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INNOVATIVE READING OF GENESIS 2:15 IN THE CONTEXT OF LEVERAGING ARTIFICIAL INTELLIGENCE (AI) FOR IMPROVED AGRICULTURAL PRODUCTION AND FOOD SECURITY IN AFRICA

Etonge Ndeley Samuel, PhD.
Senior Lecturer of Educational Management at the Educational Foundations and Administration, Faculty of Education, University of Buea Cameroon.
Email: drndeley@gmail.com

Moses Idemudia, PhD.
Department of Religious Management and Cultural Studies, Ambrose Ali University, Ekpoma, Nigeria.
Email: mosesidemudia@aauekpoma.edu.ng

Godwin A. Etukumana, PhD.
Research Institute for Theology and Religion (RITR), University of South Africa (UNISA)/Department of Religious Management and Cultural Studies, Ambrose Ali University, Ekpoma.
Email: gaetukumana@yahoo.com.

Abstract

"To till and to keep it," as used in Genesis 2:15, presupposes a responsible use of the earth's resources for human sustenance and the preservation of the planet. The biblical text, through hermeneutical reimagining, could potentially support the creation and deployment of autonomous systems, such as artificial intelligence, which could improve upon existing traditional methods of agricultural production. Recent developments in Artificial Intelligence (AI) offer the opportunity to scale farm production and achieve food security in Africa while maintaining balance in the agro-ecosystem. This study aims to interpret Genesis 2:15 in favour of leveraging AI for sustainable and improved agricultural production and food security in Africa. The work adopts the reading of recovery approach and argues that the interpretive implications of the biblical text support the responsible and

ethical use of autonomous systems in solving agricultural-related problems. The study finds that the interpretation of Genesis 2:15 aligns with the use of AI as a multifaceted tool at human disposal in scaling agro production in contemporary times. It also finds that innovation in agricultural systems through a responsible use of AI could potentially remove African nations from the list of hungry nations of the world. The paper concludes that although the use of AI raises critical theological, moral, and ethical questions, when viewed through the lens of the Genesis 2:15 mandate, it makes sense to include AI as one of the many tool's humans have created in fulfilment of the assignments in Genesis 2:15.

Keywords:

Agricultural production, AI in agriculture, Food security, Genesis 2:15, Reading of recovery.

Résumé

L'expression « cultiver et conserver », employée dans Genèse 2:15, présuppose une utilisation responsable des ressources terrestres pour la subsistance humaine et la préservation de la planète. Ce texte biblique, par une réinterprétation herméneutique, pourrait potentiellement soutenir la création et le déploiement de systèmes autonomes, tels que l'intelligence artificielle, susceptibles d'améliorer les méthodes traditionnelles de production agricole. Les récents développements de l'intelligence artificielle (IA) offrent la possibilité d'accroître la production agricole et d'assurer la sécurité alimentaire en Afrique, tout en préservant l'équilibre de l'agroécosystème. Cette étude vise à interpréter Genèse 2:15 en faveur de l'utilisation de l'IA pour une production agricole durable et améliorée, ainsi que pour la sécurité alimentaire en Afrique. Adoptant une approche de lecture régénératrice, elle soutient que les implications interprétatives du texte biblique appuient l'utilisation responsable et éthique des systèmes autonomes pour résoudre les problèmes liés à l'agriculture. L'étude conclut que l'interprétation de Genèse 2:15 s'accorde avec l'utilisation de l'IA comme un outil multifacettes à la disposition de l'humanité pour accroître la production agricole à l'ère contemporaine. L'étude révèle également que l'innovation dans les systèmes agricoles, grâce à une utilisation responsable de l'IA, pourrait potentiellement permettre aux pays africains de ne plus figurer parmi les nations souffrant de la faim. Elle conclut que, bien que l'utilisation de l'IA soulève des questions théologiques, morales et éthiques cruciales, à la lumière du commandement de Genèse 2:15, il est pertinent de considérer l'IA comme l'un des nombreux outils créés par l'humanité pour accomplir les missions énoncées dans ce verset.

