

RESEARCH ARTICLE

Colonial Schemes and African Realities: Vernacular Infrastructure and the Limits of Road Building in German East Africa

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Abstract

This article studies infrastructure development in the colony of German East Africa from the early 1890s to 1907. By focussing on questions of continuity and change in the transition phase from the precolonial era to German colonial rule, the article demonstrates that colonial road planning coexisted and often collided with established infrastructure systems. After 1891, colonial authorities sought to transform existing caravan paths into all-weather highways. The analysis applies an actor-centred approach to explain why almost all of these efforts failed. A focus on those actors being expected to construct or maintain (residents) and to use (transport workers) colonial roads reveals the non-compliance of colonial subjects, the persistence of African spatial practices, and the resulting contestation of colonial rule in everyday life. In this way, the article illuminates how Africans responded to European interventions which restructured space and how these responses complicated and frustrated colonial road works. Hence, the article challenges classical narratives of infrastructure as a ‘tool of empire’ and instead highlights the resilience of vernacular structures and their producers under colonial rule.

Keywords: Tanzania; East Africa; colonialism; precolonial; technology; labour

In 1888, upon return from East Africa, the Scottish traveller Henry Drummond reported that ‘[p]robably no country in the world, civilized or uncivilized, is better supplied with paths than this unmapped continent. Every village is connected with some other village, every tribe with the next tribe, every state with its neighbour, and therefore with all the rest’.¹ This complex network of footpaths allowed for trade and communication on local, regional, and inter-regional levels across large parts of pre-colonial Central and East Africa. On these paths, a labour force of tens of thousands of porters mediated almost all transport.² In the closing decade of the nineteenth century, the new colonial regime saw itself confronted with this pre-existing infrastructure system after the German Empire had established its colony *Deutsch-Ostafrika* or German East Africa (1885/1891–1918) in the present-day countries of Tanzania, Rwanda, and Burundi.³ While the biologist Drummond praised

¹H. Drummond, *Tropical Africa* (London, 1888), 24. This article abridges and revises arguments from a larger book project on portage and caravan trading in German East Africa. Some of the findings presented here have also been published in A. Greiner, *Human Portage and Colonial State Formation in German East Africa, 1880s–1914: Tensions of Transport* (Cham, 2022). Reproduced with permission of Palgrave Macmillan.

²S. Rockel, *Carriers of Culture: Labor on the Road in Nineteenth-Century East Africa* (Portsmouth, NH, 2006).

³I use the term Tanzania to refer to regions and places within the borders of the present-day state. I have also adapted the German transliterations of East African place and group names to today’s spellings. Where the contemporary German name differs significantly from the Kiswahili name, I have added the respective name in brackets.

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the region's interconnectedness, to German East Africa's young colonial administration the existing infrastructure seemed backward, irrational, and unreliable.⁴

In the years to come, German colonisers would embark on a programme of spatial transformation, seeking to make the colony's vast interior accessible to European rule and commerce through the large-scale implementation of colonial infrastructure systems. While in the imperialist imagination this meant first and foremost railways, sufficient funds for their construction were initially not provided by the imperial metropole and only a few kilometres of tracks were laid. It was only in the wake of the Maji Maji War (1905–7) that the colonisers eventually pushed two railway lines inland. They reached their railheads in 1911 and 1914, respectively, the latter only months before the entire German colonial empire collapsed. Railway construction in German East Africa, therefore, stood not at the beginning of colonial occupation but followed a longer attempt to interlink space by more cost-effective means.

This article studies the conflictual history of infrastructure construction, use, and contestation in East Africa's transition period from the precolonial era to colonial rule. Its focus is on road building, the colonial state's primary spatial intervention during the period from 1891 to 1907, the years before the expansion of railways began in earnest. Investigating how an emerging colonial state engaged with established infrastructure systems, in which ways it sought to transform them, and why it failed to do so, the article seeks to illuminate two aspects. First, that the slowly progressing German conquest and consolidation of power in the 1890s and early 1900s did not simply replace pre-existing structures but most often had to engage, coexist, and even compete with them; secondly, that the spatial practices of African infrastructure producers and users along with their overt contestation of German power subverted any colonial re-organisation of space.

