Navigating Traditional and Modern Technology among the Maasai Pastoralists of Kenya

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Abstract

In the past decades, pastoralists have experienced numerous challenges such as climate change, increased rainfall variability, land tenure changes, diseases, and conflicts that have put the resilience of pastoral systems to test. In the era of technological advancement, modern technology has penetrated pastoral systems and has been appropriated to meet local needs. Consequently, longstanding pastoral practices such as communication and mobility have been diversified. Based on interviews and informal conversations conducted with Maasai pastoralists in Kenya, this study demonstrates that pastoralists use both traditional and modern technology to cope with ecological challenges and build resilience in pastoral systems. We argue that modern technologies have not changed pastoral practices; instead, they have pluralised existing pastoralists' communication and mobility systems and ability to navigate ecological challenges.

Key words: Communication, Kenya, Maasai, Mobility, Modern technology, Pastoralism, Traditional technology

Introduction

Pastoralists have sustained their pastoral livelihoods in the rangeland ecosystems for centuries with the help of indigenous knowledge (Kagunyu *et al.* 2016). Recent studies show that rangeland ecosystems are undergoing many changes including higher temperatures and prolonged drought due to climate change and land use changes (Archambault 2016; Boas 2022; Butt 2015). Pastoralists have devised coping mechanisms to build the resilience of pastoral systems against these climate-related shocks and anthropogenic factors by using their indigenous knowledge. For instance, mobility enables pastoralists to meet their herd's nutritional needs (Oba 2012). Depending on resource availability,

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pastoral systems' mobility takes different shapes and forms (Turner and Schlecht 2019). Scientists and innovators have also devised ways to strengthen pastoral systems through disease-resistant cattle, navigation maps, and mobile phone applications, among others. However, strengthening pastoral systems is not a new concept since pastoralists have always used indigenous knowledge and practices to build resilience against ecological and social shocks.

Over the years, interventions aimed at building the resilience of pastoral systems have taken new directions and shapes. The emergence of mobile phones has paved the way for the invention of modern technologies that are tailor-made for pastoralists. Although limited research has been conducted to evaluate the long-term implications of modern technology (e.g. digital technology), they are slowly penetrating pastoral systems in Africa. There is also limited literature examining how modern technology coexists with and complements traditional technology in pastoral systems. This article demonstrates how Maasai pastoralists of Kenya navigate between traditional and modern technology to cope with ecological challenges to sustain their livelihoods.

Traditional technology among pastoralists

Mobility and communication are the main traditional technologies used among pastoralists around the world. However, mobility is not new to pastoralism, it has always been (Boas 2022; Nilsson and Salazar 2017). Mobility has been defined as a movement imbued with meaning (Salazar 2018) and as technology in pastoral systems (Nilsson and Salazar 2017). The latter deviates from the deterministic understanding of technology as "hard material objects" (Mauthner and Kazimierczak 2018:22). Nilsson and Salazar (2017:448) give a broader definition of technology as "a set of techniques, systems, practices or methods of organization that serve to control and adapt to the socio-cultural, political, economic and ecological environment". Mobility not only consists of material objects such as tools, weapons, and temporary shelter but also intangible components such as values, attitudes, and norms. These intangible components of technology materialise when performed to achieve the intended effect. For instance, achieving high milk yield would require moving to areas with fresh pasture.

The second form of traditional technology is communication which is a medium through which ideas and values are transferred. Pastoralists have used communication to transfer cultural values on land, cattle and pasture management, nutrition, and the environment from one generation to another. These embodied values are passed to the next generations making communication an essential technology for the continuity of pastoral livelihoods (Van Dijk 2011). Among the Maasai, the warrior age group known as *moran* oversees the herding of the cattle. Elders instruct the *moran* where to graze

cattle and delegate their herding duties to them (Ameso *et al.* 2018) , they scout for pasture and water, and relay information back before moving with herds. As such mobility and communication are entangled traditional technologies in pastoralism.

Modern technology: The emergence of mobile phones and related technologies in pastoralism

The impact of mobile phones and their related technologies on pastoralism has been widely debated. On the one hand, some scholars and innovators claim that mobile phones and related technologies have 'revolutionized' and 'transformed' pastoralism. On the other hand, other scholars argue that digital technology has not caused radical changes in pastoralism (Butt 2015; Nilsson and Salazar 2017). Instead, mobile phones and related technologies have created an opportunity for pastoralists to pluralise how they navigate challenges in their environment (Boas 2022).

