appiah, Kretchy, Yoshikawa, Asamoah-Akuoko, and France, 2021). To add more, social influence, for example, is a significant component in determining attitude. Individuals will have the mindset and intention to use technology once these items (TAM) are in place. Everybody is distinct, perceptions may vary by age and gender (Lew, Tan, Loh, Hew, & Ooi, 2020). Digital illiteracy is one key stumbling block that affects the ease of use of technology (Abraham, Ali, Andangsari, and Hartanti, 2020). In this paper, it is yet to be examined how Zimbabwean women and girls managed to cope in using ICT, teleconferencing, networking and e-learning.

Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) seeks to explain how users intend to use an information system and how they actually utilize it. There are four major constructs according to the theory: 1) performance expectancy, 2) effort expectancy, 3) social influence, and 4) enabling conditions (Philippi et al., 2021). The first three are direct predictors of usage intent and behaviour, whereas the fourth is a predictor of user behaviour (Nordhoff, Malmsten, van Arem, Liu, and Happee, 2021). The figure below summarises or shows the UTAUT.

The impact of the four major constructs on usage intention and behaviour is thought to be moderated by gender, age, experience, and voluntariness of use (Ayaz and Yanartaş, 2020). The theory was created by reviewing and combining the constructs of eight models that havex previously been used to explain information system usage behaviour (Gunawan, Sinaga, and Sigit Purnomo, 2019) . This theory is very important to this paper. This is so since the three major aspects of the theory which are performance expectancy, effort expectancy, social and influence have a bearing in as far as the use of ICT, teleconferencing, networking and e-learning by Zimbabwean women and girls are concerned.

Figure 3: Unified Theory of Acceptance and Use of Technology



Source: Researcher's Construct (2022)

4.3 Review of Related Literature

This section seeks to present the review of recent research articles. (Arceo-Gómez et al., 2020) carried out research on the impact of COVID 19 on women. The research findings proved that women suffered more financial losses as they had to divert their resources to take care of their loved ones and families. This implies that, some of the financial savings meant for the business were eroded due to the burden of COVID 19 and some women ended up closing their business and they were exposed to the vicious jaws of poverty (Arceo-Gómez et al., 2020). Apart from that, it was also realised that women and girls ended up devoting more work on unpaid care work, as more and more people were affected by the deadly pandemic (Arceo-Gómez et al., 2020). Research shows that 70% of the informal business in developing economies, such as Zimbabwe, are sustained by women, thus the above explanation depicts the adverse effect that was experienced by women in their businesses.

To add more, in Zimbabwe women vendors experienced a drop in their revenue as some of the second-hand products they were importing from China were banned amid fears that the clothes were contaminated with the deadly Coronavirus (Oosterom and Gukurume, 2020). Apart from that, research has proved that Zimbabwean women in business suffered from poor financial support due to the limited funding provided by the government, for example, the government offered ZWL600 million to small businesses, but the money was too little, and this was further exacerbated by the fact that the Zimbabwean currency is on a nose diving loss of value (Chamunogwa, 2021). Thus, this further worsens the fact that women entrepreneurs are generally viewed as less credit worthy, have less exposure to business practises such as the use of teleconferencing facilities and have limited networking opportunities , thus their

chances of getting loans or lines of credit are between slim and next to nothing (Charuma, Nyoni, and Kapepa, 2021).

Tesemma (2020) examined the impact of the COVID 19 pandemic on girls in Africa, where a total of 120 million girls were adversely affected by the closure of schools. Of note and concern is the fact that Zimbabwe is part of these statistics.

Research findings depicted that due to a lack of ICT facilities and data, many girls have been denied access to online learning, basic healthcare, and protection, and thousands have been subjected to abuse and exploitation (Tesemma, 2020). Aside from that, several students of school going age were malnourished, for example during the outbreak, more than 26 million African girls skipped school meals (Tesemma, 2020). To add more, research findings proved that e-learning was not inclusive to all girls as it was only accessible to learners using limited major languages (Tesemma, 2020).

