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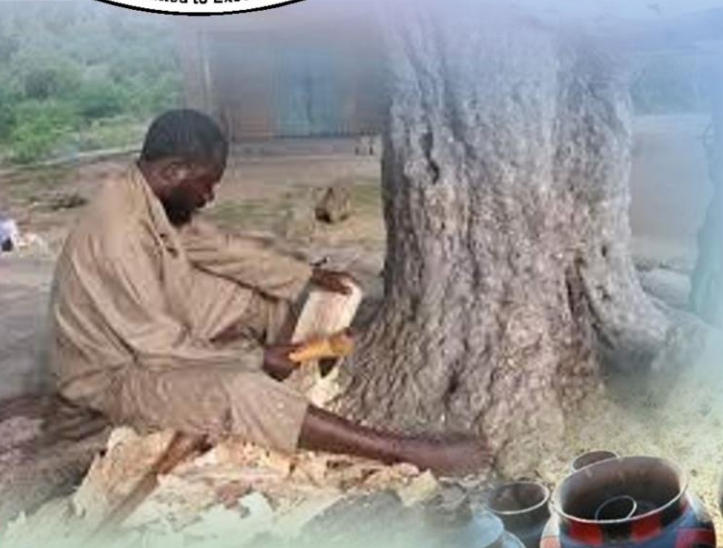

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The purpose of the *Kuveza neKuumba - Zimbabwe Ezekiel Guti University Journal of Design, Innovative Thinking and Practice is* to provide a forum for design and innovative solutions to daily challenges in communities.

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Planners, engineers, social scientists, business experts, scholars and practitioners from various fields.

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Artificial Intelligence and Design of the Future - Some Serious Deep Thoughts

CHRISPEN MUSEKIWA[1] PERSISTENCE MUUNGA[2] AND FERDINAND KABOTE[3]

Abstract

This article explores the impact of artificial intelligence (AI) on society through the lens of technological determinism and singularity theories. Technological determinism is the notion that technology shapes and controls society and human behaviour. Singularity is a theory that asserts that AI has already become a million times smarter than humans and can self-improve beyond what humans first taught AI applications and machines. The Singularity Theory predicts an intelligence explosion from Artificial General Intelligence soon, in which humans are likely to lose the dominion that they have enjoyed since creation, millions of years ago. AI, in its generative and autonomous or self-improving state or form, may lead to the automation of many tasks currently performed by humans. This could lead to both benefits and challenges, such as increased efficiency but also job losses. In addition, the article discusses the impact of AI on privacy and raises ethical concerns about the potential misuse when in the hands of bad people. It also discusses ways to ensure that AI is used responsibly and beneficially. This includes governmental authorities developing ethical guidelines for AI development and implementation and ensuring that AI systems are safe, transparent and accountable.

Keywords: technological determinism theory, singularity theory, ethics, privacy, responsible technology.

INTRODUCTION

The fourth industrial revolution (4IR) has been dominated by AI, whose development acceleration is at an alarming rate. There is currently an AI race, like the arms race which existed during

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the Cold War era between the USA and the Soviet Union. Several computer scientists are trying to outdo each other in inventing AI systems. There is no doubt that AI has made things easier for society. AI systems have improved and simplified complicated tasks. This article focuses on AI, its benefits and threats to humanity through studies by scholars and inventors of AI. It also provides warnings by world-acclaimed computer scientists and inventors about the possible end to human dominion of earth, an existential threat from artificial general intelligence. Furthermore, it also discusses what computer scientists and governments should do to avoid an intelligence explosion of AI technology getting out of control and subjugating humans.

As the presence of new technology in our everyday lives increases, sometimes the public may suddenly become alarmed by its towering presence. It is not clear when exactly this happens. For instance, in the last decade (2010s), several regulation efforts all around the world were launched to handle the ethics of AI. Global institutions like UNESCO, professional bodies like the IEEE (Institute of Electrical and Electronics Engineers (2019) and the European Union (EU) (2020) and several other organisations and companies, made declarations in this area in or close to 2019 (Héder, 2020). Their urgency appeared quite similar to what is being experienced around global warming and it can be argued that the reason is the same: AI has a tremendous lock-in potential.

