

# Application of new technologies in narrow Fields

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**Abstract.** The agricultural sector, a pivotal player in shaping our future, is confronted with an array of challenges that necessitate innovative solutions. This article serves as a comprehensive exploration of the transformative role played by new technologies in agriculture, emerging as a beacon of hope in addressing the escalating issues facing the sector. In a landscape characterized by dynamic changes, be it technological advancements, evolving regulations, or the surging demands of a growing population, this work delves into the crux of the matter. Beginning with a succinct introduction to the topic, the narrative navigates through the complexities that mandate the implementation of new technologies in agriculture. The primary focus of this article lies in delineating the utilization of novel technologies and methods within the agricultural sector while concurrently shedding light on the intrinsic issues necessitating their adoption. Through a synergistic approach, the article aims to not only highlight the pressing challenges but also underscore the instrumental role of technology in paving the way for a more sustainable and efficient agricultural future.

## 1 Introduction

As one delves into the realm of environmental issues, one finds himself in a state of complexity. The way out of such unnatural robust chain of event is through becoming increasingly cognizant of the need for sustainable approaches to be implemented in different fields and industries. It is also vital that we recognize the fact that these approaches are inextricably linked to our future in an active way. Neglect of such links and avoidance of necessary steps taken in favour to combat the issues will lead to the future of no hopes. Similarly, recognition and appropriate solutions will act in our favour and for the bright future.

We humans with our hands shifted healthy environment to the precarious state. Our population plays a vital role in this issue. The increase in population led to occurrence of different events, sometimes catastrophic, that negatively has impact on us-humans and the whole system of the nature. Therefore, new technologies must be implemented and used in a prospers ways that their concomitant benefits will extend beyond environmental preservation and serve as a remedy for existing problems.

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The use of innovative and beneficial technologies in the field of agriculture exemplify the transformative effect toward eco-friendly practices. One can argue that technologies are the one that accelerated the phenomenon such as global warming and other unhealthy events. It is believed that technology can cause damage in a larger scale if used or applied in correctly. Sometime this can be done intentionally. However, this article will cover the use of new technologies that are transforming the agricultural sector toward environment friendly side.

## **2 The need for the introduction of new technologies and practices**

There are different reasons for the idea that new technologies are or must be implemented in the sector of agriculture. For the clarity, three-man reasons will be considered. Overpopulation is the first reason, and it is the main one of introduction of other issues that led to transformation of agricultural sector. The second one is global warming and all the uncertainties it brings. And the last one, regulation that are compulsory to follow when using practices in the sector of agriculture.

### **2.1 Overpopulation**

Our planet is an enormous place to live and with the overpopulation this statement loses its meaning. Overpopulation as it was mentioned earlier is the main reason of almost all negative event happened, happening or will happen. The number is reached in a short time to 8 billion and the number is still rising. This situation introduces a lot of issues that needs to be faced. First one is related to the lands (living area). Each person needs place to live, and thus more lands are transformed into living areas, the shortage in lands for cultivation cases dilemma. More people mean more food and goods, and similarly more space to achieve this aim. Henceforth, different practices are utilized with technologies such as vertical farming, aquaponics and so on. Technologies are used to increase production rate to the unimaginable rate as demands still go up. Also, their usability helps to lower the overall cost and cuts production time [1]. New technologies can cope with the rising overpopulation, but they both harm environment in an unrestorable way, including some systems (ecosystems) and species [2].

### **2.2 Global warming**

Global warming is a result of overpopulation and intense use of technology. Of course, there are other factors too, that contributed to escalate global warming phenomenon. The main issue that brings global warming to the agricultural sector is temperature shifts. Due to unstable of shifts in temperature, most of the old approaches and technologies are not applicable in modern time. Therefore, introduction of new ideas, technology, methods are the key factor for this sector to exist in a state that it can handle the demand and for the other sectors too. The other side of agricultural sector, that most of the people do not see, is its contribution to global warming. Agriculture is in the top in list of contributors to emitting greenhouse gases. Its contribution can take more than quarter of total amount. Therefore, technologies used in this sector must comply with the emission side, otherwise it will only make the situation with global warming worse [3, 4].

### **2.3 New regulation**

The stricter introduction of regulation in the history are ruled lately. The main reasons, as stated from most of the regulators, behind this is to fight global warming and to introduce

more eco-friendly approaches. These regulations are met with strong repulsion from the farmers as they require dramatic changes in the well-established sectors (agricultural). Due to the new regulations some farms are disturbed and for some of them this might be the end. New regulation includes novel approaches and use of new technologies that are eco-friendlier than these used in previously. However, it puts regular farmers, as it was stated before, in a harsher situation than those that are toward mass production. New regulations are a must thing in the modern case, but some of the choices are still not clear [5, 6].