Mobile phones have a variety of uses among pastoralists. Some of these include communication about pasture and water (Parlasca 2021), relaying market prices (Butt 2015), sending and receiving money (Nilsson and Salazar 2017), managing herds (Parlasca 2021), accessing veterinary services (Daum *et al.* 2022), facilitating 'illegal' grazing in protected areas (Boas 2022), recovering raided cattle (Butt 2015), and mobilising cattle raids (Parlasca 2021). While the use of mobile phones has positively impacted pastoral activities, there are instances when mobile phones have been used to jeopardise activities within pastoralist groups. For instance, mobile phones have been used to relay false information on pasture and water in contested spaces. A study by Butt (2015) in Narok County in Kenya shows that Maasai pastoralists purposefully share false information on contested grazing and water points.

The use of mobile phones among pastoralists has not been without challenges. Pastoralists experience poor network coverage, especially those who live in remote areas, which hinders the efficient relay of information (Parlasca 2021). Consequently, the transmission of vital information is delayed, distorted, or not delivered. Besides poor network coverage, there are also difficulties in relaying complex information on ecological conditions and social factors (Parlasca 2021). Despite these challenges, mobile phones have paved the way for new digital inventions. For instance, *M-pesa*, a mobile phone money transfer application that started in Kenya is rapidly picking up in East African countries as a convenient mode of payment. Like mobile phones, *M-pesa* has penetrated the Maasai pastoral systems as a mode of payment for services such as contractual herding (Nilsson and Salazar 2017).

Mobile phone applications that target pastoralists are also slowly picking up, and currently there are a few pastoralist-centred mobile applications in Kenya (Daum *et al.* 2022). One such is Afriscout - the first well-established mobile phone application created for pastoral communities launched in Kenya in 2018 by Global Communities formerly Project Concern International (Hickman 2018). Before its launch in Kenya, Afriscout had been launched in Ethiopia and Tanzania (Hickman 2018; KNU 2018).

Afriscout was developed to mitigate the challenges that pastoralists face during the dry season migration since it was believed that the use of indigenous knowledge has become unreliable due to climate change and land use change (KNU 2018). It aimed to revolutionise how pastoralists search for pasture and water through satellite images of community grazing maps and mobile technology (Hickman, 2018). Afriscout also provides pastoralists with information regarding human-wildlife conflict and livestock diseases (KNU 2018). Another aim was to help pastoralists reduce time spent on scouting and improve their collective water and pasture management (KNU 2018). Afriscout can be downloaded on any Android smartphone from Google Play Store.

Study sites and methods

This study was conducted in Narok, Kajiado, and Laikipia Counties. Kajiado County covers an approximate area of 21,900.9 km^2 consisting of plains, hills, and valleys. It is made up of four livelihood zones; namely: agro-pastoral, pastoral all species, mixed-farming, formal and casual labour, and business. Laikipia County is located within the Rift Valley region and covers an area of approximately 9500 km^2 consisting of arid and semi-arid savannah and acacia bushland (Yurco 2017). The county is well known for biodiversity conservation and livestock production. Narok County is also situated along the Great Rift Valley covering an area of 17,944 km^2. The main economic activities in the county are pastoralism, crop farming, and tourism among other activities. It is a semi-arid ecosystem and the home of the renowned Maasai Mara Game Reserve.

The study sites are mainly inhabited by Maasai pastoralist communities. The Maasai are a Nilotic Maa-speaking indigenous people who inhabit Southern Kenya and Northern Tanzania (Salazar 2018). Pastoralism in its nomadic and semi-nomadic forms continues to be central to the livelihoods of the Maasai despite the socio-ecological changes that have induced diversification of livelihoods.

The study was conducted amidst COVID-19 pandemic travel restrictions from September to November 2020. A total of 19 individuals participated in the study: 10 from Narok County, 8 from Kajiado County, and 1 from Laikipia County. The study participants were conveniently selected from two Facebook groups (*Maasai Tujuane* and Kajiado County) based on those who were willing and had

time to participate in the study. The methods used in data collection were interviews, informal conversations, and archival research. The method of data collection used depended on factors like time, network connection, and participants' preferences.

Interviews: Initially telephone interviews via WhatsApp were conducted with informants who had access to a stable internet connection. Open-ended questions were administered to understand the Maasai pastoral activities, attitudes, and cultural values attached to them. This was followed by self-administered interviews where semi-structured questions with clear instructions were presented to participants using Google Forms. Follow-ups were made for clarification where needed upon return of the Google forms.