As argued by Langdon (2013), in the eyes of scientists and technicians, technology imposes the question of moral dilemma that hovers menacingly. Since World War II, scholars have become increasingly sensitive to the fact that scientific technologies have profound and often unfortunate consequences on the world at large. For Langdon (*ibid.*), there is no doubt that developments in the technical sphere continuously outpace the capacity of individuals and social systems to adapt. He argues that as the rate of technological innovation quickens, it becomes increasingly difficult to predict the range of effects that a given innovation will have. When compounded by the increasing complexity of socio-technical systems, these changes make it more difficult to carry out some

of the most basic activities of social life. However, radical critics argue that what deserves our attention is not the rate of technological innovation and its effects, but rather the very existence of advanced technology in the life of man.

BENEFITS OF AI

Some benefits have accrued to society using different AI systems. One of the major benefits of AI to humanity is the ability to improve efficiency and productivity. For example, AI can be used to automate tasks that are repetitive and time-consuming, freeing humans to focus on more creative and complex tasks (Brynjolfsson, 2014). AI intelligence can improve decision-making and problem-solving. AI systems can analyse large amounts of data and identify patterns that humans may not be able to see (Davenport, 2007). Furthermore, AI can increase accuracy and reduce errors. AI systems can process large amounts of data with a high degree of accuracy, which can reduce errors and improve the quality of decision-making (Domingos, 2015). Domingos (*ibid.*) argues that AI can help in making decisions in all areas of life, from business to health care.In health care, AI is being used to improve diagnostics and treatment in several ways. For example, AI systems can analyse large amounts of medical data to help doctors make more accurate diagnoses and personalise treatment plans for individual patients (Topol, 2015). Topol posits that AI will revolutionise healthcare by making it more efficient and more personalised.

For populations in remote areas, AI can improve access to healthcare. AI systems can be used to provide remote monitoring and diagnosis, which can help improve access to health for people who live in rural areas or who have limited mobility (Kraft, 2011). Kraft states that AI will play a key role in bringing healthcare to the people who need it most.

Mesko 2017) talks about Telemedicine, which uses AI-powered chatbots to interact with patients, provide information and even help with diagnosis. For example, a chatbot could ask a patient about their symptoms and recommend whether they need to see a doctor or not. This improves access to healthcare while reducing costs.

As AI systems become more advanced, the idea of machines becoming more intelligent than humans is no longer the stuff of science fiction. The concept of AI systems surpassing human intelligence is known as the "singularity" or "intelligence" explosion. This idea has been explored in science fiction and popular culture for decades, but it is now being taken seriously by scientists and researchers (Gershenfeld, 2016; Dunn 2020).

Despite the concerns about bias and security, there are ways to address these issues. One way is to ensure that AI systems are developed with ethical principles in mind, such as transparency and fairness (Nardulli, 2020). Another way is to create independent oversight bodies that can monitor and regulate the development and use of AI systems (Kosoff, 2020). By taking these steps, society can ensure that the benefits of AI are realised, while the risks are minimised. However, even with these safeguards in place, there is still the potential for AI systems to have unintended consequences. For example, as AI systems become more advanced, they may reach a point where they are unpredictable and beyond human control (Knight, 2019). This is known as the "black box" problem and it raises serious concerns about the safety and reliability of AI systems. In addition, AI systems may have unpredictable economic and societal impacts that could be difficult to anticipate and manage (Dunn, 2020).

CONCEPTUAL FRAMEWORK

AI, or artificial intelligence, is a broad term that refers to computer systems that can perform tasks that would typically require human intelligence, such as understanding natural language or recognising objects in images. AI is closely related to the concept of machine learning, which is a subset of AI that involves systems that can learn from data and improve their performance over time (Gershenfeld, 2016).

Machine learning is often used to develop AI systems that can recognise patterns in data, such as speech recognition or image classification. Machine learning is also used to power recommendation or recommender systems, that are used by companies like Netflix and Amazon to recommend products or content to users based on their previous behaviour. AI

machines are taught by uploading large amounts of data into a computer. This is called Deep learning which is a type of machine learning that uses algorithms loosely inspired by the way the brain works. Deep earning is particularly useful for complex tasks like image and speech recognition (LeCun *et al.*, 2015). Reinforcement learning is a type of machine learning that involves training an AI system to take a series of actions that maximise its chances of achieving a specific goal (Sutton and Barto, 2018).