From the research it was further discovered that, some girls were digitally excluded from ownership of smartphones and related gadgets to use for e-learning (Tesemma, 2020). Thus girls in rural areas from poor economic backgrounds were excluded from accessing e-learning due to poverty and lack of ICT devices. This is also supported by (Chamunogwa, 2021) who posited that in the Zimbabwean rural areas only one quarter of the children were engaged in e-learning. This implies that the majority lacked access to online education. Though the research does not give clear statistics on the gender distribution of those who lacked access to e-learning facilities, it is with no doubt that girls and children living with disabilities were also adversely affected (Chamunogwa, 2021). However, some of the students were saved from walking long distances to school as they could follow some of the educational activities via WhatsApp. Apart from that, access to some sporting activities was affected as most of the sporting activities could not be done online.

Apart from that, due to limited ICT knowledge, girls were exposed to uncensored online material which exposed them to online sexual predators (Tesemma, 2020:15). This also increased access and use of the girls information by other users, since some of the girls were not aware of data privacy and protection measures (Olaitan Anifowoshe, Aborode, Anifowoshe, Ifeoluwapo, Ayodele, Rebecca, Iretiayo, & Oluwafemi, David, 2020).

A study by Liu, Wei and Xu (2021) on women led business during the COVID 19 era on a global scale, realised that women-led enterprises are less likely to obtain bank loans and are more inclined to cut their workforce, particularly female employees. This indicates that lack of funding and labour are crucial factors that affected women during the pandemic. These research findings are at par with the views of Mbunge et al. (2021), who posited that local business people in Zimbabwe experienced increased huge overhead costs and reduced revenue during the Coronavirus period, and some of the business were closed for good.

Similarly, Chirisa et al., (2021) researched on the effects of the COVID 19 pandemic on the Zimbabwean economy. The research findings proved that the informal traders (both men and women), and remittances' contribution to urban and rural livelihoods were affected. Apart from that, it was also discovered that the use of internet banking increased during the pandemic time, but this was only advantageous to those with the technological know-how (Chirisa et al., 2021).

To add more, the use of e-banking and teleconferencing among business players (women and men) was greatly affected due to high data costs as well as lack of smartphones and laptops

(Chirisa et al., 2021). This also affected the chances of women in networking as some had no IT compliant gadgets to use.

In terms of access to education, it was realised that private schools had better access to online learning platforms as compared to rural schools. This implies that educational access was biased towards those with access and know-how of e-learning. Apart from that, students were excluded from online examinations due to lack of technology, this affected female learners as well. Well-developed private schools progressed further educationally because all their educational activities were done online. Thus, the gap between the rich and poor female students widened due to technological issues. In some areas in Zimbabwe, especially primary school pupils never attended any class during the COVID 19 period, thus the pedagogical status for such students was adversely affected. The long –term effects were prolonged educational periods, as well as pressure on students to complete their syllabus.

Matose, Maviza and Nunu (2022) researched on irregular migration of female migrants from Zimbabwe. These migrants usually buy and sell goods from Botswana. From the research it was realised that some of these women suffered loss of goods or money due to harsh conditions they faced while they travelled to Botswana (Matose et al., 2022). Due to the increased hardships of COVID 19 lockdowns, some of these women continued in their business of cross boarder trading but were exposed to rape, violence, robbery and pyscho-emotional harassment (Matose et al., 2022).

Zeidy (2020) did a study on 'The Economic Impact of COVID 19 on African Enterprises,' The findings proved that African business suffered major challenges such as closure business, lack of cash flows, reduced demand of goods and services, obstacles in logistics and shipping of products, challenges of acquiring raw materials, reduced worker productivity as well reduced chances to meet new clients. These challenges also affected Zimbabwean women since Zimbabwe is part of the African continent.

Relatedly, Makurumidze (2021) researched on 'The financial impacts of COVID 19 on women entrepreneurs in Harare.' The survey found out that small manufacturing and commerce SMEs managed by women have been among the most hit financially by the crisis (Makurumidze, 2021). Aside from that, the findings revealed that 18 percent of women-owned firms reported a drop in equity as a result of the epidemic. Due to technological issues, 26 percent of women entrepreneurs were unable to receive orders online as a result of the national lockdown's complications (Makurumidze, 2021). It was also discovered that female entrepreneurs were paying more for their goods.