### **3 New technology application in agricultural sector**

Any sector goes through minor or dramatic changes due to the different factors. Competition, new regulations, change of priorities or direction, climate change and many others are the key players for the sector to undergo some changes. Technological progress is another side that transforms most of the sectors, and it is the main one as well. Agriculture and related fields are fields that utilizes and adopts new technology and practices for profit and production rate. Henceforth, this section will cover the new technologies that are used in agricultural sector.

#### **3.1 Blockchain**

In the verdant realms of agriculture, the inexorable march of blockchain technology has unveiled a profound transformation. It emerges as a beacon of change, a sentinel that heralds a revolution across myriad facets of the industry. Foremost among its applications, the agricultural sector embraces blockchain to forge transparent, immutable, and secure ledgers, ones that meticulously chronicle the odyssey of products from the very bosom of the farm to the conviviality of the dining table. This innovation unfurls the banner of authenticity, casting a shield against the specter of fraud, while proffering to consumers the priceless knowledge of their nourishment's origin. In a symphonic harmony, smart contracts, woven into the blockchain's tapestry, orchestrate automation, enhancing the cadence of transactions and assuaging the administrative burden. Beyond mere technology, blockchain bestows a mantle of trust and accountability upon the industry, forging pathways for fair trade and sustainability. Thus, with these advancements, the agricultural landscape undergoes a metamorphosis, not merely in how its products are cultivated and disseminated, but in the nurturing of a transparent and conscientious ecosystem [7].

#### **3.2 IoT**

In the fertile soil of agriculture, the Internet of Things (IoT) emerges as a transformative artisan, crafting innovative solutions to address multifarious challenges and bestow the gift of efficiency. Within the agricultural domain, the IoT's embrace beckons sensors and data analytics, creating a symphony that monitors the vital rhythms of soil, sky, crop, and beast. These sensors, akin to sages of the earth, offer a constant stream of data, empowering farmers to make decisions steeped in the wisdom of bytes, optimizing the allocation of resources and coalescing into bounteous harvests. Machines and tools, imbued with the enchantment of IoT, move with precision, planting, harvesting, and irrigating, their toil reducing costs and enriching yields. This omnipresent realm of the IoT offers a digital realm where farmers may tend to their domains remotely, their stewardship, ever-present and accessible via the conduit of mobile devices. Thus, the harvest is sustainable, efficiency is the new plow, and agriculture stands as the sentinel of a changing world, a guardian of resources, and a proponent of environmental stewardship [8].

### **3.3 Drones**

In the fertile fields of agriculture, drones take flight as harbingers of a technological renaissance. With the drone industry poised to burgeon from \$1.2 billion in 2019 to \$4.8 billion in 2024, the agricultural sector stands as a fertile crucible for their utilization. Drones, swift and compact, effortlessly traverse vast expanses, offering unparalleled aerial vistas of the cultivated domain. They ascend to capture vistas that the human eye cannot perceive, rendering bird's-eye views as vibrant canvases of agricultural landscapes. These ethereal photographs, known as RGB maps, usher in a fresh perspective for the farming community, unveiling areas of concern that would otherwise remain concealed. Such a harvest of information can be sown to visualize farmland, plan future developments, monitor the land's evolution across the seasons, and more. Beyond these visual wonders, drones conjure up the Normalized Difference Vegetation Index (NDVI) maps. These maps reveal the subtleties of hidden information, the infrared tendrils of the land's vitality. They unveil the secrets of malnourished regions and drought-stricken domains, offering insights invisible to the human gaze. Moreover, drones, like diligent sentinels, can detect the insidious presence of parasites and diseases, safeguarding the health of the agricultural realm. Replacing cumbersome tools of yore, drones are more than just technology; they are the custodians of agricultural landscapes, offering insight, oversight, and boundless possibilities for the nurturing of agricultural prosperity [9].