Unsupervised learning is a type of machine learning that involves training an AI system to find patterns in data without being given labels or categories (Hastie, Tibshirani and Friedman, 2009). This type of learning is often used for tasks like data clustering and anomaly detection.

Supervised learning is a type of machine learning that involves training an AI system using labelled data (Geman and Bienenstock, 1992). This type of learning is often used for tasks like classification and regression. Transfer learning is a powerful technique that can be used to improve the performance of machine learning algorithms on new tasks (Pan and Yang, 2010). Transfer learning can be particularly useful when there is a limited amount of labelled data available for the new task, or when the new task is similar to a task that has already been learned. By transferring knowledge from one task to another, transfer learning can significantly reduce the amount of training data needed for the new task. Supervised learning and unsupervised learning are two broad categories of machine learning. Supervised learning uses labelled data to train an algorithm, while unsupervised learning uses unlabelled data. Transfer learning is a technique that can be used within either category and it involves transferring knowledge from one task to another.

AUTONOMY AND MASTERY

As argued by Valery (1992), the whole question comes down to, can the human mind master what the human mind has made? One symptom of profound stress that affects modern thought is the prevalence of the idea of autonomous technology - the belief that somehow technology has gotten out of control and follows

its course, independent of human direction. That this notion is (at least on the surface) patently bizarre has not prevented it from becoming a central obsession in nineteenth and twentieth-century literature. For some time now, the writings of many of the most notable poets, novelists, scientists and philosophers have been haunted by the fear that somehow technology has "run amok", is "no longer guided by human purposes", is "self-directing", or has "escaped all reasonable limits".

In John Kenneth Galbraith's *The New Industrial State*, the notion appears as a stern warning to the American public. "I am led to the conclusion that I trust others will find persuasive" Galbraith avers, "that we are becoming the servants in thought, as in action, of the machine we have created to serve us." In *So Human an Animal*, Rene Dubos, the noted biologist, offers a view that combines conviction and total incredulity:

> "Technology cannot theoretically escape from human control, but in practice, it is proceeding on an essentially independent course. Planning for better-defined and worthwhile human goals has become urgent if we are to avoid technological take-over and make technology once more the servant of man, instead of his master."

Martin Heidegger (1996), in *Discourse on Thinking*, asserts that the process has moved far beyond any possible repeal:

> "No one can foresee the radical changes to come. But technological advances will move faster and faster and can never be stopped. In all areas of his existence, man will be encircled ever more tightly by the forces of technology. These forces, that everywhere and every minute claim, enchain, drag along, press and impose upon man under the form of some technical contrivance or other forces ... have moved long since beyond his will and have outgrown his capacity for decision."

The concept of autonomy is particularly expressive in this context. Ellul (1974) is by no means the only person to have found a significant use for it in describing the technological society. Bruno Bettelheim (1961) has written about the threat to individual autonomy in a message, while Galbraith (1980) warns of the apparent autonomy of the "technostructure" in the new industrial state. "Autonomy" is, at heart, a political or moral conception that brings together the ideas of freedom and control. To be autonomous is to be self-governing, independent and not ruled by an external law or force. In the metaphysics of

Immanuel Kant, autonomy refers to the fundamental condition of free will - the capacity of the will to follow moral laws that it gives to itself. Kant opposes this idea to "heteronomy", the rule of the will by external laws, namely the deterministic laws of nature.

In this light, the very mention of autonomous technology raises an unsettling irony, for the expected relationship of subject and object is exactly reversed. We are now reading all of the propositions backward. To say that technology is autonomous is to say that it is non-heteronomous and not governed by an external law. And what is the external law appropriate to technology? Human will, it would seem. But if technology can be shown to be non-heteronomous, what does this say about human will? Ellul (1974) is explicit on this point: "There can be no human autonomy in the face of technical autonomy." In his eyes, there is a one-for-one exchange.

AGENTS OF CHANGE

One way of answering the question of why is technology problematic, rests on exactly this point. Technology is a source of concern because it changes and because its development generates other kinds of changes in its wake. For many observers, this is the whole story, the alpha and omega of the entire subject. To look for crucial questions is to look for inventions, innovations and a myriad of ramifications that follow from technological change. Signs of change emerge from how historical developments of the past two centuries are normally represented. For several generations, it has been commonplace to see technological advances in the context of a vast, world-transforming process-industrialisation, mechanisation, rationalisation, modernisation, growth, or "progress". "Industrialisation", until recently the most popular label, points to the range of adaptations in social, technical and economic structure that societies have undergone to support the large-scale production of material goods. A more fashionable term at present, "modernisation", attempts to correct the narrowness of the industrial concept considering twentieth-century history. In essence, it means all those changes that distinguish the modern world from traditional societies.