On another dimension, Torres (2021) researched on 'The Impact of the COVID-19 pandemic on women-led businesses. The research findings depicted that suspension of in-person operations and mobility restrictions, supply chain interruptions, diminishing consumer demand, and lack of access to digital technologies have all been problems for women-led businesses (Torres, 2021). Again, it been discovered that female entrepreneurs have less and poorer social network relationships than their male counterparts (Torres, 2021).

Lastly, (Rudhumbu et al., 2021) examined 'Online Teaching Behaviours in Zimbabwean Universities during the COVID 19 era.' The findings proved that the majority of universities lack suitable ICT infrastructure, leadership support and training opportunities are minimal. The ICT regulations regarding online education are unclear (Rudhumbu et al., 2021). Apart from that, it was shown that most university lecturers adopted the lecturer-centred teaching

styles, which has an impact on students' active participation in online learning. (Rudhumbu et al., 2021).

5. Research Methodology

The Qualitative Approach was used in this paper and Documentary Analysis was the main data generation procedure. Research articles that focus on Africa, Sub-Saharan Africa and Zimbabwe were used to gather the key answers to the research objectives of this paper.

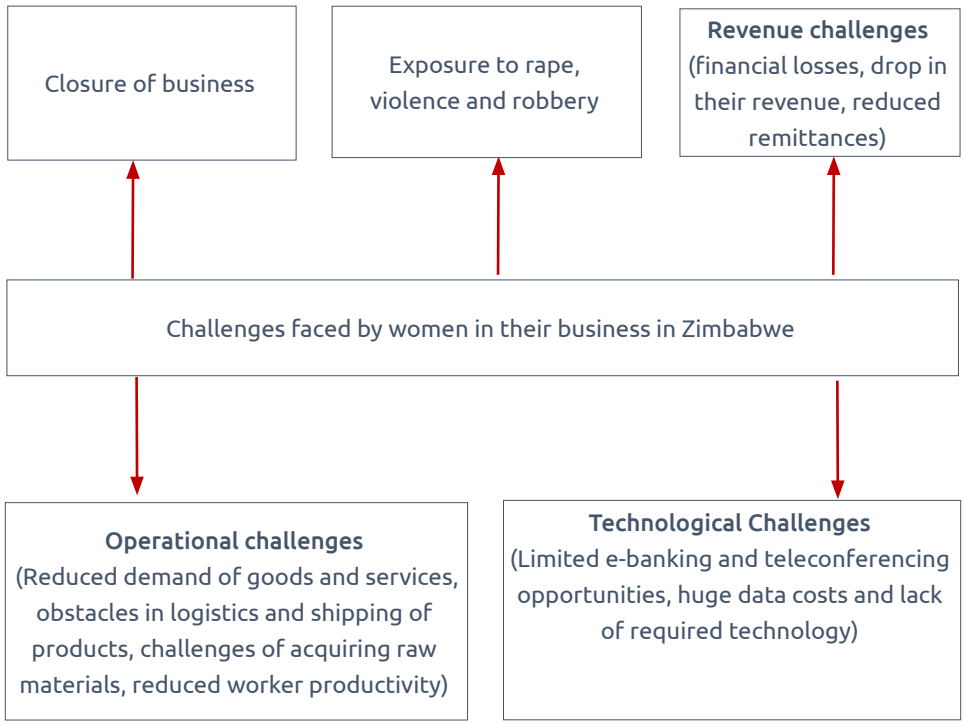
5.1 Data Analysis

This section seeks to present the data analysis. The following themes emerged from the literature review and they will be used to answer the research questions. The first research objective is restated below:

- To unearth challenges faced by women in their business during the Coronavirus era in Zimbabwe.