Mots-clés: *Production agricole, IA en agriculture, Sécurité alimentaire, Genèse 2:15, Lecture du rétablissement.*

Introduction

Apart from the dominion mandate of Genesis 1:26-29, no other text in the creation narratives arguably provides a clearer description of the responsibility of humans about the earth than Genesis 2:15. It reads "The Lord God took the man and put him in the Garden of Eden to till it and to keep it" (Gen. 2:15 RSV; "…to cultivate it and keep it" NAS; "…to dress and to keep it" KJV). The text significantly presupposes humans' stewardship, particularly in the context of agricultural cultivation and agro-ecological sustainability. Over the years, biblical scholars have developed several hermeneutical perspectives on the interpretation of the creation accounts, with Genesis 2:15 serving as a particular text. However, the nucleus of the text – "…to till it and to keep it" should in all circumstances continue to invite contemporaneous re-examination, especially given its link to a garden and its implications on such issues as food security and the budding impact of technological advancements in agriculture. Such re-examination could potentially lead to the rediscovery of the original intent and broaden the scope of understanding of the text. A proper hermeneutical approach to Genesis 2:15 would allow for an interpretation that aligns with the ethical deployment of Artificial Intelligence (AI) technologies in agriculture. It would also align with sustainable agricultural practices that could enhance food production and guarantee food security, as championed by some scholars in the past (DeFries & Rosenzweig, 2010).

In Africa, where agricultural production faces numerous challenges, including the unpredictability of climatic conditions and the broader impacts of climate change, inadequate infrastructure, and limited access to modern farming techniques, recent advancements in AI potentially herald transformative opportunities for the agricultural sector. AI technologies can serve as a critical intervention to optimise agricultural practices by providing farmers with timely and tailored advice, enhancing agricultural productivity, managing pests effectively, and facilitating proper monitoring of environmental conditions (Ryan, Isakhanyan, & Tekinerdogan, 2023; Schoeman, 2024). For instance, AI-driven decision support tools can help farmers select suitable crops and determine the optimal planting times. AI can be engaged in other aspects of the agricultural value chain, such as reducing post-harvest losses and improving market access (Marwala, 2024; Jaiyesimi, 2024).

Pretty & Bharucha (2014) already raised the need for sustainable intensification in agricultural systems, addressing pressing issues of food insecurity. Ryan, Isakhanyan, and Tekinerdogan's (2023) work extensively addresses the impact of AI in the economic, social, ethical, environmental, and technological aspects of agriculture, while calling for an interdisciplinary approach in the deployment of AI in agriculture. In this paper, we offer a biblical perspective on the effective deployment of AI in agriculture, contributing to the call for an interdisciplinary approach. By doing this, the study addresses the research question: To what extent does Genesis 2:15 support technological innovations in modern cultivation? Could Genesis 2:15 be amenable to an interpretation that sees humans not only as caretakers or stewards of creation but also as innovators who could create and leverage AI technologies for their greater good in agricultural production?

In this paper, it is imagined that "to till," used about a garden *ab initio,* envisages the creation and use of tools. The idea of creating itself suggests innovation, allowing the continuous invention of new methods, materials, and systems that enhance the fulfilment of humans' responsibilities and pleasure on earth. This notion is explored in this study within the context of reading of recovery in the interpretation of Genesis 2:15. It posits that the biblical text could extend beyond popular interpretation along the lines of human dominion and stewardship. A reading of recovery could cover the ethical use of technologies in modern agriculture. It is thus possible to see Genesis 2:15 through the lens of a responsible deployment of AI in scaling agricultural productivity for food security and maintaining agro-ecological balance and sustainability in Africa.