In making these arguments, the article adds to the study of African mobility in the German period. Previous research by Stephen J. Rockel and Thaddeus Sunseri has examined how East African caravan porters and migrant workers engaged with the colonial system, highlighting that long-established patterns of long-distance mobility continued to exist under colonial rule.⁵ Sunseri as well as Christiane Reichart-Burikukiye also partly address the role of African labour in the construction of colonial infrastructure, shedding light on forced road works while also illuminating that thousands of men and women actively involved themselves in the business of expanding railways, either as construction workers or by selling supplies at construction sites.⁶

The present article is the first study to thoroughly engage the road building programme in German East Africa. Building on the aforementioned studies, the following analysis advances the understanding of African activity in the process of infrastructure expansion. Making use of approaches derived from the vibrant field of Science and Technology Studies (STS) as well as the recent scholarship on mobility in colonial Africa, it places African agency at the heart of spatial transformation.

In recent years, a number of studies has moved beyond previously dominant narratives of colonial infrastructure as a 'tool of empire' theorised by Daniel Headrick as a guarantor of economic and political exploitation.⁷ Instead, different scholars have directed a spotlight on local conditions and actors, and examined how they negotiated, contested, and appropriated technological

⁴As an introduction to German colonial rule, see M. Pesek, *Koloniale Herrschaft in Deutsch-Ostafrika: Expeditionen, Militär und Verwaltung seit 1880* (Frankfurt, 2005); J. Koponen, *Development for Exploitation: German Colonial Policies in Mainland Tanzania, 1884–1914* (Helsinki, 1995); and R. Tetzlaff, *Koloniale Entwicklung und Ausbeutung: Wirtschafts- und Sozialgeschichte Deutsch-Ostafrikas, 1885–1914* (Berlin, 1970).

⁵Rockel, *Carriers*; T. Sunseri, *Vilimani: Labor Migration and Rural Change in Early Colonial Tanzania* (Portsmouth, NH, 2002).

⁶Sunseri, *Vilimani*, esp. 167–78; C. Reichart-Burikukiye, *Gari la moshi – Modernität und Mobilität: Das Leben mit der Eisenbahn in Deutsch-Ostafrika* (Münster, 2005).

⁷For this notion, see D. Headrick, *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century* (New York, 1981).

interventions.⁸ Studies by Jennifer Hart and Joshua Grace, for instance, explore how Africans embraced new motor technologies in Ghana and Tanzania respectively.⁹ Hart demonstrates that Ghanaian entrepreneurs from the 1920s on invested in motor vehicles and expanded roads on their own account. In this way, she argues, African drivers and passengers created spatial relations which posed an alternative to colonial infrastructure networks.¹⁰ In like vein, Grace examines the use of cars in colonial and postcolonial Tanzania, illuminating that motorised transport was originally introduced to facilitate the exercise of colonial power but was soon appropriated by African users and owners, who ‘transformed motor vehicles from a tool of imperial rule into an African technology’.¹¹ Embedding the car in the wider history of East African transport and thus writing an African-centred history of development, Grace calls on historians to defy exclusively Western notions of mobility and technology and instead take into account the ‘host of vernacular practices, technologies, and ideas about movement, its meanings, and its longer histories’.¹²

Building on Grace’s call and his notion of vernacular mobility, the present article proposes a further departure from the conceptual framing of many recent studies in STS and the history of technology. While research in the last decade has ventured beyond classical narratives, its focus often remained on European technologies and their adaptation and implementation in the Global South; be it cars, electricity, monoculture schemes, or railways. Given this emphasis, combined with a temporal focus on the twentieth century, many studies have paid particular attention to how Africans appropriated these imported technologies.¹³

European engagement with African infrastructure, by contrast, has until now often evaded the historian’s gaze. Important steps towards unmuting this history have been made in the various key contributions of Clapperton Chakanetsa Mavhunga.¹⁴ Using the example of hunting in Zimbabwe, he shows how European outsiders adopted existing socio-spatial patterns and adapted themselves to them.¹⁵ Most recently, John Cropper has investigated how local and imported systems of energy use intersected in colonial Senegal, observing that energy infrastructure ‘was not only a mix of European and African systems of knowledge and labor, but also a blend of localized, ethnic systems of material production’.¹⁶ Adding to these pioneering studies, the present article helps to further promote the analytical shift of frameworks, away from western technologies and their adoption by Africans towards African technologies of movement.