Figure 4 below shows that the main challenges that were faced by women in their business during the Coronavirus attack in Zimbabwe were many. These were grouped into operational, technological as well as revenue related challenges. The key operational challenges that women faced were reduced demand of goods and services, obstacles in logistics and shipping of products, challenges of acquiring raw materials, reduced worker productivity. Apart from that, in terms of revenue challenges it was realised that Zimbabwean women were exposed to obstacles such as financial losses, a drop in revenue, as well as reduced remittances.

Figure 4: Business challenges faced by women in Zimbabwe



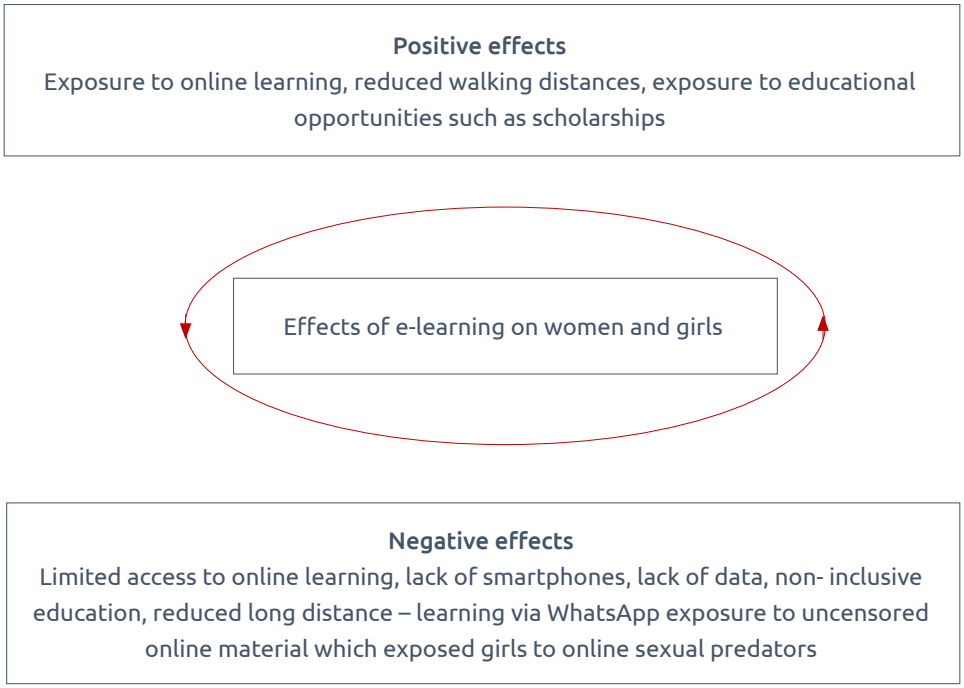
Source: Researcher's Construct (2022)

In terms of technological challenges, it was realised that women in Zimbabwe suffered from limited e-banking and teleconferencing opportunities, huge data costs and lack of required technology during the COVID 19 pandemic. Other challenges that were faced by women, especially cross boarder traders, included exposure to rape, violence and robbery as well as closure of their business. This suffices in meeting the demands of the first research objective of this paper.

The second research objective of this paper is restated below:

- To determine the effects of e-learning to women and girls in accessing education in Zimbabwe.

Figure 5: Effects of e-learning to women and girls



Source: Researcher's Construct (2022)

Figure 5 shows that the key negative effects of e-learning on women and girls in accessing education in Zimbabwe were limited access to online learning, lack of smartphones, lack of data, non- inclusive education, reduced long distance – learning via WhatsApp exposure to uncensored online material which exposed girls to online sexual predators. On the other hand, the positive effects of e-learning were exposure to educational opportunities such as scholarships and increased interaction and access to the global village. However, the costs outweigh the benefits and this has been largely attributed by the poor ICT infrastructure as well as limited ICT technology.

6. Policy Recommendations

This section seeks to present the policy recommendations of this paper. This will help to answer the third research objective of paper:

- To offer policy recommendations on ways of improving education, ICT, teleconferencing, networking and e-learning opportunities for women and girls in Zimbabwe.

