DIGITAL TECHNOLOGY: A PANACEA FOR SUSTAINABLE LIVESTOCK REFORMS IN OUR COMMUNITY AND CONFLICT RESOLUTION

1ONARIASE, E. I. O., 2ENWELIM, O. J., 3IHENSEKHIEN, I., 4NWABAH, N. I
1Department of Community Development,
Ministry of Local Government, Community and Chieftaincy Affairs, Edo State.
2Department of Home Economics Education, Federal College of Education (Technical) Asaba
3&4Department of Vocational and Technical Education, Faculty of Education,
University of Benin, Benin City.
1Onariaseunice@gmail.com 2enwelimjoy@gmail.com 3isoken.ihensekhien@uniben.edu

Abstract

Livestock production plays a vital role in ensuring food security, economic stability, and social wellbeing in many communities worldwide. However, traditional livestock practices often face numerous challenges, such as unsustainable resource management, conflict arising from resource scarcity, limited access to information and support systems. This paper explores the potential of digital technology as a panacea for sustainable livestock reforms and conflict resolution in our community. Digital technology offers transformation opportunities to address these challenges and promote sustainable livestock practices. The integration of digital tools, precision agriculture, data analytics, internet of things (IoT), and artificial intelligence, enables the collection and analysis of real-time data on animal health, nutrition, and environmental conditions. These advancements facilitate evidence-based decision-making, optimize resource allocation, and enhance productivity while reducing environmental impact. Furthermore, digital platforms and mobile application provide accessible and user-friendly interfaces for livestock farmers, extension workers and community members. Moreover digital technology can contribute to conflict resolution within the livestock sector. By enabling transparent and traceable supply chains, Blockchain technology helps prevent fraud, reduce theft, ensures fair market transactions, enhance security and mitigate conflicts related to land use, grazing area and resource allocation. However the successful implementation of digital technology for sustainable livestock reforms and conflict resolution will ensure equitable access to digital infrastructure, addressing the digital divide, fostering digital literacy, and considering the specific needs and contexts of different communities. In conclusion, digital technology holds immense potential as a panacea for sustainable livestock reforms and conflict resolution in our community. Embracing digital tools and fostering digital inclusion will pave the way for a resilient and thriving livestock industry that contributes to sustainable development and community well-being.

Keywords: Home Digital Technology, Sustainable Livestock Reforms, Community, Conflict Resolution

Introduction
Digital Technology refers to internet, mobile phones and related technologies that facilitate the collection, storage, analysis and sharing of data and information (Deichmann, Goya & Mishra, 2016).

Digital technology symbolizes the convergence of technological innovates, which currently make ambiguous contributions to sustainable development. The digital revolution, including virtual and augmented reality (Virtual reality and AR), additive manufacturing (AM), (general purpose) artificial intelligence (AI), deep learning, robotics, big data, Internet of Things (IOT), and automated decision-making systems, has entered the public discourse in many countries. Looking, digitalization and conflict resolution strategy were barely featured in the 2030 sustainable development goals or the Paris Agreement (Domingos, 2015; Schwab, 2016; Tegmark, 2017;).

Hence, there is an urgent need to bring the sustainability, digital and technology communities together to align the direction of changes with the 2030 Agenda and a sustainable livestock reforms and conflict resolution (Nakicenovic et al, 2016).

Sustainable development is the efficient production of safe, high quality agricultural products, in a way that protects and improves the natural environment, the social and economic conditions of farmers, their employees and local communities, and safeguards the wealth and welfare of all farmed species (Senso wave, 2017).

Therefore, social responsibility component of sustainability includes:

- Improving and maintaining the societies and communities where livestock food products are produced.
- Safeguarding the health, wellbeing and social right of workers, farm managers and their families.
- Guaranteeing food safety, public health, improving animal health and welfare.