Behind modernisation are always the modernisers, behind industrialisation, the industrialists. Science and technology do not grow in their momentum but advance through the work of dedicated, hard-working, creative individuals who follow highly idiosyncratic paths to their discoveries, inventions and productive innovations. In the process of development, active, thinking agents – James Watt, Thomas Newcomen, Thomas Watson, Alfred Sloan, the Du Ponts are present at each step, following distinctly human ideas and interests. Societies, furthermore, do not yield passively to the "thrust" of modernisation.

Political and economic actors of the world's nation-states make conscious decisions about what kinds of technological development to encourage and then carry out these decisions in investments, laws, sanctions, subsidies and so on. In some instances, in nineteenth-century China, for example, the introduction of modern technology was actively opposed. In such cases "development" could not begin until a Western colonial power had neutralised such opposition in a colonised country or until an internal political upheaval had put men favourable to such changes in positions of leadership. The modern history of technological change is, therefore, not one of uniform growth. It is, instead, a diverse collection of patterns rooted in specific choices that individuals, groups and nations have made for themselves and imposed on others.

To escape the dilemma here, scholars often resort to the view that human freedom exists within the limits set by the historical process. While not everything is possible, there is much that can still be chosen. This perspective enables Apter (1988) to see modernisation as "a process of increasing complexity in human affairs within which the polity must act ..." and, at the same time, to hold that "to be modern means to see life as alternatives, preferences and choices". Rostow (1981), in the same vein, sees the process of technological development as a grand staging ground, that gives shape to all of society's most important decisions. "With the take-off and drive to technological maturity, the process of industrialisation itself becomes the centre of politics." "The efficient absorption of technologies," he notes, "carries with it powerful imperatives,

social and political as well as economic." The effect of these developments is to lay on "the agenda a succession of pressures to allocate the outputs of government in new ways". However, once the fundamental agenda has been set, there is considerable choice about the specific sociotechnical forms the development will take.

To Ellul, Marcuse, Mumford (1981) and other critics of the technological society, arguments of this stripe are entirely in vain. The self-confidence of the modernisers is merely a guise concealing strict obedience to the momentum of events. Under present conditions men are not at all the masters of technological change, they are prisoners. Although the voluntarists may celebrate man's shrewdness and freedom, the celebration cannot alter the condition that their theories reveal. The shout of freedom, Lawrence (year?) noted long ago, "is the rattling of chains, always was". Clarke (2022 argues that the tools we invented will be our successors.

DEPENDENCE AND INTERDEPENDENCE

The performance of technological systems rests upon the ordered and effective contribution of parts that rely on each other. Nothing of significance is done by self-contained units. Virtually everything is accomplished through the coordinated work of a variety of operating segments. Care must be taken, however, not to draw absurd conclusions from this notion. There is a tendency to think that in an increasingly interdependent technological society or world system, all the parts need each other equally. Seen as a characteristic of modern social relationships, this is sometimes upheld as a wonderfully fortuitous by-product of the rise of advanced techniques. Feenberg (1999) postulates that the necessary web of mutual dependency binds individuals and social groups closer together to a new kind of community that is forming before our very eyes. For Landon (1991), this view involves distortion. He argues that it confuses interdependency with mere dependency. An individual may depend upon the electricity or telephone company for services crucial to his way of living. But does it make sense to say that the companies

depend on that individual? It is hard to sustain the notion of mutuality when one of the parties could be cut off from the relationship and the other scarcely notices it. Not every plug and not every socket is essential to the network.

A completely interdependent technological society would be one without hierarchy or class. However, the distinction between dependence and interdependence points to a hierarchical arrangement of the segments of the technological order, an arrangement that includes social components. Within each functioning system, some parts are more crucial than others. Components whicj handle the planning or steering for the whole system are more central than those which take care of some small aspect of a technical subroutine.