⁸For a review of the recent literature, see J. van der Straeten and U. Hasenöhl, ‘Connecting the empire: new research perspectives on infrastructures and the environment in the (post)colonial world’, *NTM Zeitschrift für Geschichte der Wissenschaften, Technik und Medizin*, 24 (2016), 355–91. For examples, see M. Ertsen, *Improvising Planned Development on the Gezira Plain, Sudan, 1900–1980* (Basingstoke, 2016); J. B. Gewald, S. Luning, and K. van Walraven (eds.), *The Speed of Change: Motor Vehicles and People in Africa, 1890–2000* (Leiden, 2009); as well as M. Chikowero, ‘Subalternating currents: electrification and power politics in Bulawayo, colonial Zimbabwe, 1894–1939’, *Journal of Southern African Studies*, 33:2 (2007), 287–306.

⁹J. Hart, *Ghana on the Go: African Mobility in the Age of Motor Transportation* (Bloomington, IN, 2016); J. Grace, *African Motors: Technology, Gender, and the History of Development* (Durham, NC, 2021).

¹⁰Hart, *Ghana*, 7.

¹¹Grace, *African Motors*, 8.

¹²*Ibid.*, 10.

¹³See *Ibid.*, 26.

¹⁴C. Mavhunga, ‘Firearms diffusion, exotic and indigenous knowledge systems in the lowveld frontier, South Eastern Zimbabwe 1870–1920’, *Comparative Technology Transfer and Society*, 1:2 (2003), 201–231; C. Mavhunga, ‘Introduction’, in C. Mavhunga, *What Do Science, Technology, and Innovation Mean from Africa?* (Cambridge, MA, 2017), 1–27; C. Mavhunga, *The Mobile Workshop: The Tsetse Fly and African Knowledge Production* (Cambridge, MA, 2018).

¹⁵C. Mavhunga, *Transient Workspaces: Technologies of Everyday Innovation in Zimbabwe* (Cambridge, MA, 2014). In a similar vein, research on processes of colonial border drawing suggests that borders were not always drawn arbitrarily but could reflect precolonial boundaries and vernacular patterns of usage. See P. Nugent, ‘Arbitrary lines and the people’s minds: a dissenting view on colonial boundaries in West Africa’, in P. Nugent and A. I. Asiwaju (eds.), *African Boundaries: Barriers, Conduits and Opportunities* (London, 1996), 35–67.

¹⁶J. Cropper, ‘Running on empty: fossil fuels, local fuels, and entangled infrastructures in colonial Senegal, 1885–1945’, *The Journal of African History*, 63:1 (2022), 19–36.

This involves a re-conceptualisation of the concept of infrastructure itself, which is still predominantly framed in European terms. In line with the terminology suggested by Joshua Grace, the following analysis proposes the term ‘vernacular infrastructure’ to describe those networks and technologies developed from within Eastern Africa, in particular portage and the paths on which porters moved. As we will see, imported and vernacular structures differed significantly in their purpose and conception of ideal users. Still, emphasising continuities rather than disruption, the article places colonial road works in the wider context of infrastructure production in the region since the mid-nineteenth century. By highlighting the longevity of vernacular networks of mobility, it seeks to reveal the perpetual dependence of colonial spatial interventions on African actors and their day-to-day activities.

Retrieving their experiences and agency from the colonial archive is difficult. The few sources produced by caravan travellers which we have at hand give only very limited evidence of their spatial practices.¹⁷ To gain insights into their everyday activities, the analysis in this article reads the available colonial source material in two directions. Reading European records ‘against the grain’ allow us to retrieve practices and ideas of caravan travelers and entrepreneurs by understanding official circulars and regulations as responses to their activities. Additionally reading the colonial archive ‘along the grain’, as proposed by Ann Laura Stoler, helps us understand the ways in which colonial officials perceived their surrounding environment and how they dealt with it.¹⁸ The information contained in these records can only be utilised by meticulously cross-referencing and layering source material of different origin.¹⁹ In addition to published travelogues the following historical analysis thus draws on a novel corpus of unpublished source material recovered from different archival sites; reports and communication by the colonial administration, the government in Berlin, missionary societies, as well as field journals of individual German officials and travellers. Interrogating these sources, predominantly written in German language, the present article also sets out to contribute a case study from a comparatively understudied European empire to the growing body of literature on Africans as agents of infrastructure development.