It is pertinent to note that farm animals depend on human care and it is society’s responsibility to respect their welfare. According to the fire freedoms the ideal state to strive for is that farm animals should be free from hunger and thirst, discomfort, pain, injury and disease, fear and stress and they should be free to express normal behavior (Senso Wave, 2017).

Food production must be economically viable. Farmers and other food chain stakeholders must be able to prosper to sustain investment, while consumers need access to quality food that is affordable. Therefore, from an economic point of view, sustainable livestock farming system are characterized by: Enabling economically viable food production along the food chain, ensuring’] farm operators obtain a fair share of the profits achieved in the food chain and supporting the ability of livestock producers to invest in sustainability improvements through the inclusion of digital technology. (Senso wave, 2017).

According to Bakut,( 2012), land conflict is a social fact in which at least two parties are involved, the roots are different interest over the property rights to land: the right to use, manage, generate income, exclude others, transfer, and derive compensation from it are accorded an individual(s), it is absolutely necessary to note that land which is a factor of production is increasingly a scarce resource and limited in supply while the human population keep on increasing by the day. As reported by Gwaleba (2018), violent conflict that leads to destruction of lives and properties like the ones that happen between the pastoralists and farmers/communities in land disputes is dangerous. This is associated with colossal economic loss.

Community is a set of people living together, sharing common interest and attitudes and in a defined geographical area (Ministry of Local Government, Community and Chieflaincy Affairs, field workers handbook, 2023).

The major occupation of Nigeria rural communities is farming. About 75% of them are farmers therefore the Community-Based Agricultural Support Project (CBASP) is designed to stimulate inclusive economic growth and poverty reduction in poor rural communities by improving access to production infrastructure and services that are expected to lead to Sustainable Agricultural production and equitable returns (IFAD, 2023).
Food security, on the other hand encompasses a sustainable agricultural development that contributes to improving resource efficiency, strengthening resilience and securing social equity/responsibility of agriculture and food systems in order to ensure food availability and nutrition for all, now and in the future (HLPE, 2016).

Drawing from the conceptualization of conflict and food security. It is implied that pastoralists-farmers/communal conflicts and food security are inversely related. Conversely, where pastoralist-farmer conflict thrives unabated, food security may be a huge mirage. However, upholding sustainable peaceful resolution mechanisms in resolving conflicts among the two major agricultural producers in Nigeria would go a long way in ensuring food security in the country. Therefore, it become apt to strongly endorse peaceful resolutions through digital technology among warring parties as a panacea for food security in Nigeria (Ja’afar-furo M.R et al, 2018)

It is well known that global population is still growing and it is expected to be 9 billion by 2050 and the Food and Agriculture Organization of the United Nations (FAO) estimates that this will increase the demand for high quality protein such as meat (Senso Wave, 2017).

Livestock sector is the largest user of natural resources with 80% of all agricultural land used for grazing or animal feed production and 8% of the global water use.

The European union (EU) has to address a challenge due to it is necessity to produce larger quantities of high quality and affordable demand while making sure that production system is sustainable from environmental, social and economic points of view (Senso Wave, 2017).

Resilient and sustainable livestock systems are a cornerstone of food secure communities and the demand for livestock products and services is set to increase in the future due to the projected global population increase (Herrero and Thornton, 2013).