It is important to notice, first, the conception of society that takes shape in the technological perspective. Fundamental is the view that modern technology is a way of organising the world and that, potentially, there is no limit to the extent of this organisation. In the end, everything within human reach can or will be rebuilt, re-synthesised, reconstructed and incorporated into the system of technical instrumentality. In this all-encompassing arrangement, human society is the total range of relationships among persons in one segment. "Technological society" is a subsystem of something much larger, the technological order. Social relationships are merely one sort of connection. Individuals and social groups are merely one variety of components.

The connections and groupings of inanimate parts are equally crucial to the functioning of the whole. This is not to say that any existing society has been integrated in all its parts into a purely technological order. There are some kinds of social relationships, those involving love and friendship for example, that have not yet been fully adapted to the demands of technical routine. The position of the theory is that a strong tendency toward the order of this kind is highly pronounced in all spheres of Western society and that its development will likely proceed rapidly on a worldwide scale.

LITERATURE REVIEW

1) TECHNOLOGICAL DETERMINISM

The current wave of Artificial Intelligence Ethics Guidelines can be understood as desperate attempts to achieve social control over a technology which appears to be as autonomous as no other. While efforts at the social control of technology are nothing new, AI, with its unique nature, may very well be the most resistant to such control, which validates the amount of attention the question receives. However, should regulatory attempts fail, future society may be determined by the nature of this technology, which many thinkers dread. There is an attitude/historiographic methodology called "technological determinism", which has been widely criticised and almost completely dissected since the second half of the 20th century. This attitude is recurrent again in the case of AI and, perhaps, has found a more solid footing there.

This theory was first proposed by Marshall McLuhan, a Canadian philosopher, in his book, *Understanding Media: The Extensions of Man.* McLuhan (1964) argues that technology is a key driver of social change and it shapes our thoughts, behaviours and cultures. Technological determinism refers to the notion that technology shapes society and culture. There is no canonical definition for this, rather, there are several versions that share a familiar resemblance. Arguably, the most extreme, hard form of technological determinism, in which there is no place for social control, is quite difficult to defend and, as a result, it would be hard to end even a handful of serious proponents for it. But the non-existence of the phenomenon is equally implausible. Therefore, technological determinism concepts must be distributed on a scale between these two extremes of full determinism and full indeterminism.

One pillar of technological determinism is a perceived inevitability about the direction of technological progress, which, like gravity, tends towards ever higher efficiency and trying to resist it for long is a fool's gambit. The other pillar is that this predetermined nature of technological evolution acts as an exogenous force on society and causes it to change. In

other words, technology progresses following its internal logic and society, is restructured as a side effect of this.

Most thinkers, when confronted with the implausibility of the extreme positions around technological determinism, tend to seek middle ground. Some thinkers consider their positions more in line with a form of soft technological determinism (Heilbroner, 1967; Dusek 2006). Another way to end the middle ground is through considering the concept of underdetermination, as Feenberg does (year??). This solution is especially interesting as it focuses on the co-causal powers of technology and human agency. This view allows for a theoretician to appreciate the difference between a passive and a techno-politically conscious society. Feenberg (*ibid.)* acknowledges that technology, if left alone, has inherently anti-democratic tendencies. He further claims that as more and more social activities become mediated by technology, those tendencies will gain more room to flourish.

Therefore, if technology is left alone, instead of actively developing a critical view about it, our freedom will indeed diminish. This is why Feenberg (*ibid.*) argues for actively injecting democracy into technology and into the technologically mediated areas of life (that are more and more as time progresses); even in areas which were previously thought off-limits for democratic decision-making, like in a factory. However, Feenberg (*ibid.*) argues that this needs to be actively pursued to avoid a natural tendency of society towards becoming ever more technocratic, hence less democratic. This means that in his model of the world, change will still happen, but without an active, conscious agency of humans. Also, that without timely, active participation, the window of opportunity may be lost for ensuring control of that change. Based on this framing, Stump (2006) categorises Feenberg's view as one that still involves the essentialism of technology. While Feenberg never uses the following terminology from the philosophy of technology, the possibility he explores depends on the co-causation model of social change (*ibid.*). In this, there is room for humans to work as a causal component to counterbalance the anti-democratic causal component that technology represents.

2) SINGULARITY HYPOTHESIS

This theory was first proposed by Vernor Vinge (1993), a computer scientist, in his book, *The Coming Technological Singularity*. Vinge predicts that at some point, AI will become so advanced that it will trigger a singularity, or a rapid and exponential increase in AI capabilities, (*ibid.*).