Informal conversations: This took the form of chats and was conducted using Facebook and WhatsApp social media platforms. These informal conversations explored the forms of livelihoods the informants engaged in, the rationale and forms of pastoral mobility as well as meanings and attitudes attached to pastoral mobility. Informal conversation (chats) via social media was the most preferred way of communication by participants due to its convenience. On the downside, it was much slower in generating data because of its informal nature and at times the chats could be incoherent.

Archival research: This was conducted in relevant journals, Facebook group pages, newspapers, and Google Play store review pages. The data collected included: previous research on technology and pastoralism, reception of Afriscout, and the experiences of Afriscout users.

The data obtained from phone interviews were recorded and transcribed. Data obtained from informal conversations through WhatsApp and Facebook chats were organised into text for analysis. Archival research from Facebook groups, Google Play Store, and Websites were also organized into text for analysis. The data sets were analysed thematically - data were coded into thematic areas to identify interrelated and emerging issues, and subsequently patterns.

Traditional Maasai pastoral practices

Our findings show that Maasai pastoralists employ traditional communication and mobility systems to navigate ecological challenges. These systems permit them to address the nutritional needs of their livestock, predict weather patterns, manage pasture and water, and physically scout for grazing areas safe from wildlife.

One of the main reasons for mobility among the Maasai pastoralists is the search for water and pasture that meet the nutritional needs of their cattle. 'New' pasture is the most preferred because it is

considered to be more nutritious, and in turn boosts milk production in cattle. Another nutritional need for the Maasai cattle is salt which is derived from salty water oases or salty soil.

> We move in search for pasture and salt licks. In Narok every Maasai knows such a place [salt sources]. They believe it makes cows fertile (Male informant, Narok County).

> [we move to] change pastures that change the animal too… the new pastures will give the animals a new diet hence add weight, milk and meat production (Male informant, Kajiado County).

Weather elements such as rain, wind and sun impact mobility among Maasai pastoralists and it was apparent that they used their indigenous knowledge to predict weather outcomes. A pastoralist from Laikipia County reiterated:

> The roaring of the lion and booming ostriches and appearance of birds we call *lembae nabo* symbolise drought (Male informant Laikipia County).

Our findings show that pastoralists could predict rain by observing the appearance and direction of clouds to tell areas that were going to experience rainfall. This knowledge becomes useful when searching for water in seasonal rivers, swamps, and wells.

For Maasai pastoralists, decisions around pasture and water management are normally made with temporalities in mind, that is, wet and dry seasons influence the direction and rhythm of movement with cattle. Besides mobility, settlement arrangements are also dictated by these temporalities. A study participant stated:

> Wet season grazing pastures are areas around settlements and they are utilised during the rainy season. When wet season pasture is finished, livestock can move to dry season pastures which are located away from settlements. The process is coordinated such that no livestock moves into the dry-season grazing areas. Settlements are also not allowed there (Male informant, Kajiado County).

We found that before moving herds to water and pasture points, Maasai elders send scouts to physically survey prospective grazing and watering points. Scouts are a group of young men who make up the *moran* age group and are the most suitable for such missions because of their strength and speed.

The scouts survey the shortest routes to grazing and watering points. The shortest routes save time and energy for both the pastoralists and their herds.

> The movements are made by men or elders who will first go survey the land if the area is green. Only boys and men can take the cattle while women are left at home (Female informant, Kajiado County).

Scouting is also used to look for areas less inhabited by wildlife especially browsers since they consume a lot of pasture. Areas that are unoccupied by wildlife are preferred by the Maasai pastoralists.

> Narok County holds one of the largest game reserves in Kenya called the Maasai Mara. In the reserve, we have animals like elephants, wild beasts, and zebras that consume tonnes of pasture. The nomads have to move more frequently in search of places less inhabited by these animals and cannot be easily discovered especially by the elephants because they keep a record of these places in their photographic memory (Male informant, Narok County).

Use of modern technology among Maasai pastoralists

Findings show that mobile phones have become part of the everyday life of the Maasai pastoralists in Kajiado, Narok, and Laikipia Counties. Mobile phones are used to get information on cattle prices, make transactions on *M-pesa*, and coordinate the mobility of cattle.