However, despite the importance of livestock, the resilience and sustainability of the livestock system across the globe, particularly in rural communities, is increasingly under threat due to General Environmental Challenges (GEC), volatile commodity markets and fragile political economics. Also, as complex systems with plethora of actors, livestock system are affected extensively by the unpredictable interactions of actors within the system e.g., power dynamics. It is prudent therefore to indicate that modern livestock systems are facing major strains which are projected to continue (Tendall et al, 2015). As a result of this, Gahukar (2016) specifically indicated that relying on food strategies including livestock production (system) to feed our ever-growing human population seems to be impossible. For this reason, if communities are to be food secure, there is need to establish mechanisms to overcoming the challenges threatening modern livestock system and this may include effecting infrastructure transformations or even deploying digital technology (Mulligan and Berti, 2015). While developing sustainable livestock systems requires a “cocktail” of solution, Mulligan & Berti (2015) suggested that DTs may hold the key to coordinating sustainable food systems and resolving existing and future crisis in the livestock industry. Based on this, the literature paper attempts to critically review the potentials of Digital Technology as a panacea for sustainable livestock reforms and conflict resolution in our communities. Also, considering Choi and Graham’s perspective that “practices of food production, consumption, distribution and challenges have the potential to go through immensely transformative shift as information and communication technologies (ICTs) become increasingly embedded in every domain of contemporary life” (Choi and Graham, 2014).

The use of DTs in agriculture is not an entirely new concept even in developing countries despite many researchers focusing on the limitation of the digital device in developing countries. Based on the predictions that by the year 2019 at least 930 million people in Africa will be making use of mobile phones and 75% of these will be accessing the internet, (Caine et al, 2015). Therefore, it is inevitable and reasonable to consider that, critical systems, such as livestock system will be transforming to accommodate ICTs as they become embedded in everyday life even in rural communities such as in Ovia North East Local Government in Edo State.
Susceptibility of Livestock to Biophysical Risks and Digital Innovations

Livestock systems in rural communities are highly susceptible to biophysical risks and vulnerabilities-global environmental changes (GEC), (Herero and Thornton, 2013). Climate change has become a major concern for both developed and developing communities. In rural communities relying on agricultural systems, the effects of climate change are highly visible. Over the years, agricultural output has dropped extensively leaving millions without food and source of income. The livestock system also has not been spared from the impact of climate change. It has been affected in several ways, for example lack of food, water and emergence of new diseases. Over the years, smallholder farmers and others within the livestock system have devised approaches to overcome and deal with the impacts of climate change. Even though there are many scientific deliberations on dealing with climate change, these are poorly communicated to those at the bottom of the pyramid (BOP). The majority of smallholder farmers rely on traditional knowledge to deal with climate change.

The advent of DTs has brought revolutionary approaches to dealing with climate change which can also improve the resilience and sustainability of the livestock system. Livestock farmers can take advantage of new technologies such as remote sensing, crowdsourcing and mobile technology (Enenkel et al, 2015, Antle et al, 2016). There are new DTs which are being used to make a prediction of seasonal and weather forecast, communicating climate change information e.g., early warning system and even dealing with the impacts of climate change (Eakin et al, 2015, Hearn et al, 2014). Also, DTs can be used to help communities to adapt to climate change for instance, through social interaction with others (Stevens et al2016). There is extensive use of DTs in developing models to predict the future of climate change. Long lasting solutions for challenges within the systems require “structural transformation” which include technology advances (GSDR, 2015). Further to this, ICTs and recent innovations such as social media have potential to connect people in communities struggle “connect” with each other especially for peer-to-peer advice and the new DTs can bridge this gap as social networking and sharing ideas can strengthen farmers groups.

Against the increasing impacts of climate change, there are however emerging initiatives to provide financial products to rural communities specifically through mobile technologies. In Edo State, the State Government, Governor Godwin Obaseki is leading in fiber optics connectivity in achieving part of his reforms of Making Edo Great Again (MEGA). The internet connectivity in communities across Edo State will promote mobile micro insurance product designed to ensure inputs and crops against drought or excessive rainfall, insured farmer will also receive daily weather information, farming tips and information on when and where to sell, and the best price for their produce.

Also, DTs are providing livestock farmers and other actors within the system a massive opportunity to develop new approaches to solving traditional problems. In the African context, smallholder farmers use traditional knowledge mostly and DTs can be critical in the profiling and archive of that traditional knowledge. (Leon Tinashe Gwaka, 2017).In Edo State, the device is used in tracking and addressing conflicts at potential flash points.