### **3.4 Data science**

Within the agricultural realm, the tapestry of big data and data science weaves a rich narrative, yielding a wellspring of innovation that nourishes productivity, kindles the flames of sustainability, and illuminates the path of sound decision-making. Here, amidst vast data plains, ranging from weather patterns to soil's secret whispers, data science unfurls its mighty banner. The insights gathered here metamorphose into informed decisions, steering the ship of agriculture to optimize the planting, irrigating, and fertilizing endeavors, ultimately reaping bountiful yields. Furthermore, predictive analytics, harnessed from the rich data mines, act as oracles, predicting the ebbs and flows of disease outbreaks, pestilence, and meteorological caprices, guiding farmers towards informed action, safeguarding their toil. In the realm of livestock, data science assumes the role of healer and nourisher, tending to the health of beasts and optimizing their sustenance, invoking a symphony of efficiency across the pastoral expanse. Thus, in this agricultural opera, big data and data science coalesce, sculpting a tapestry of knowledge, productivity, and sustainability that ensures the soil remains fertile, the harvests abundant, and the agricultural symphony plays on [10, 11].

## **4 Outcomes or results**

The following article delves into the complex web of environmental issues and emphasizes the urgent need for sustainable approaches across various fields and industries. In this particular case, agricultural sector is considered. The work highlighted the crucial connection between these approaches and our future, emphasizing that neglecting such links and avoiding necessary steps will lead to a future without hope. The discussion underscores the significant role of human population growth in exacerbating environmental challenges, leading to catastrophic events. To address these issues, the article advocates for the implementation of innovative and beneficial technologies in agriculture, transforming the sector toward eco-friendly practices. The three main reasons for the introduction of new technologies in agriculture are identified as overpopulation, global warming, and new regulations. The article argues that these technologies, when used correctly, can not only

increase production rates to meet rising demands but also contribute to environmental preservation and serve as a remedy for existing problems. It further explores specific technologies, such as blockchain, IoT, drones, and data science, highlighting their transformative effects on the agricultural sector and their potential to foster transparency, efficiency, and sustainability. Overall, the article stresses the importance of embracing technological advancements to address environmental challenges while acknowledging the need for responsible and eco-friendly practices in the agricultural sector.

## 5 Conclusion

In conclusion, the agricultural sector stands out as one of the most critical domains shaping our future. This article has diligently illuminated the multifaceted issues emanating from this sector and their far-reaching consequences. With a central emphasis on leveraging technology to navigate the challenges inherent in agriculture, the discourse underscores the pivotal role of innovative solutions. Addressing significant problems within the sector, such as emissions, becomes imperative, requiring the integration of appropriate practices intricately entwined with new technologies and methods. The recognition of the intricate links between environmental challenges and agricultural practices is paramount. By delving into the complexities of issues like overpopulation, global warming, and evolving regulations, the article advocates for a transformative approach. It underscores the potential of technologies such as blockchain, IoT, drones, and data science in fostering transparency, efficiency, and sustainability within the agricultural landscape. Through a conscientious embrace of these technological advancements, the agricultural sector can not only meet the demands of a growing population but also emerge as a steward of the environment, ensuring a future that harmonizes productivity with ecological responsibility.

## References

1. NIC, Global future trends 2030: alternative worlds (2017)
2. I. A. Magomedov et al IOP Conf. Ser.: Earth Environ. Sci., **677** (2021)
3. W. James, C. Bill, Global Warming's Increasingly Visible Impacts ed M Horn, 5-8 (USA:Environmental Defense Fund, 2005)
4. I. A. Magomedov, M. S-U. Khaliev, A. M. Bagov, *Agriculture and its contribution to global warming*, IOP Conf. Ser.: Earth Environ. Sci., **548** (2020)
5. O. A. Fernandez, J. L. Ordóñez-Ávila, I. A. Magomedov, *Evaluation of parameters in a neural network for detection of red ring pest in oil palm*, AIP Conference Proceedings 13 December, **2442(1)**, 030015 (2021)
6. A. Sorto, T. Marquez, A. Carrasco, J. Ordoñez, Journal of Physics: Conference Series, **1710(1)**, 012009 (2020)
7. I. A. Magomedov, A. Dzhabrailov, A. Bagov, *Blockchain technology and its common threats*, AIP Conf. Proc., **2647(1)**, 040096 (2022)
8. M. Barenkamp, A New IoT Gateway for Artificial Intelligence in Agriculture, 2020International Conference on Electrical, Communication, and Computer Engineering(ICECCE), Istanbul, Turkey, 1-5 (2020)
9. I. Magomedov, M. M. Khulamkhanova, N. A. Staroverova, *Possible Use of an Agricultural Service with Artificial Intelligence to Monitor Crops*, BIO Web Conf., **63**, 05010 (2023)
10. D. M. Rodríguez, J. Phys.: Conf. Ser., **1409**, 012018 (2019)

11. V. A. Gerasimov, M. G. Nuriev, D. A. Gashigullin, International Russian Automation Conference (2022)