> Pastoralism is our source of income, it is our ATM. When we don't have money, we can call the market [contact] to find out cattle price and negotiate then arrange delivery (Male informant, Laikipia County).

Besides mobile phones, Maasai pastoralists were also found to use modern means of transport including motorcycles and vehicles in their everyday activities. These means of transport have reduced the long distances that they previously walked in search of markets, water, and pasture.

> Nowadays we make things easier by using modern transport such as motor vehicles and motorcycles to transport people, young calves and do other errands (Female informant Narok County).

This study found that the Afriscout app was only available to pastoralists in Kajiado County. Pastoralists in Narok and Laikipia counties had not started using Afriscout at the time of our study.

However, some of them were aware of the application's operations in the neighbouring Kajiado County. An analysis of Afriscout's Google Play Store page from 2017-2022 showed that it had received a lot of positive reviews in Kenya. Its convenience, accuracy, ease of use, and provision of real-time information on pasture and water were the most commended features by its users. Users also attested to saving time and energy that they would have used if they opted for physical scouting to inform their mobility. Study participants who had incorporated Afriscout into their pastoral activities commended it for the ease of searching for pasture and water without movement. From the comfort of their homes, they could access information that informed their mobility decisions.

> Nowadays technology is making it easier. There is an app on a mobile phone which can help us find green pastures without unnecessarily moving from place to place. It is called Afriscout (Male informant, Kajiado County).

Afriscout has a feature that allows its users to receive alerts on predators, diseases, conflicts, and so on. These alerts are updated by other Afriscout users who take up the role of scouts. Instead of making phone calls to alert the rest of the group back at homes or camps, they can make an update on the platform which is then sent to other Afriscout users. The transmission of vital information is executed in multiple ways, that is, by word of mouth, text messages, phone calls, and Afriscout alerts. Pastoralists not only receive alerts on the ecological conditions of prospective grazing areas but also anthropogenic factors like conflicts and market prices. All this information can be obtained through a smartphone without moving to the actual location.

Despite its benefits, several issues were raised by new and prospective Afriscout users. Access was a key issue raised by pastoralists on the Kajiado County Facebook page. One user wondered how prospective users without smartphones would access its services and recommended a text message service that would reach users with ordinary phones. Another user highlighted the lack of technological skills and illiteracy among most pastoralists. This potentially excluded a considerable number of the target population from accessing the service.

> Great work, though in my view most of the herders in the above-mentioned regions [Kajiado] have no technological skills and have not been empowered to use them. This App, therefore, excludes around 60% of those who are in dire need of water and grass for their livestock (Facebook user, Kajiado County).

Other challenges experienced following the scaling of Afriscout included poor network and accuracy of information relayed.

> Besides, indigenous knowledge is better in predicting decisions on water, and pasture availability. Pastoralists can make decisions when [they] scout physically to good grazing areas than using a smartphone (Facebook user, Samburu Development Forum).

Navigating traditional and modern technology

The study findings indicate that the Maasai pastoralists in Kenya use both traditional and modern technologies. Traditional technology is a product of indigenous knowledge that has existed among Maasai pastoralists for centuries. It has been curated and adapted to an ecosystem characterised by unreliable rainfall and drought.

The Maasai pastoralists still use mobility- a longstanding traditional technology to maximise scarce natural resources like water and pasture. The nature, duration, and frequency of mobility are determined by the availability of natural resources. For instance, long-distance mobility occurs during the dry season due to scarcity of water and pasture. Conflict over grazing and watering points as well as wildlife and zoonotic diseases also influence the duration and pattern of mobility. Our findings further show that mobility aids in meeting the livestock's nutritional needs through pasture, water, and salt. Continuous access to fresh pasture, water, and salt means constant movement, especially during drought and it is during this season that scouts play a crucial role by relaying relevant information.

Like mobility, communication takes multiple forms among pastoralists - by word of mouth and mobile phones - combining both traditional and modern forms of technology. Instead of walking back to camps, a mobile phone can be used to ring the remaining groups which saves time and energy. Mobile phones have been seamlessly adapted into pastoralist practices because they are portable and easy to operate as confirmed by Nilsson and Salazar (2017) and Butt (2015) among the Maasai of Tanzania and Kenya respectively. Their findings indicate that the success of mobile phones in the two pastoral systems is attributed to the long-standing mobility culture.