Natural Factors Leading to Environmental Degradations

Desertification in Northern Nigeria where herdsmen are dominant, erosions and other natural hazards contribute in limiting the spectrum for grazing. This phenomenon leads to competition or increased pressure in accessing land resources, thereby serving as potential point for conflict. Oladele and Oladele (2011), Okoi, Chukuma and Atelhe (2014) and Ngah and Zeh (2016) earlier reported this finding.

Possible Political Instigation

There are conjectures in the literature of possible instigations by unscrupulous politicians who want to unseat the incumbent governments, be it in the LGAs, States or Federal, to cause unrest. This creates a scenario of the incumbent lacking capacity to contain such insecurity situations.
thereby giving the opponents a platform to canvass for votes. The pastoralists and farmers incessant conflicts which claimed several human/animal lives and properties in Taraba State, Nigeria, in late part of 2017 up to middle part of 2018, were such conflicts.

Minimal Government Intervention on Pastoralist Issues

In spite of the huge contribution to the country’s economy by the pastoralist in terms of supply of milk, meat, hide and skin, manure, among others, which 80% of the Nigerians depend on. Successive governments in the past have neglected and marginalized these set of producers. The first meaningful attempt of the Federal Government of Nigeria (FGN) to assist pastoralists was in 1965 when the grazing law was established to provide access to more pasture for their livestock (Genyi, 2014). The present effort of the FGN to pass a Bill that would lead to establishment of National Grazing Routes and Reserves Commission to acquire lands in all the 36 states for grazing and ranching is a laudable effort. But this is not without stern resistance from political elites and farmers, more especially from states in the central and southern parts of the country without taking into account the economic benefits such as projects attract to the host communities.

Today, the pastoralists in Nigeria are the most neglected group of people in the country. In spite of their large population and economic contribution, they live in the most remote communities with no or poor access to basic amenities such as schools, hospital, portable water, source of electric power and other necessities of life. They are often visited by the political elites with bundles of provisions during election periods to canvass for votes which hitherto remain unfulfilled, (Genyi, 2014).

Introduction of Cattle Tracking System

Tracking system is very important for strengthening the capacity of security agencies by the government to facilitate curbing. Rustling and banditry, instituting animal tracking system in the Agricultural sector will tremendously assist in further checking the menace thereby limiting the livestock migratory trend. In this regard, ICG (2017) strongly endorsed the inclusion of Ministries of Agriculture in states to oversee animal tagging, register animal, traders, monitor cattle marketers and regulate slaughter houses and abattoirs. In line with this, Mohammad, Ismail and Babu (2015) endorsed the application of Geographical Information in easily tracing the defined cattle route and farmlands in assessing and solving disputes between the pastoralists and sedentary farmers. In Edo State, one of the measures put in place to track conflict in livestock industry, is the Fiber Connectivity on going across the 18 Local Government Areas.

Potentials of Digital Technology in Livestock Production and Reforms

Digital technology has the potential to bring about significant and sustainable reforms in the livestock industry across our communities, as well as aid in conflict resolution. Digital technology can act as a panacea for the under listed challenges

1. Data driven decision making: Digital technology enables the collection and analysis of vast amount of data related to livestock production, such as animal health, records, feed consumption and environmental impact. By leveraging on this data, stakeholders can make informed decisions to improve productivity, reduce waste and promote sustainable practices.

2. Precision farming: IOT devices such as sensors and drones, can be utilized to monitor and manage livestock health, productivity and welfare. For example, wearable sensors can track an animal’s vital and detect early signs of disease or distress, allowing for prompt intervention. This not only improves animal’s welfare, but also minimizes the use of antibiotics and other medications promoting sustainability.

3. Supply chain transparency: Block chain technology can be employed to create a transparent and traceable supply chain for livestock products. This ensures that consumers can track the origin and quality of the products they purchase guaranteeing food safety and promoting ethical practices. Additionally, it can help prevent the sale of counterfeit or
illegal sourced products, which can lead to conflicts between producers and consumers.