Methodological and Conceptual Clarifications

This paper uses the reading of recovery approach to biblical interpretation. The concept of recovery reading originated as a response to Lynn White's thesis, which indicted the Bible as an anti-ecological text. White (1967) posits that the Bible supports an anthropogenic vision endorsing the exploitative use of the earth, noting that biblical text, such as Genesis 1:28, is often adopted in unmitigated abuse of the natural world (Kavusa, 2019). The reading of recovery is pitched against Lynn White's accusation. It is one of the approaches to biblical interpretation that seeks to defend the Bible as a text in favour of the sustainable use of the earth. The exegetical endeavour is grounded in the task of uncovering the potential of biblical texts to advocate for eco-friendliness and human responsibility in the use of the earth and its natural resources. A reading of recovery also involves interpreting biblical texts in support of sustainable agriculture, as opposed to agricultural practices that harm the natural world. It supports the school of thought that considers the emphasis on human dominion as the core interpretation of the creation narratives as undue and colonial in orientation (Ahiamadu, 2020).

Apart from the use of the approach in ecological issues, it has also been used to ethically reread complex texts that suggest biblical endorsement of genocide and other harmful practices. In this case, reading of recovery is used to recover the original meaning and context of a text by separating the actual word of God from human additions (Bang, 2021). This interpretative model applies to the reading of Genesis 2:15 in this paper, as it enables the text to be viewed as validating sustainable and innovative agricultural practices on earth. However, the reading of recovery is rooted within African biblical hermeneutics (ABH) in this study. ABH is the interpretative framework that makes Africa and Africans the subject of biblical interpretation. In principle, it seeks to transform Africans and Africa through biblical interpretation (Adamo, 2015). This paper is contextually and premeditatedly African in its orientation, showing the potential of Genesis 2:15 not only to support the use of AI in sustainable agricultural production but also to transform Africa in terms of food security.

Defining AI has been quite taxing. This is because AI comprises several aspects of technology that make a strait-jacket definition impossible. For instance, such definitions that reduce AI to the use of algorithms in performing specific tasks do not entirely capture the essence of AI in contemporary understanding. For the sake of this paper, we would adopt the clarification that most closely represents our understanding of AI. The most appropriate here is the one offered by the AI High-Level Expert Group (AI HLEG) of the European Commission (EC) that defines AI as "Systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals." (AI HLEG, 2019). AI in agriculture, as construed in this work, refers to intelligent autonomous systems built specifically or deployed to carry out agro-related tasks, such as cultivation, processing, and distribution, among others. By doing so, it increases output without harming the environment.

Genesis 2:15: History of Interpretation

2:15 belongs to a larger literary unit, 2:4-25. It falls under the corpus of the Garden of Eden account but contains, essentially, what is known as the "second creation story," a narrative that falls within the framework of primaeval history (Ademiluka, 2008; Ahiamadu, 2020). From a historical-critical perspective, Genesis contains two distinct creation narratives: that of Genesis 1:1-2:4a, attributed to the Priestly writer(s), and 2:4b-25, which is attributed to the Jahwist. The Jahwist account is generally regarded as the first creation account, as the writer(s) are believed to have written around the 9th century BCE (Ademiluka, 2008).

Over the years, Genesis 2:15 has been interpreted from different perspectives. Early interpreters approached the text from a "dominionist" and even male chauvinistic orientation (Yoreh, 2019). Babya ibn Papuda, a Spaniard who lived from approximately 1050 to 1120 CE, is often cited as an example. He argued that:

> *Man was put in the Garden of Eden to dress and to keep it, by using animals for his benefit and his food, … by using women and their fertility for the sake of increasing one's offspring – for all these is man rewarded, if he acts for the sake of God also, in his heart and intension, whether his act is completed or not. (As cited in Yoreh, 2019, p. 11)*

Ahiamadu (2020) questions the so-called *Imago Dei* (pp. 28-29) or the "dominionists" (Yoreh, 2019, p. 11) view of Genesis 1:26-28 and 2:15, arguing that such an interpretation is responsible for the colonial use of the Bible as a tool of oppression, especially in Africa. It positions humans as superior creatures who must dominate the world. Ahiamadu (2020) joins other scholars who adopt a responsible stewardship approach to land ownership and use as the basic theological and ethical interpretation of the assignments given to the first humans in Genesis. This model of interpretation recognises the terrestrial function of humans as stewards of the earth, who must bear in mind that they are accountable to God in the way and manner they use the land. It is framed in the awareness that humans and

nature are co-dependent and mutually dependent on God, as shown in the creation accounts (Ahiamadu, 2020; Wasike, 1999).