The assumption that digital technology such as Afriscout has 'transformed' and 'revolutionised' pastoral systems oversimplifies the role of traditional technology. It has also been argued that indigenous knowledge has become unreliable coupled with climate change, while changes in land use (Hickman 2018; KNU 2018) have made pastoralism considerably challenging. While we agree that

climate change and changes in land tenure have made pastoralism challenging in contemporary times, we find the argument that indigenous knowledge is unreliable problematic.

Our observation is that it is external factors like climate and land tenure systems that have become unreliable. In other words, the challenges faced by pastoralists today have become more complex compared to centuries ago. This does not disqualify indigenous knowledge as a solution to contemporary challenges since it is a product of one's environment through time and space. Pastoralists' understanding of their physical environment is useful in rangeland management (Oba 2012) and this understanding is fundamental in developing any pastoralist-centred modern technology. Afriscout essentially perpetuates the traditional practice of sharing information on prospective grazing areas among the *moran* and elders (Boas 2022).

Technology as well as ecological and anthropogenic factors facilitate multiple forms of mobility in pastoral systems (Maru 2020). Our study found new forms of (im) mobility that were enabled by Afriscout. For instance, through Afriscout, pastoralists were able to obtain an aerial view of several grazing areas. This form of mobility can also be referred to as 'virtual travel' (Sheller and Urry 2006). In this scenario, pastoralists are not the only ones moving virtually, the images of pasture and water also move virtually from Afriscout to pastoralists. Thus through technology (Afriscout and mobile phones), multiple forms of mobility occur simultaneously or parallel to each other. Virtual mobility of Afriscout users, images, and alerts happen simultaneously while physical mobility is experienced by scouts who update their observations on Afriscout to alert the rest of the pastoralists. Hence two forms of mobility are created through Afriscout - virtual and physical mobility. In addition to mobile phones and Afriscout, vehicles and motorcycles are other forms of modern technology that are incorporated into the mobility of people and cattle to make work easier by saving time and energy.

We argue that traditional and modern technology can complement each other to achieve a common goal. For instance, observation of cloud patterns and direction is used by Maasai pastoralists to determine areas that have experienced rainfall and such information is used to plan movement to watering and grazing points. This knowledge can be used alongside the satellite images available on Afriscout to confirm the availability of pasture and water by an Afriscout user. Another way Afriscout and traditional technology can complement each other is through water and pasture management. Through vegetation and water images as well as predator and disease alerts, the Maasai pastoralists can plan their grazing and watering points accordingly.

There is no doubt that the use of Afriscout has made information more accessible to groups who were initially disadvantaged. For instance, the Maasai youths who can access Afriscout can obtain information on prospective grazing and watering areas that were previously controlled by elders. Despite the youth accessing such information on Afriscout, elders have a role to corroborate and complement such information with indigenous knowledge to address concerns regarding the accuracy of modern technology. Indeed, pastoralists in Kajiado County raised such concerns on Facebook where they expressed a preference for physical scouting over 'virtual' scouting. Nilsson and Salazar (2017) also found that pastoralists' mistrust of certain modes of technology especially linked to the West is not something new.

Concerns about accuracy and mistrust as well as access challenges of Afriscout (poor network, illiteracy, and lack of smartphones) means that pastoralists will continue to navigate between traditional and modern technologies based on their circumstances. Access challenges are likely to marginalise certain groups of pastoralists from using modern technologies such as Afriscout. Such groups will continue to rely on traditional technology as those with access navigate both traditional and modern technology in pastoral systems.

Conclusion

This study shows that pastoralists have increasingly adopted modern technologies into their traditional pastoral systems. Mobile phones are the most commonly adopted modern technology due to their portability which makes them easy to incorporate into traditional Maasai technologies of mobility and communication. Consequently, mobile phones paved the way for other forms of modern technology such as Afriscout. The application was designed to help pastoralists navigate ecological challenges by use of satellite images of existing community grazing sites. Hence adapting to the pastoralists' traditional knowledge and practices.

Emerging modern technologies are not the sole drivers of change among Maasai pastoralists but are embedded in their knowledge, practices, worldviews, beliefs, norms, and histories. The pastoral systems have been able to reorganise themselves in the face of ecological, political, social, and economic challenges. The incorporation of Afriscout into pastoral systems does not make traditional technologies irrelevant. As has been shown in this study both technologies complement each other to pluralise longstanding practices such as communication and mobility. Further research is required to examine how pastoralists navigate between traditional and modern technologies and how the two coexist and complement one another.

Acknowledgment

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