4. Market access and information dissemination: Digital technology provides a platform for farmers to access information, market their products, and connect with buyers without middlemen. This can empower small-scale farmers by eliminating information asymmetry and enabling fair pricing, ultimately reducing conflicts arising from unfair trade practices.

5. Conflict resolution through digital platforms: Digital communication platforms can serve as a neutral ground for stakeholders to engage online forums, chat groups and social media networks can facilitate discussions, knowledge sharing and mediation between parties, promoting understanding and collaboration.

6. Fiber connectivity in Edo State: Digital Technologies and more recent innovations (fiber connectivity) can be used by community dwellers, small and large holder farmers and livestock farmers to overcome the challenges and conflicts which they face in production and marketing of their produce. Positive impacts are being recorded relating to the wellbeing of the community members, livestock and crop farming activities as a result of easy access to mobile phone through the Edo State policy of fiber connectivity across the eighteen (18) Local Government Areas and communities in Edo State with improved Geographical Information System (GIS). This is to promote community development and also reduce communal crisis to the barest minimum (MLGC & CA, 2021).

Overall, digital technology has the potential to revolutionize the livestock industry, making it more sustainable, transparent and efficient. By leveraging on digital tools, we can address existing challenges, promote responsible production practices, and foster peace and stability in our communities.

Sustainable livestock reforms and mitigation of associated conflicts in Nigeria

Saawua Terzungwe (2023) suggested the underlisted:

1. There is need to deploy innovative and adaptable technologies grounded in scientific and indigenous people’s knowledge, jointly designed and implemented with strong producers’ participation.

2. Livestock production practices should increase crop-livestock integration, development of grazing reserves, establishment of smallholder and commercial dairy and beef farms, establishment of pastures and feedlots and management of livestock migration among other development strategies.

3. Strengthen the role of traditional rulers and community leaders in managing the affairs of farmers and herders including the sustenance of inter communal relations for effective management of disputes and conflicts.

4. Strengthen peace-building interventions at all level among farmers and herder by adopting proactive early warning and early response mechanisms. This will also include adoption of alternative dispute resolution and training of community leaders and other community gatekeepers on techniques of mediation.

5. Work out practical mechanisms for increased and viable private sector investments in the agricultural and pastoral production industry with framework for strengthening backyard integrations in the livestock value chains.

6. The sub-national, national and regional laws, legislations and policies to make applicable reforms for improving livestock production and addressing conflicts need to be revisited and reviewed.

7. Agricultural and pastoralists organizations, cooperative societies and relevant producer associations and professional bodies need to be supported for improved productivity.

8. Media organizations need to create awareness at all levels that will promote inclusive communities, strengthen harmonious relations to encourage government and private sector investment for cohesive societies and improved productivity. Similarly, profiling and reportage that malign socio-economic and ethnic groups need to be avoided.

9. UN agencies, bilateral institutions, regional organizations (AU and ECOWAS), national and international CSOs and other support
organizations should increase the level of funding and support to the government of Nigeria in the impact of climate change, addressing technology gaps, poverty, skills gap and improving people’s livelihoods.

**Challenges of Digital Technology**

In the African context, community dwellers use traditional knowledge to solve traditional problems rather than digital technology. They reflect digital technology on the basis of conflicting values since DTs are characterized as bearing Eurocentric resemblance.

Despite the new innovation which support livestock systems such as mobile apps, there is problem of internet connectivity within most rural communities.

Food systems are inherently social and the majority of rural communities still hold on to cultural beliefs. Digital technologies are inherently Eurocentric in the elderly population of which majority reside in rural communities (Davies, 2014).

In the same strength of culture, the issue of gender and DTs still persist in most rural communities. Women are mostly deprived the access and use of DTs in their every day duties within the household (Leon Tinashe G, 2017).