This objective was successfully answered with the aid of the research question below:

- What policy recommendations, emanating from the study, can be suggested for improving education, ICT, teleconferencing, networking and e-learning opportunities for women and girls in Zimbabwe?

Going by the study findings presented above, together with the reviewed literature on the researched issue, the following policy recommendations are made:

1. That there be a deliberate step up on the part of Government in financing the programmes to train women and girls on the use of ICT and other online facilities.
2. That the marginalised women and girls be given priority through National programmes that promote ICT use, through Gender related groups and the Government Departments that directly deal with women affairs.
3. That donour agents and other NGOs be seriously engaged to assist with the improvement of women accessibility to ICT compliant gadgets for ease of access.

7. Conclusion

This paper has examined Education, ICT, Teleconferencing, Networking And E-Learning with a specific focus on of Zimbabwean women and girls during the COVID 19 pandemic, through qualitative research techniques. The study findings and policy recommendations have been chronicled above, and the need to step up funding and programmes to enhance the capacitation of women and girls cannot be re-emphasised.

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BOOK REVIEW

Law and Industry 4.0: Selected Perspectives on a New Scholarship of Teaching and Learning

Edmund Terem Ugar
University of Johannesburg

Law and Industry 4.0: Selected Perspectives on a New Scholarship of Teaching and Learning. Edited by Letlhokwa Mpedi and Mzukisi Njotini. LexisNexis (2020).

The articles in the book, *Law and Industry 4.0: Selected Perspective on a New Scholarship of Teaching and Learning* (edited book by Mzukisi Njotini and Letlhokwa Mpedi) address the disruption that is currently experienced in the education sphere, especially for legal students, educators, and practitioners, due to the proliferation of the technologies of the Fourth Industrial Revolution (4IR), such as robotics, artificial intelligence (AI), and information communication technologies (ICTs).

Several theorists have engaged with the positive and adverse effects of the technologies of the 4IR on society. On the one hand, theorists such as Klaus Schwab (2017) and Xu et al. (2018) contend that technologies of the 4IR can improve production in different nation-states, especially developing countries. In addition, Wim Naude (2019) and Ayentimi Tutu and John Burgess (2019) hold the view that the technologies of the 4IR can blur the inequality lines that exist in sub-Saharan Africa by creating jobs through the manufacturing and upskilling individuals to engage with this technological age. This is because the technologies of the 4IR are characterised by intensified technologies, such as AI, robots, and ICTs, which are important developmental bolsters.

On the contrary, some thinkers argue that there are some adverse effects of the 4IR technologies within the context of sub-Saharan Africa. Edmund Ugar (2022) points out that sub-Saharan Africans do not have the requisite resources and skills to engage with the technologies of this industrial era. The technologies of this epoch are disruptive due to their unpredictability. Consequently, these technologies have the potential to monopolise jobs, that is, ensuring that all jobs gravitate towards technologies and while jobs that are not technologically oriented become redundant (Ugar, 2022). However, while these arguments have been raised in the literature on the technologies and mindset of the 4IR, Mzukisi Njotini and Letlhokwa Mpedi (2020) and the contributors of this current reviewed book focus precisely on the effects of 4IR technologies in the academia and law firms.

The authors seek to investigate how to navigate through the effects of technologies within the legal sphere, especially in academia. Undoubtedly, with the ubiquity of technologies such as AI and ICTs, many jobs are being automated; what used to be the traditional way of teaching is now slowly becoming obsolete. Currently, students can attend lectures remotely using technologies such as the internet and devices that make communication feasible. The

emergence of COVID-19 upsurged the movement from traditional contact learning to mostly remote learning.