By focussing on the activities of two African actor groups – producers (the residents of the Tanzanian interior) and users (caravan travellers) – and their engagement with infrastructure before and after colonisation, the following analysis provides new insights into the transformative effects of colonial rule and the resilience of African spatial practices. With this proposed actor-centred approach, the article conceives a research agenda for studying processes of production, appropriation, and contestation of different infrastructure systems, which hopefully will provide a starting point for future analyses beyond the East African context. My ultimate aim, then, is to demonstrate the feedback loops of infrastructure development in the colonial world: on the one hand showing how colonial authorities engaged with the existing (infra)structures of the world they encountered (which was anything but a *tabula rasa*); on the other hand contributing to a better understanding of the different ways in which indigenous actors responded to the colonial state and the spatial transformation it engendered.

The article starts with a brief sketch, based on the existing literature, of the development of caravan infrastructure and its primary users, human porters. The subsequent section scrutinises how

¹⁷See, among few others, S. bin Mwenye Tshande [Chande], ‘Meine Reise ins Innere Ostafrikas bis zum Tanganyika’, in C. Velten (ed.), *Schilderungen der Suaheli: Von Expeditionen v. Wissmanns, Dr. Bumillers, Graf v. Götzens, und Anderer* (Göttingen, 1901), 1–55; C. Velten [and M. bin Mwenyi Bakari] (eds.), *Sitten und Gebräuche der Suaheli, nebst einem Anhang über Rechtsgewohnheiten der Suaheli* (Göttingen, 1903), 284–301; J. MacQueen, ‘Notes on African geography’, *Journal of the Royal Geographical Society*, 15 (1845), 371–6.

¹⁸See R. Roque and K. A. Wagner, ‘Introduction: engaging colonial knowledge’, in R. Roque and K. A. Wagner (eds.), *Engaging Colonial Knowledge: Reading European Archives in World History* (Basingstoke, 2012), 1–32; and A. L. Stoler, *Along the Archival Grain: Epistemic Anxieties and Colonial Common Sense* (Princeton, 2008).

¹⁹See also Michelle R. Moyd’s excellent discussion of German colonial sources in M. Moyd, *Violent Intermediaries: African Soldiers, Conquest, and Everyday Colonialism in German East Africa* (Athens, OH, 2014), 23–31.

European travellers and, after 1891, German colonial authorities engaged with the established system of circulation, in which ways they utilised it, and how and why colonisers set out to construct all-weather highways. The third section investigates how German state authorities organised workers for their road building projects and how those pressured into road works contested spatial interventions on the scene. To fully understand the struggles over space, the fourth section puts a focus on infrastructure users and their role in the process of colonial spatial transformation. Illuminating that the ideal users envisioned by German planners were not the real users of their roads, it explores how caravan crews interacted with the infrastructural arrangements provided by the colonial state, whether and how they used them, and to what extent they placed these new structures in relation to existing ones.

East African infrastructure before colonisation

Precolonial East Africa witnessed the emergence of a complex long-distance trade system. In the first decades of the nineteenth century, chiefs from the interior began to send pioneering caravans with ivory to the coast, most notably the Wanyamwezi of central Tanzania.²⁰ Around the same time, traders from the Zanzibar archipelago and the Indian Ocean coast pushed inland, trading imported commodities, such as rifles and textiles, for slaves, ivory, and other products from the interior.²¹ Because vast parts of the region were infested with trypanosomiasis – a disease causing weakness, lethargy, and death in affected animals – almost every use of pack or draught animals in this commercial system was impossible. As Stephen J. Rockel has shown in his seminal study *Carriers of Culture* (2006), instead of animals the foundation of all trade caravans consisted of tens of thousands of professional porters.²²

In the second half of the nineteenth century, three main trade corridors existed in today's Tanzania (Fig. 1): in the north, caravan routes stretched from the coast inland to Mount Kilimanjaro and further in the direction of Lake Victoria or towards Ugogo. In southern Tanzania, a second corridor ran from the coastal towns of Kilwa and Lindi to Lake Nyasa. The most important corridor was the so-called central route between the coastal towns facing the Zanzibar archipelago and Lake Tanganyika.²³ Rather than single paths, the routes in these corridors should be understood as clusters of different smaller trails, branching from or running parallel to each other.²⁴

The network of long-distance routes, as Adrian S. Wisnicki puts it, 'constituted a complex spatial infrastructure – one that regulated the flow of people (caravan porters; slaves; Arab, Swahili, and Indian traders) and goods (ivory, gum copal) between the East African coast and interior'.²⁵ Because carts or pack animals almost never travelled along this network, it was human interaction that produced and remade its infrastructural manifestations. To participate in the long-distance

²⁰S. Rockel, 'A nation of porters': the Nyamwezi and the labour market in nineteenth-century Tanzania', *The Journal of African History*, 41:2 (2000), 173–95; Rockel, *Carriers*, 65–95.