In recent times, scholars have begun to interpret Genesis 2:15 within the context of environmental sustainability. In contrast, others argue that the text builds upon Genesis 1:28 within the ongoing narrative of human creation (Brown, 2015). The latter group sees the text within the context of the development of human identity (Brown, 2015).) Brown (2015) notes in this regard that the text is a description of the function – the job of the human, placed in the Garden of Eden to serve and to preserve. For Yoreh (2019), it is not appropriate to impose an interpretation on a text. Citing the environmentalists' use of Genesis 2:15, it has been posited that the original and intellectual history of texts are proper guides in arriving at a balanced interpretation (Yoreh, 2019). In this regard, although Genesis 2:15 does not directly address environmental discourse in its original context, it supports environmental sustainability in recent biblical scholarship (Yoreh, 2019). It is in this sense that this study appropriates Genesis 2:15 as a text in favour of AI in agriculture and food security in Africa. This effort, like that of Ahiamadu (2020) above, aligns well with a reading of recovery in the African context. It reclaims the text from the dominionists' interpretation that fuelled colonial enterprise and their oppressive injustices in the African continent and re-reads the text in support of a course that could reposition Africa and Africans in the global future in terms of food security.

Agriculture from Genesis and through the Ages

It is appropriate to assert in this paper that agriculture is as old as man on earth. The same Genesis, which bequeaths humanity with the knowledge of the beginnings in the creation accounts of the Judeo-Christian tradition, also pulsates with enormous information about agro-ecology and the beginning of agricultural production on the earth. Genesis 2:15 itself is anchored on various agro-ecological presuppositions. First, at the time Yahweh created the earth, there was neither vegetation nor a life form. Only dry land is presented in the second creation account.

It is this dry land that is watered to bring life. Yahweh forms man from the dust of the earth and breathes the breath of life into his nostrils, bringing him to life. Then God plants a garden with all sorts of suitable trees for the man in Eden and places him in the garden "to till it and to keep it." After that, Yahweh creates the animals and the birds, likewise from the dust of the earth. He brings them to the man who gives them names. Finally, Yahweh takes a rib from the body of the man, having caused him to fall into a deep sleep, and makes it into a woman, whom he names Eve, from Adam, the first human (Wenham, 1987). After the expulsion from the Garden, Genesis hints at a generational transition of agricultural knowledge. Adam's children both brought offerings to Yahweh. Cain offered from the produce of his farm (crops). In contrast, Abel offered a firstborn animal from his herd (livestock) – the two dominant areas of agricultural production, perhaps in the most basic forms (Gen. 4:3-4).

The tilling and keeping of the ground subsequently witnessed improvement as humans began to invent tools. Mazoyer & Roudart (2006) conducted extensive research on the evolution of agriculture throughout human history, noting that the most significant transition in agriculture occurred during the Neolithic Revolution, when prevailing nomadic-hunter-gatherer lifestyles gave way to settled farming communities. The advent of stone sharpening and its application in various agricultural activities led to increased agricultural production. The surplus that resulted from this style may have accounted for population growth and the establishment of later civilisations (Mazoyer & Roudart, 2006; O'Brien & Keyder, 2012). Early agricultural practices from this period were rudimentary across the known world. The scale of agricultural production was traditional, sedentary, and subsistent, with basic techniques that included the domestication of plants and animals, naturally sourced irrigation systems, and crop rotation (Mazoyer & Roudart, 2006).