Contributing authors such as Daleen Millard and Riaan Loots (2020) point out that the use of technologies such as learning management systems (LMS) software attached to a technology like Blackboard, used for online learning at the University of Johannesburg (UJ), is of immense importance to teaching and learning. They argue that by using LMS, lecturers in the law department at UJ can now track students' progress and know struggling students who need academic, socio-economic, and psychological assistance using predictive analytics. Here, analytics means "the process of analysing data to uncover patterns using computer algorithms, programming and statistical modelling techniques to find valuable, timely correlations. This allows an institution to identify actionable insights which can drive decision-making" (Millard & Loots, 2020:7). Through learners' participation in the online space, using predictive analytics, educators can predict their performance and provide interventions where necessary. Blackboard Learn, used by the Faculty of Law at UJ, has been particularly useful in this regard. To get an accurate result from the abovementioned analytics, students' data, including their demographics, past education, and socio-economic conditions, are loaded into the system (Millard & Loots, 2020:9).

Furthermore, the book addresses the problem of disruption of the educational system from the perspective of robot-aided learning- a new learning method that is a step further from e-learning and uses robots to supplement teaching activities in schools (Njotini 2020:36). The book seeks to find out ways educators are adapting to this new trend and the skills they have acquired to enable a swift transition into the current modus operandi of educating students.

In addition, the book exposes the need for educators to leverage the benefits of technologies of the 4IR to accentuate teaching and learning, especially for law students. The book focuses on law students due to the automation of various legal apparatuses and ways in which legal authorities conduct their affairs. Currently, we now have sophisticated robots that are proliferating and acting as robot lawyers. For example, technologies such as Lisa and Billy, robot lawyers, are disrupting the traditional way of interpreting the law by automating legal services (Van Eck, 2020: 47). Given this disruption, there is a call for educators to diversify the skills of their law students in the age of advanced automated technologies. This is to ensure that universities remain afloat in producing law students. Nonetheless, this does not only apply to legal institutions and students. Technological disruption cuts across every facet of the education system. As a result, it has become evident that teaching and learning in our current social milieu categorised by technology can only be seamlessly feasible if educators can understand how technology works (Njotini, 2020:34).

Finally, the book also challenges educators within the law departments to ensure that they understand the disparity between different generations and their exposure to technologies when teaching. For example, the baby boomers generation, that is, those born after the Second World War; the X generation, children of the baby boomers; and the Y generation, those born in the 1980s, have different exposures to technologies (Louw 2020:64). Thus, law educators must learn how to use blended learning to accommodate these different generations of learners.

In as much as the book exposes the benefits of technology to the future of learning and teaching, the contributors also point out some of the adverse effects of the proliferation of technology, especially predictive technologies. For instance, Millard and Loot (2020) contend that predictive technologies such as Blackboard Learn were not produced for the context

of sub-Saharan Africa. As a result, these technologies do not consider the socio-economic conditions of this locale and their education grading method. For the authors, this posed some challenges to educators. I (Ugar 2022) have engaged elsewhere with the idea that technology should be regionally politicised to capture the conditions of various regions, a view that can be corroborated with the concerns of these authors. Here, I argued that technology is not value-neutral; it comes with its designers' values, norms, and politics embedded in them. This view is also shared by Winner Langdon (1989) and Don Ihde (1993).

In addition, the book also points out that predictive analytics may be biased. This is on the basis that because students come from certain demographics, plagued with certain socio-economic challenges, the technology then "assumes" that they may be facing academic challenges. However, it is not always the case that people from humble backgrounds experience academic challenges. Thus, a student's profile does not immediately tell if the student is having learning difficulties, as the predictive technologies will "assume."

Finally, the book is well written and organised. The book is written most simplistically and addresses a very important issue of our current social milieu: the rampant production of technologies and how these technologies affect the future of teaching and learning. In addition, even though the book is specifically written for the legal audience and educators, it applies to all education and work spheres. The book comes at a very important time in our history, the COVID-19 pandemic. It is an important time because of how the pandemic forced everyone to work, teach, and learn remotely while relying on technologies during the pandemic. The book challenges all educators to accept that technology is here to stay; it is all left for educators to upskill themselves to be relevant in this technological epoch.