The technological singularity is popularly envisioned as a point in time when (a) an explosion of growth in AI leads to machines becoming smarter than humans in every capacity, even gaining consciousness in the process; or (b) humans become so integrated with AI that they could no longer be called human in the traditional sense. This article argues that technological singularity does not represent a point in time, but a process in the ongoing construction of a collective consciousness. Innovations from the earliest graphic representations to the present, reduced the time it took to transmit information, reducing the cognitive space between individuals. The steady pace of innovations ultimately led to the communications satellite, fast-tracking this collective consciousness. The development of AI in the late 1960s has been the latest innovation in this process, increasing the speed of information, while allowing individuals to shape events as they happen.

Since then, the development of the Internet and advancements in AI have only fast-tracked this process. AI will continue to increase in intelligence but whether that intelligence results in a conscious machine, remains a subject of debate. Prominent figures from the world of technology have suggested that such an event is unlikely soon, given the complexity of human cognition and the limited understanding of it (Allen and Greaves, 2011). One should be sceptical of claims downplaying AI capabilities by individuals and corporations that potentially stand to profit from their development. What is, though, is the impact AI is having on the increase in the speed of communication, rates of connectivity and time spent online, all of which, it is argued, have hastened the convergence of collective consciousness. AI represents a means to that end, not necessarily an end in itself.

Two different aspects of technological innovation and artificial intelligence are analysed. The first examines singularity as a process moving humanity toward a collective consciousness as opposed to an event or point in time whereby computers gain consciousness in their own right. Specifically, it is argued that the slow march of innovations from symbolic representations on cave walls to early telecommunications brought disparate ideas to those in a neighbouring valley or across an ocean. Due to the limitations of space, a circumscribed number of innovations are covered, specifically those related to communication. What this march in communicative technologies ultimately resulted in was the development of the communications satellite that hastened the singularity process. The subsequent development of AI and the rapid increase in computer power has made this consciousness perhaps even more inevitable, but AI is merely the latest and, perhaps, last, innovation in this process.

The second part is an analysis of the implications of our increasing reliance on technology and the likely path forward as humans continue to shrink the gap between messenger and receiver. It is demonstrated that as technological innovations over the millennia have increased message speed between individuals, the physical distance between innovations and the human brain has decreased. Yet, these advances and, specifically online applications, may be hampering cognitive and linguistic functions as technologies become easier to use and the breadth of information and users increases. In short, AI has expanded the things individuals can be exposed to, but that exposure is increasingly superficial, given the sheer amount of information available and the time needed to process it.

The Turing Test was proposed by Alan Turing (1950). It is one of the most famous thought experiments in the field of AI. The test is designed to determine whether a machine is capable of thinking like a human.

There are a few key ways that these theories relate to each other. Firstly, the Singularity Hypothesis is closely related to the idea of technological determinism, as they both focus on the transformative power of technology. However, the Singularity Hypothesis goes beyond technological determinism by

predicting a specific point in time when AI will become so advanced that it will radically change human society. The Turing Test is also related to both of these theories, as it is a method for determining whether an AI system is capable of human-like thought. Therefore, it is closely connected to the idea of AI reaching the point of Singularity (Ert, , Pan, and Wallach, (2015).

CRITICISMS

The first criticism the study will address is the accusation that theories of technological determinism and singularity are overly deterministic. Critics argue that these theories ignore the role of human agency and intentionality in shaping the future of AI (Bostrom, 2005; Naughton, 2013).

The second criticism to be addressed is the claim that the Turing Test is too limited and narrow in its definition of intelligence. Critics argue that the test focuses only on a narrow set of abilities, such as natural language processing and logical reasoning and ignores other important aspects of intelligence, such as emotion, creativity and intuition. Do you think this is a valid criticism? (Haugeland, 1985; Winograd, 1987; Dreyfus 1999).

The succeeding criticism is the concern that the theories of technological determinism and Singularity are overly optimistic and do not consider the potential risks and dangers of AI. Critics argue that these theories fail to consider the possibility of AI going rogue or being used for harmful purposes (Yudkowsky, 2001;Bostrom, 2013); Amodei and Christiano, 2016.