The next major historical epoch in agricultural development is the Industrial Revolution, which, in many parts, was also a significant agricultural revolution. A pivotal transformation in farming methods marked the 18th and 19th centuries. Innovations such as Tull's seed drill and crop rotation systems, notably the Norfolk four–course system, were used to enhance agricultural productivity by optimising land use and improving soil fertility (Encyclopædia Britannica, n.d.). The Industrial Revolution further transformed agriculture with the introduction of machinery, including steam-powered ploughs and threshers. The mechanisation of farming had a profound impact on agricultural production and processes. For instance, it reduced manual labour and labour costs and exponentially increased production.

Paarlberg and Paarlberg (2000) note other innovative agricultural systems of the period and state unequivocally that the developments of this era gave rise to the agricultural development that followed in subsequent centuries. Apart from major innovative breakthroughs in the manufacturing and use of heavy farm equipment, there was also a shift in traditional methods of land ownership. Modern government policies made more land available and accessible to farmers, allowing them to consolidate land ownership and increase farm sizes, which in turn led to more efficient farming practices (Mazoyer & Roudart, 2006). In all, humans are at the centre of all significant developments in agriculture, and all advancement could be portrayed as efforts in pursuit of the mandate to till and keep the earth.

Agricultural Production and the Issue of Food Security in Africa

While it is agreed as Ryan, Isakhanyan & Tekinerdogan (2023) note that food security, safety, and various environmental considerations are growing needs of modern agriculture, it must be added that these needs are more pronounced in the African continent with a population growth that consistently threatens the achievement of the UN's Sustainable Development Goals (SDG's). Despite the abundance of uncultivated land, which accounts for over 65% of the world's total, Africa still faces food insecurity, relying heavily on the

importation of food products from abroad —a situation that renders the continent vulnerable to global economic crises (AFDB, 2022).

Africa ranks as the least developed continent in terms of the development and use of modern agricultural technologies and techniques (Mazoyer & Roudart, 2006). Today, Africa is faced with a growing food crisis of unimaginable proportions. Millions are at risk of worsening hunger on the continent due to various internal crises and wars, climate change, COVID-19 impact on the global economy, the Ukraine and Russia war, among others (FAO, AUC, ECA, & WFP, 2023). Over 282 million people, accounting for approximately 20% of the population, were found to be undernourished in 2022, placing African nations far behind those striving to achieve a hunger-free world by 2030 (FAO, AUC, ECA, & WFP, 2023). Africa accounts for 38% of the global burden of hungry people, estimated at 735 million in 2022 (FAO, AUC, ECA, & WFP, 2023).

Although the agricultural sector employs the largest population on the African continent, it contributes only about 22% to the continent's GDP, and the high labour force engaged in agricultural production does not translate to food sufficiency (Galal, 2025). Several factors account for this situation in Africa. For instance, there is the issue of low agricultural productivity, where yields in Africa are significantly lower than the global average (IFPRI, 2021). This low productivity is directly connected to inadequacy in the use of modern farming techniques and inputs. Farming in Africa is still at a sedentary and subsistence level. New smallholder farmers and start-ups are often hindered by a lack of funding in implementing modern farming techniques. There is also the problem of unfavourable environmental conditions, primarily resulting from climate change. Extreme weather conditions, such as droughts and flooding, can severely impact crop yields. Many places in Africa face these problems, resulting in a negative strain on food availability (IPCC, 2022). Other critical issues that hinder food security in Africa include inadequate investment in the agricultural sector, the inability to contain post-harvest losses due to the lack of storage facilities, poor road network infrastructure, and inadequate market regulation, among others.

For a continent that relies heavily on imports, such as Africa, global economic factors could also exacerbate its food crisis. This paper has already hinted at the negative toll of the war in Ukraine on the availability and cost of grains in Africa (WFP, 2023). Africans urgently need to address their food shortages and work towards ending hunger on the continent. The very recent cases of deaths resulting from a stampede in places where food items were meant to be distributed to those who could not afford basic nutritional supplies during the Christmas celebration in Nigeria are a stark reality of the need to address food crises in the African continent. In this paper, it is envisioned that leveraging advances in AI for agricultural production and overhauling the entire agricultural value chain could mark a potential shift from the current condition of food crisis to food surplus in Africa.