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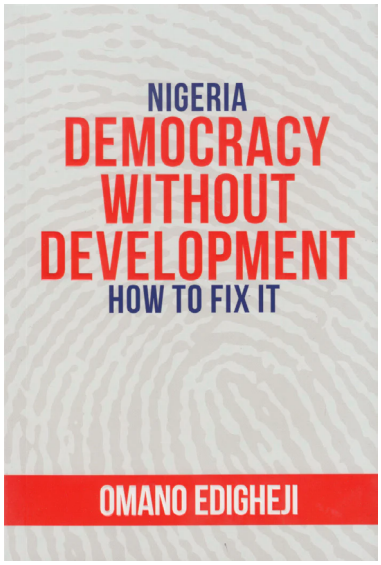
BOOK REVIEW

Nigeria Democracy without development: How to fix it

Lesego Motsage
Institute for Pan-African Thought and Conversation (IPATC)
University of Johannesburg



Nigeria Democracy without development: How to fix it. By Edigheji, O. 2020. Alime Media Limited

Nigeria is a democratic state as well as the wealthiest country in Africa. However, Nigeria is not where the people of the African continent expected it to be twenty years after democracy was instated. The author states, "There is a general assumption that democracy leads to inclusive and sustainable social and economic development" (pg. xxiii). The assumption here is that Nigeria should have witnessed the progressive development characterised by increased infrastructure, employment, equal opportunities for all and high patriotism amongst its citizens rather than the retarded development currently. However, this is not the case for Nigeria; democracy in Nigeria is characterised by corruption, low development, and mismanagement of natural resources. The characteristics mentioned above are why Mr Omano Edigheji saw a need to write this book: he wanted to bring to light the discrepancies within Nigeria's leadership and why Nigeria has not seen any development in the last two decades lastly, to provide solutions to Nigeria's problems.

Omano Edigheji claims that the political elite in Nigeria has excluded the rest of Nigerians from the benefits of democracy. "The economy benefits the wealthy, especially politicians who have used the state as a means of private accumulation rather than the provision of basic services to the people of Nigeria" (pg. xxv). The people who are supposed to propel the country and its citizens forward are the reason for its low development. This leads to ordinary civilians having less faith in the concept of democracy. Omano Edigheji believes that democracy is the best form of rule in Nigeria; however, it needs to be developmental. "I call for Nigeria to build a Democratic Developmental State (DDS), a state that is developmental and democratic" (pg.xxv). He worries that Nigeria has had two democratic regimes that resulted in the military taking over and did not work well for Nigeria, so he does not want history to repeat itself. He fears that Nigerian civilians negatively perceive the concept of democracy. However, he highlights in the book that reason for the discrepancies happening in Nigeria is not because of the concept of democracy but rather the people who are supposed to implement democratic practices in Nigeria.

According to Omano Edigheji, "political elites are embezzling state funds for their enrichment and are doing nothing to help emancipate everyone who lives in Nigeria" (pg49). The book is centred around two key arguments: the democratic Nigerian government is characterised by

the poor political leadership and weak institutions. In simple terms, Nigeria is a democratic country on paper, and the only apparent practice of democracy in Nigeria is that free and fair elections are held every four years. Furthermore, the book highlights corruption as a norm in Nigeria, and opportunities are distributed based on nepotism and cronyism.

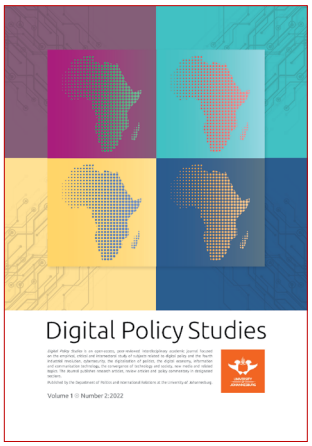
The author uses statistics and graphs throughout the book to emphasise his claims; the book takes a scientific approach and is well-written and well-researched. The author should be commended for writing this book, and he does not restrict or censor his opinions; he lays it all out in the open, the good, the bad and the ugly. He leaves no stone unturned. It takes courage to be able to write and publish what everyone is thinking in their heads but is too scared to say out loud. The author does not use complex or bombastic words so that the ordinary Nigerian can skim this book. It is impressive that the author needs to criticise and speak about all that is wrong with the current leadership of Nigeria. However, he provides feasible solutions to fix the problems and calls on all Nigerians to participate in the revamping of making Nigeria great.