**Way Forward on Challenges of Digital Technology**

There is need to improve the internet connectivity within the rural communities for improved mobile networks.

- There is need to advocate for public investment on digital technologies for improved sustainable livestock reforms in agrarian communities.
- In the issue of cultural and gender belief. The different sexes and age groups need to be developed based on everyday experiences and the present trend (Digital era) as target users.
- GIS tracking facility should be improved on for effective and quick tracking of conflict flash points for immediate invention.

In conclusion, DTs have the potential to be central to the achievement of sustainable and resilient livestock reforms in our communities. However, there are many factors which influence the success of these DTs in sustainable livestock production. Conflict between pastoralist and farmers in agrarian communities presents a formidable challenge livestock production in Nigeria. It is associated with both structural issues like population, cultural, political and ethno-religious differences as well as unproductive conflict behaviour and struggle for livelihood survival by the disputants. The results point to problems of incompatibility of livelihood strategies, competition for access and use of natural resources such as land and water. Pastoralist-farmers’ conflict has production and economic consequences for herding. Pastoralist’s assets both in terms of human, physical, social, economic are affected, hence productivity and sustainability of the sector will be compromised.

Therefore, the study recommends that there should be more awareness on the use of digital technologies in sustainable livestock production in our communities. There should be improved GIS and internet connectivity across communities in Edo State for quick and effective tracking of crisis in conflict flash point areas for prompt intervention so as to save lives and properties.

Also, all stakeholders (government, non-governmental organizations, extension agencies, Community Development Officers, rural Institutions among others) should intensify efforts to build cooperative and peaceful coexistence between farmers/community dwellers and pastoralists through public enlightenment, education and campaign in agrarian communities. Government and NGOs should promptly intervene with aids (e.g. ICT tools etc.)/Compensation to reduce vulnerability, persistence and further spread of conflicts of pastoralist-farmer/community dwellers conflict in communities. Also, the need to enforce policies that ensure strict compliance to grazing reserve and migration routes, internet connectivity for improved technological tracking/use of ICT by rural dwellers is an imperative for sustainable management of farmers’ headers conflict in agrarian communities.
References


http://www.unimaid.ng/jaes.


Religious Conflict Resolution and peace building. International center for Ethno-
Religious meditation 1st October.

Gwaleba M.J. (2018). A review of the causes of land use conflicts Between Farmers and
Pastoralists in Tanzania and a Proposal for Resolution. International Journal of

Ecology Theory to Scope the Emerging Role of Social-Media in the Evolution of
Urban Food Systems. Futures, V.R., Futures, 62, B, 202-212.

Level Panel of Experts. HLPE (Eds). Sustainable Agricultural Development for


Leon Tinashe Gwaka (2017). Digital Technologies and Sustainable Livestock
Systems in Rural Communities. University of the Western Cape, University of
Pretoria, South African.
tinashegwaka@gmail.com EJISDC (2017) 81, 6, 1-24.

MLGC&CA (2021) Matters affecting Communities in Edo State.

MLGC&CA (2022-2023) Data on displaced Communities, CADRE Harmonise File
No: MLG/CCD/702, PP. 64-66

Moritz (2013). Rangeland governance in an open system: protecting transhumance Corridors
in the far North Province of Cameroon. Pastoralism: research, Policy and Practice.
Vol. 3 No.26 (October).

Network.


12:259-262.

Oladele O.T. and Oladele, O.I. (2011). Effect of Pastoralist Farmers Conflict on Resources in

Nigeria. Aljazeera Centre for Studies. Retrieved from
https://www.grin.com/document/67950


and innovation
http://www.eaap.org/wp.

Agro-food sustainability. Current Opinion in Environmental Sustainability, 18, 99-106.

Tendell, D. M., Joerin, J., Kopainsky, B., Edwards, P., Shreck, A., Le, Q.B., krueiti,


Food Security and Improved Nutrition and Promote