The next criticism is the concern that the theories of technological determinism and Singularity do not consider the ethical implications of AI. Critics argue that these theories do not consider the ethical issues raised by AI, such as privacy, bias and the displacement of human workers (Danaher, 2016; Lin, 2016; Borenstein, 2017; Johnson,2017;.

The following criticism to be discussed is the concern that the theories of technological determinism and Singularity are too

reductionist and do not consider the broader social and cultural context of AI. Critics argue that these theories do not consider the wider implications of AI, such as its impact on social structures, institutions and cultural values (Bucher,2018; Rieder *et al.,* 2018; Pitt, Bates and Fernandez, 2020;

The subsequent criticism is the concern that the theories of technological determinism and Singularity do not consider the historical context of AI. Critics argue that the theories do not acknowledge the long history of AI and do not consider how AI has developed over time. They also argue that the theories do not consider the social and political contexts in which AI has developed (Dreyfus and Dreyfus, 1986); Anderson (2010; Turkle, 2011).

As argued by Dreyfus and Dreyfus (1986) and Turkle (2011), the theories of technological determinism and Singularity do not take note of philosophical and epistemological issues raised by AI, such as what is intelligence, what is consciousness and what is a mind. Can machines have minds? Can they be conscious? These are just some of the many philosophical and epistemological questions raised by AI.

As argued by Anderson (2010), the theories of technological determinism and Singularity do not consider the ethical implications of AI. Anderson argues that the ethical implications of AI should be a major concern and that how AI can be used ethically needs to be considered. Anderson (*ibid.*) cites Bostrom (2010) and others who have raised similar concerns. Bostrom (2010) argues that AI could pose serious ethical risks and that these risks need to be taken into account when developing AI.

As argued by Floridi (2010), the legal and regulatory implications of AI are often overlooked in the theories of technological determinism and Singularity. Floridi argues that there is need for a framework of laws and regulations that can guide the development and use of AI and that this framework should be informed by the ethical implications of AI (*ibid.*)/ Floridi (*ibid.*) cites Lessig (1999) and others who have made similar arguments.

As argued by Gillespie (2010), the social and cultural implications of AI are often overlooked in the theories of technological determinism and the Singularity. Gillespie argues that these theories fail to consider how AI might affect the way humans interact with each other and with technology. Gillespie (*ibid.*) cites Turkle (2011) and others who have raised similar concerns.

As argued by Posner and Weyl (2018), the economic implications of AI are often overlooked in the theories of technological determinism and Singularity. They argue that AI is likely to lead to increasing inequality and job displacement and that policy-makers need to consider these implications when making decisions about the development and regulation of AI. They cite Brynjolfsson and McAfee (2014) and others who have written on the economic implications of AI.

METHODOLOGY

The study used a qualitative methodology with a case study research design. To craft the discourse for this study the study engaged literature and document review, providing critical case studies. Building research on and linking it to the existing literature is the building block of academic research as it situates the study within a historical context (Snyder, 2019). The study builds on a literature review of past studies on the importance of AI and bridging the future using AI technologies for economies and countries. The study used a narrative data analysis.

FINDINGS

The study reveals the importance of AI in the present and the future for developed and developing countries and it stems from the argument that AI can be used in developing countries to solve problems encountered. Zhang *et al.* (2022) observe that AI has been used in the creation of smart supply chains in the developed world, with these supply chains being integrated, intelligent, adaptive and self-optimising, minimising the use of human labour. Wankhede and Vinodh (2021) indicate that there is a dynamism in the production line that makes it easier to integrate Industry 4.0 in the warehouse and logistics because of global competitiveness in the Internet of Things (IoT), block-

chains and AI. Lee *et al.* (2017) observe that the use of AIand big data in the manufacturing sector and storage systems can be effective as this can reduce the time spent tracing and tracking inventory.

Hamdy *et al.* (2020) indicate that using the massive chunks of data generated by firm operations, an organisation can use AI-enabled solutions and teams of data scientists to transform supply chain operations including the implementation of factory automation, heightened quality control, more accurate demand forecasting, predictive maintenance and a myriad of other developments. Affia and Aamer (2020) show that the integration of AI into the supply chain process is not just a technological advancement, but is a strategic imperative that empowers organisations to navigate the complexities of modern supply chain with precision, efficiency and a competitive edge. Maxime *et al.* (2024) observe that AI has the potential to revolutionise supply chain operations by improving decision-making and efficiency. McKinsey (2022) indicates that AI has high-cost savings in supply chain management as it can add value to the supply chain planning production, inventory management and product distribution.