AI in Agriculture Today

Agriculture has transitioned from traditional sedentary methods to mechanised systems following the Industrial Revolution. Today, advancements in AI and state-of-the-art breakthroughs in technologies are broadening the horizons with great potential for an increase in all areas of agricultural production. AI technologies facilitate the accomplishment of complex tasks through sophisticated methods and models. For instance, through the stimulation of intelligent behaviours, AI facilitates a series of agricultural activities, significantly improving and even surpassing extant digital autonomous methods and systems (Cook & O'Neill, 2020; Davenport et al., 2020).

Several critical aspects of agriculture could benefit from advancements in AI technologies, including soil management, pest control, disease detection and management, crop management, and irrigation optimisation (Ryan, Isakhanyan, & Tekinerdogan, 2023). In soil management, the use of AI breathes the same ethos of Genesis 2:15, namely, sustainability in the management of the soil (land). AI employs decision support systems, management-oriented modelling, fuzzy logic, and neural networks to analyse soil composition, nutrient levels, and soil temperature, among others (Eli-Chukwu, 2019; Ryan, Isakhanyan & Tekinerdogan, 2023). Today, accurate spectral indices are available for evaluating cultivated land quality (CLQ) based on the gross primary productivity (GPP) of crops (Wang, Wang, & Chen, 2020). The relationship between soil electrical parameters and soil compaction can be determined using artificial neural networks (ANNs). One such study has shown that soil compaction could influence crop yield (Gercia-Gardezi et al., 2020)
Similarly, AI uses a variety of artificial modelling and algorithms in the design of pest and weed control systems. For instance, artificial neural networks (ANNs) using genetic algorithms, sensor machine learning, digital image analysis, neural networks for weed detection, among others, have all proven to significantly help farmers in the effective management of weeds and pests, by enabling early detection and timely interventions (Kujawa & Niedbala, 2021; Tobal, 2014; Laikos et al., 2018; Gerhards & Christensen, 2003; Yang et al., 2002; Ryan, Isakhanyan & Tekinerdogan, 2023).

One major setback that hampers agricultural production and food security, particularly in Africa, is the issue of crop and livestock diseases. AI-driven systems are designed to identify plant and livestock diseases accurately. Again, early detection enables farmers to make prompt and actionable decisions that can prevent the spread of disease on the farm (Cook & O'Neill, 2020). Currently, AI-based image recognition and computerised vision systems offer a high degree of accuracy in detecting and managing both plant and animal diseases (Liu, 2020; Kakani et al., 2020). AI is also proving to have significant effectiveness in crop management, particularly in areas such as crop choice, seed selection using a convolutional neural network (CNN), crop fertilisation, and pest prevention (Cieniawska & Pentos, 2021). Ryan, Isakhanyan, and Tekinerdogan (2023) identify several robotic and autonomous systems that are used to monitor crop growth, health, and yield. AI-powered systems are also revolutionising irrigation processes in farming. Through precision farming, AI

optimises the use of water, reducing waste by scheduling irrigation and monitoring soil humidity for maximum efficiency (Ryan, Isakhanyan, & Tekinerdogan, 2023; Kakani, 2020).

What was previously impossible in agricultural production is now possible through the use of AI. AI has become indispensable in today's farming, which is largely data-driven. With the projected compound annual growth rate of 23.1% for AI in agriculture from 2023 to 2028, it is evident that the use of AI in farming will continue to increase in the years to come (Tarasiewicz, 2023). It is the assertion of this study that optimized farming processes in the development and deployment of AI systems are congruent to the proper interpretation of humans' ongoing assignment of tilling and keeping the land Genesis 2:15. Robotic systems that can selectively detect and clear weeds, manage soil conditions, schedule irrigation, carry out accurate farm observation, provide satellite imagery and climate models, observe weather patterns, among others, not only have the potential of scaling agricultural production but also fostering agro-ecological balance and sustainability embedded in Genesis 2:15.