²¹For the East African long-distance trade and its actors, see Rockel, *Carriers*; A. Sheriff, *Slaves, Spices & Ivory in Zanzibar: Integration of an East African Commercial Empire into the World Economy* (Athens, OH, 1987); as well as T. McDow, *Buying Time: Debt and Mobility in the Western Indian Ocean* (Athens, OH, 2018). For the history of the ivory trade, see in addition E. Alpers, *Ivory & Slaves in East Central Africa: Changing Patterns of International Trade to the Later Nineteenth Century* (London, 1975); and P. Gooding, 'The ivory trade and political power in nineteenth-century East Africa', in M. Chaiklin, P. Gooding, and G. Campbell (eds.), *Animal Trade Histories in the Indian Ocean World* (Cham, 2020), 247–75.

²²Rockel, *Carriers*. See also S. Rockel, 'Caravan porters of the Nyika: labour, culture, and society in nineteenth century Tanzania' (unpublished PhD thesis, University of Toronto, 1997).

²³For the different sets of routes, see Rockel, 'Caravan porters', 13–49, 351–6.

²⁴*Ibid.*, 14. See also H. Kjekshus, *Ecology Control and Economic Development in East African History: The Case of Tanganyika, 1850–1950* (Athens, OH, 1996), 122.

²⁵A. S. Wisnicki, 'Charting the frontier: indigenous geography, Arab-Nyamwezi caravans, and the East African Expedition of 1856–59', *Victorian Studies*, 51:1 (2008), 118.