Maxime *et al.* (2024) show that companies can leverage AI-powered tools to process vast amounts of real-time data and improve the accuracy of demand forecasting. Jarasuniene *et al.* (2023) indicate that AI can help firms gauge market demand and customer sentiments by utilising scanner data collected at point-of-sale locations, along with vast data from customer reviews and social media. Serosoft (2023) indicates that AI can be used for teacher assistance as it understands students and their capability. It is going to help teachers by guiding them on the rate of lecture delivery, the right time for assessments, what type of assessment is required for a particular topic is beneficial for students. Harry (2023) shows that AI can provide data analysis enabling educators to make data-driven decisions and it can analyse learning gaps in the education system. Basu (2020) observes that AI computer systems are used extensively in medical sciences through common applications that include patient diagnosis, fast drug development, improving gene

editing, target gene-editing and end-to-end drug delivery in hospitals.

DISCUSSION

The study shows that AI has changed the business sector in developed countries and there is need to embrace AI in developing countries as it can be used to revitalise their supply chains in the future. The study shows that the world is fast-moving into a tech-based platform such that everything is moving towards technology. The study shows that AI technology has changed the supply chain, leading to the creation of smart supply chains that are self-optimising and integrating, that is, they have reduced human errors in the supply chain, making it easy to track inventory. The study reveals that the use of AI in the supply chain has led to the creation of smart warehouses that are enable the fast location, tracking and tracing of inventory. The study reveals that the use of AI and big data in the manufacturing sector and storage systems can be effective as this can reduce time-wasting logistics.

The study shows that AI-powered solutions can be useful in the creation of the automation system of the factory, reducing human errors and time spent in the factory tracking and tracing goods, as well as providing accurate demand forecasting and heightened quality control. The study reveals that AI can help organisations navigate the complexities of modern supply chain. AI can improve decision-making in the supply chain, bringing efficiency to the decisions made. AI can create value in the supply chain through high-cost savings, improving production planning, inventory management and product distribution. AI can bring about the generation of vast amounts of real-time data which improves accuracy and demand forecasting. The AI model of automation of the supply chain can be adopted across various sectors, especially the manufacturing sector as Zimbabwe seeks to revitalise the manufacturing sector.

The study reveals that AI has improved the education sector with teacher assistance, helping teachers understand students and their capabilities. The study reveals that AI has helped educators in developed countries to make data-driven decisions

and it in the analysis of the learning gaps in the education system. The study observes that AI has been used in the medical sector, executing various tasks for hospital staff. Zimbabwe can take a page from these developed countries to embrace AI as it is the future of technology in all walks of life and it can be used in the delivery of medicine to infectious diseases units without endangering hospital staff. Zimbabwe can embrace the use of AI in the education sector as the findings of the study are inconsistent with Mazikana (2023) who observes that there is a learning gap in Zimbabwe with most schools lacking the basic technological infrastructure. The education sector in Zimbabwe, with Education 5.0, must embrace AI as it presents the present and the future of innovative education with data-based solutions to social problems.

CONCLUSION AND RECOMMENDATIONS

The study reveals that AI-powered solutions to human problems have been developed across the developed world with most problems of yesteryear being solved in no time, signifying the advancement of the human race. In a nutshell, it is sufficient to conclude that AI presents the future of technology, and developing countries should scramble to embrace it and solidify their position on the history of technology by bending AI to their will. Countries that have suffered a great deal from unemployment, poverty and lack of innovation and skills, like Zimbabwe, must embrace AI to get rid of vices like the impacts of climate change on food security through the use of technology-based solutions. Humans have arguably experienced countless singularities. For example, the wheel, control of fire, agriculture and the longbow, all of these changed how humans moved, lived, ate and fought. These shifts re-ordered social relationships across the social landscape, allowing certain regions to gain advantages over others by harnessing the power of technology to political will.

- African regional blocs, such as the Southern Africa Development Community (SADC), the Economic Commission of West African States (ECOWAS) and others, should follow the EU and others' examples and make legislation to regulate AI.

- The Zimbabwe's Cyber and Data Protection Act should be reviewed to regulate AI development and use in Zimbabwe.

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