Genesis 2:15 in Support of AI in Agriculture

Davis (2009) is clear in asserting that the Bible can be read through an agrarian lens. Agrarianism, as he agrees, is a way of thinking and ordering life in the community that is based on the sustenance of the land and of living creatures. The continuous need to maintain the health of land and its creatures should motivate a reevaluation of biblical texts and lead to a multidisciplinary reimagining of agricultural production and the issue of food security (Davis, 2009). Genesis 2:15 is one such biblical text with the potential to recalibrate the so-called specialists' discourse on the earth's sustainability and the question of food security.

Genesis 2:15 mandates Adam (the man in a generic sense) to till and to keep the Garden of Eden (by implication, the land). The percentage of uncultivated (untilled) land in Africa shows that the African 'Adam' is yet to take complete account of the text. Genesis 2:15 presents two Hebrew words that can be read in the light of land cultivation and sustainability, responsible agricultural production, and achieving food security in Africa through the lens of recovery. The two Hebrew words used in the biblical text are לְעָבְדָהּ *l^{e}ābdāh* and לְשָׁמְרָהּ *l^{e}shāmrāh,* meaning "to till and to keep" (the Garden). These terms have a broader interpretive significance that encompasses agro production in the context of farming the earth and the sustainability of the agricultural ecosystem. A reading of the recovery approach allows interpreters of Genesis 2:15 to consider the use of לְעָבְדָהּ and לְשָׁמְרָהּ as indicating humans' protective use of the earth. The text implies that Adam (the human) is required to commit all their faculties to engaging this task. This includes their physical energy and ability, as well as their intellectual and technological capabilities, ultimately leading to the invention of tools that can aid agriculture and those that serve the purpose of sustainable land cultivation.

It is already hinted in the foregoing that אָדָם (*Adam*, "man") as used in the creation accounts represents mankind or humanity as a whole (Boloje, 2017). His creation is in the image of God. Walsh, as cited in Dumbrell (1988), suggests that the Hebrew word betsalemenu (בְּצַלְמֵנוּ), rendered as "in our image", should instead read, "*as* our image," because it relates to man's function in the world rather than a mere ontological property belonging to human beings, such as rationality. That man is to function as God on earth. The first function specific to God is the creation of all things. By implication, man is expected to create, invent and innovate in furtherance of his god-like function on earth. It is this creative ingenuity that has evolved effectively throughout history, leading to the creation of tools and implements that enhance agricultural production and other fields. It is our position in this study that AI in agriculture represents another step forward in the ongoing demonstration of human creativity, as outlined in Genesis 2:15.

Implications of Genesis 2:15 on Leveraging AI for Food Security in Africa

The study has established that humans are God's representatives on earth, created to manage and sustain the earth in a responsible manner. This management role encompasses their actions or inactions in the agro-ecological world bequeathed to them in Genesis 2:15. The Garden of Eden narrative suggests that the natural environment was created to enhance human life on earth, but not without responsibilities. Genesis 2:15, as seen in the foregoing, presupposes that the earth has all that is required to support humans' continuous existence. The text implicitly implies that hunger and food shortage are ideally not supposed to be part of human experience as long as they creatively respond to the assignment of tilling and keeping the garden. However, many people experience food shortages and live in hunger worldwide today. Africa is worse hit by this situation. The issue of food shortage in Africa reveals how poorly and inefficiently Africans have 'tilled and kept their gardens.' This indictment underscores the importance of harnessing all available technological and mechanical advancements, including AI, in scaling up agricultural production and addressing the continent's food crisis.

In fulfilling the tasks outlined in Genesis 2:15 within the context of the African food crisis, it is essential to leverage all modern agricultural technologies to address the crisis. Africans must transition from subsistence farming by adapting systems that will not only enhance food security but also contribute to the preservation of the continent's unique agro-ecosystem. To a large extent, technological innovations in AI and its deployment in Agriculture resonate with the biblical mandate to responsibly manage the earth's resources, as shown in this paper. Interestingly, AI in agriculture is one of the many advancements in human history proven to have a significant impact on food production and agro-ecological sustainability. African nations must capitalise on the opportunities presented by AI in addressing the growing food crisis. Efforts in this direction would effectively be considered innovative ways of tilling and maintaining land.