What is impressive about the book is that the author provides solutions to the issues faced in Nigeria; one can feel the author's patronage and love for his birth country Nigeria. Just like Martin Luther King, Omano Edigheji has a dream. In the final chapter titled "The Nigeria of my Dreams", He shares his dream of a Nigeria without Poverty, unemployment and inequality, "I dream of a Nigeria where the rule of law will prevail, and human rights will be respected" (pg. 143). He leaves no one behind in his dream of a better Nigeria and asks all Nigerians to work together to make his dreams a reality.

A critic of the book is that the author paints Developmental Democracy as the only answer to Nigeria's shortfalls; however, he does not adequately highlight the disadvantages and challenges of implementing development democracy. According to him, "there is no other future for Nigeria unless it implements a Developmental democracy" (pg.19), assuming the approach is the only flawless concept for Nigeria's future solution. The book would have been more impactful if it had explored other theories and democratic concepts and practices that would benefit Nigeria. The book is well structured but repetitious, and the author keeps reinforcing the same arguments throughout the book using different words.

In Conclusion, the book is very informative and inspiring as it sheds light on many unjust practices happening in Nigeria and shares guidelines on how to fix the issues. It comes at a very appropriate time when the African youth are invested in Politics and how their countries are run. The book calls for action to the Political elite to do things better and encourages Nigerian youth to actively participate in the country's affairs and assist in eradicating injustices present. Anyone can read this book and feel inspired; the book is worth a read.

Call for Papers and Special Issue Proposals



Digital Policy Studies is an open-access, a peer-reviewed interdisciplinary academic journal focused on the empirical, critical and intersectoral study of subjects related to digital policy and the fourth industrial revolution, cybersecurity, the digitalisation of politics, the digital economy, information and communication technologies, the convergence of technology and society, new media and related topics. For us, digitalisation is a broad concept that can only be grasped with the use of tools and approaches of multiple disciplines for an interdisciplinary readership.

Recent articles in *Digital Policy Studies*, for example, have covered aspects of the following:

- COVID-19 and Healthcare
- Digitalisation of Politics
- Digital Access and Inequality
- Diplomacy and Digital Technologies
- Education and Digital Technologies
- Industrial Revolutions
- Social Media
- Technology and the Future of Work

Research Articles

All research article submissions are subjected to a thorough peer-review process for publication in open-access online. Articles must be between 5, 000 and 8, 500 words. They must be written in accessible English. Use the Oxford Dictionary spelling. Papers must be referenced according to the APA referencing and citation style (author date: page number, e.g., Chan, 2021: 3).

Visit https://journals.uj.ac.za/index.php/dps to learn more about the journal and submit your articles for consideration. Please study the Guidelines for Authors before making your submission.

Book Reviews

Book Reviews of no more than 1500 words are welcome. Please send the title and author(s) of the book you intend to review to Dr Emmanuel Matambo on: ematambo@yahoo.com. Please use the subject line 'DPS Book Review' in your submission email.

Policy Commentaries

Policy Commentaries and Opinions of no more than 1500 words are also welcome. Submit by sending one to Dr Tinuade Ojo at: Tinuade.Ojo@digitalpolicystudies.org. Please use the subject line 'DPS Policy Commentary' in your submission email.

Special Issues

Special issues are welcome. Please contact Dr Bhaso Ndzendze (Editor In Chief) to propose a special issue at bndzendze@uj.ac.za. Please use the subject line 'DPS Special Issue' in your email. Please submit a 1-2 paged document stating the following:

- The title of your proposed special issue;
- The rationale, aims and scope of your proposed special issue;
- The brief professional biographies of the proposed guest editors;
- The draft call for papers for your proposed special issue;
- The timeline of the publication of your special issue.

Payment Policy

No payment is expected from contributors. Neither do we pay contributors for their works.