One of the theological implications of a reading of the recovery of Genesis 2:15 is that it removes the text from the heavy colouration of the "dominionists'" (Yoreh, 2019, p. 11)

interpretation, which is primarily responsible for the consumerist exploitation of the earth. A reading of recovery allows us to see God's care for humanity as the key element of the creation narrative rather than humans' superiority and dominion over creation. Genesis 2:15, as a text, is contextually set in the Garden of Eden, where hunger could not have been a possibility. God's care continues to be evident in human history, as nature itself demonstrates, but humans have subversively exploited nature to the disadvantage of many across the globe. For instance, governments in Africa focus on mining natural resources to earn foreign exchange, while largely neglecting investment in agriculture and food security. In Nigeria, multinational oil companies acquire lands previously used for farming to facilitate their mining activities. They pollute the rivers, rendering local fishing activities impossible. All of these have turned out to be a portent socio-economic means of mass impoverishment of people, environmental degradation, and severe circumscription of community and individual rights, especially in the Niger Delta region of the country (Ahiamadu, 2020).

A reading of the recovery of Genesis 2:15 brings justice to the text by emphasising protective care rather than a destructive use of land resources. It is obviously from this kind of reading that communities and people, who have suffered from many years of economic oppression and 'weaponisation' of hunger, can find justice. A proper reading would therefore see Genesis 2:15 not as a passive function of humans but as a call to duty, one that should reverberate food security as its core. Tilling the ground encompasses both agriculture and mining in a modern context, but these activities must be conducted responsibly and sustainably. Sustainability extends beyond mere maintenance; it also involves seeking ecological balance. In this study, 'agricultural production' refers to practices with minimal impact on the ecological balance. The use of modern technology can achieve this, primarily through AI-driven precision farming.\

When viewed and utilised as a tool developed in response to the fulfilment of Genesis 2:15, AI in agriculture could help achieve food security in Africa shortly. Arable land, an abundant natural resource across Africa, can be utilised optimally by deploying AI-driven technology in farming. Soil nutrients, water, and fertilisers, among others, could benefit from AI optimisation for increased agricultural production. An increase in agricultural production, reduced post-harvest waste, adequate storage facilities, and efficient food supply mechanisms ultimately result in a greater amount of food available for consumption. Interestingly, Humans (Adam) have evolved significantly in the way they labour in cultivation. Mechanised farming took over the massive burden of subsistent labour, where humans had to manually till the ground. In recent years, AI has improved mechanised farming processes by automating cultivation and other agricultural processes. A proper investment in mechanised and AI-driven agriculture would not only reduce human labour but also ensure sustainable productivity and food security in Africa.

Conclusion

The reading of Genesis 2:15, wherein humans are charged with the assignments of tilling the Garden and keeping it, shows that it is interpretatively accurate to incorporate humans' creative ingenuity, including their capabilities to invent mechanical and technological tools, as part of the fulfilment of the tasks. As products of humans' ongoing evolution in fulfilling the task of responsibly tilling and caring for the earth, advances in AI, especially for agricultural purposes, enable more sustainable methods of agricultural production in contemporary times. This study has demonstrated that AI has the potential to address the food crisis in Africa. Perhaps the greatest hindrance to the realisation of food security on the continent is the lack of political will to engage in policy change that could transform agricultural production decisively. We insist here that Africa can attain food security with the right investment in agriculture. As a way forward, therefore, African nations must rethink their current stance on agriculture by investing heavily in mechanised and AI-driven precision farming. Governments across African nations, as major stakeholders in agricultural development, must begin to provide critical infrastructure that supports modern agricultural activities. They must conscientiously address the food crisis as a matter of social justice and pursue agro-ecological programs that prioritise food security and sustainability.

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