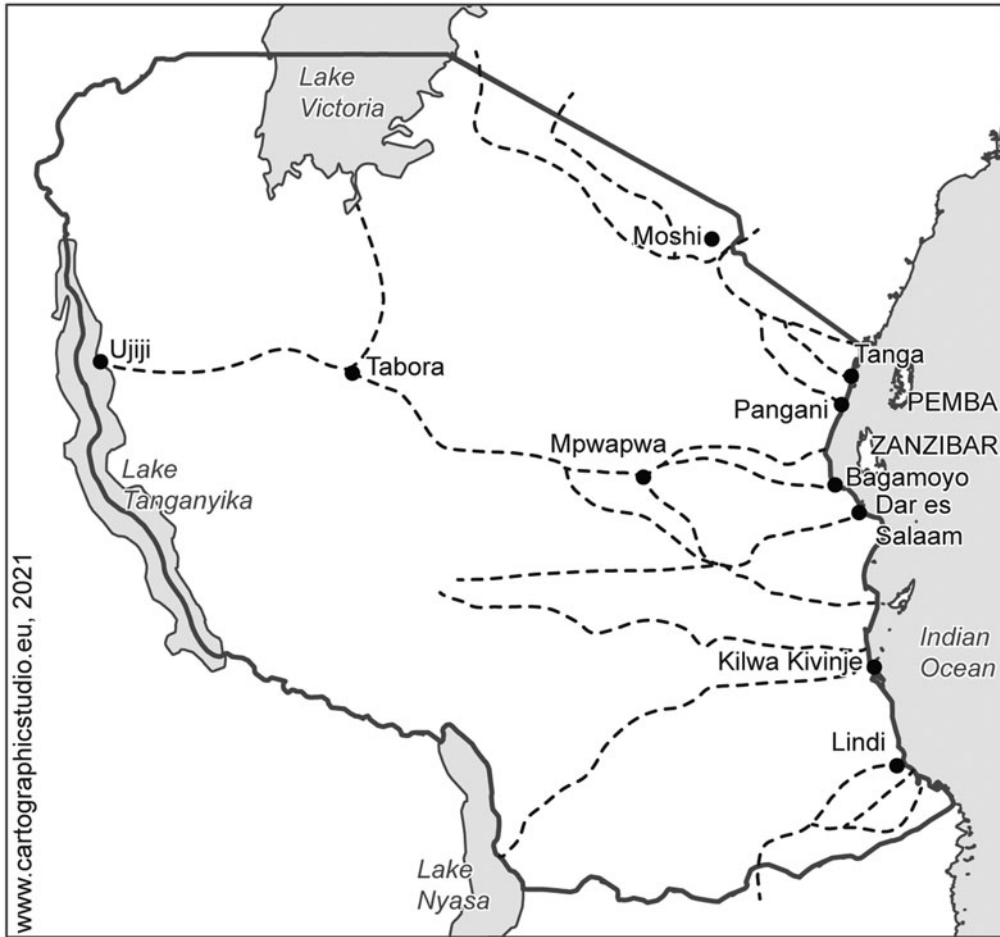


Fig. 1. The three caravan sectors with the major routes as observed by German officials in 1891.

Source: Map by Annelieke Vries, adapted from BAB, R 1001/1107, 44.

economy and gain access to imported goods and firearms, different groups living in proximity of caravan routes organised a supply infrastructure. Earlier research by Rockel and other scholars has already pointed to their different activities: residents provided auxiliary transport workers, dug wells, or provided safe accommodation. Most importantly, many groups established market-places where caravanners could stop and resupply themselves with food and water.²⁶

In return for the provision of these different resources, residents (at least those of the central route) demanded a fee from travellers, known as *hongo*.²⁷ Of this system, we learn from a unique

²⁶See S. Rockel, 'Forgotten caravan towns in 19th century Tanzania: Mbwamaji and Mpwapwa', *Azania*, 41:1 (2006), 1–25; Rockel, *Carriers*, 99–103, 135–41; P. Gooding, 'Lake Tanganyika: commercial frontier in the era of long-distance commerce, East and Central Africa, c. 1830–1890' (unpublished PhD thesis, SOAS University of London, 2017), 56; I. Kimambo, 'Environmental control & hunger: in the mountains & plains of northeastern Tanzania', in G. Maddox, J. Giblin, and I. Kimambo (eds.), *Custodians of the Land: Ecology and Culture in the History of Tanzania* (London, 1996), 71–95; as well as J. Koponen, *People and Production in Late Precolonial Tanzania: History and Structures* (Helsinki, 1988), 117–21 and 236–41.

²⁷Rockel, 'Caravan porters', 31–2; C. J. Sissons, 'Economic prosperity in Ugogo, East Africa, 1860–1890' (unpublished PhD thesis, University of Toronto, 1984), chapter 3. See also C. Velten [and Mtoro bin Mwenyi Bakari] (eds.), *Sitten*, 278–9; and

non-European travel account, written by the Swahili caravan leader Selemani bin Mwenye Chande, who operated in the central trade corridor on the eve of colonial rule. He reported from the central Tanzanian region of Ugogo that in every village that his party passed, they were asked to pay the tribute, usually in imported textiles.²⁸ Conflict over resources was another decisive factor in the establishment of long-distance structures. When chiefs and travellers could not agree upon an adequate sum, armed conflict was the result.²⁹ Villages or war bands also specialised in ambushing and raiding caravans while, at the same time, porters raided the stocks of villages in search of food.³⁰

By providing infrastructure, but also by blocking and destabilising it, many groups residing near important arteries of commerce engaged in processes of spatial transformation.³¹ But it was not their activities alone that gave shape to the landscape. Being the primary — and often sole — users of caravan infrastructure, caravan travellers, too, played a crucial role in producing the network of long-distance routes, as witnessed by many European travellers.³² According to Gerald Portal, the British Special Commissioner to East Africa, for instance,

it is well known that an African road consists simply of a footpath some ten inches wide worn in the grass by the constantly-passing naked feet of native villagers and caravan-porters. If, for any reason, such a path falls into disuse for a few months, especially during the rainy season, it is quickly obliterated by the rank grass, thorns, and creepers.³³

Not only were the footpaths marked out and maintained by the feet of those marching on them, but the users' navigation through the infrastructural network also affected its trajectories on a larger scale. Rockel, whose research provides deep insights into the working conditions and everyday experiences of caravan crews, observes that caravans responded to both threats and incentives by travelling on the routes which suited them best: caravan leaders and guides could often choose between different paths running in similar directions. They made their porters march on the most accessible and safest track, bypassing geographical obstacles, avoiding war zones, famine regions, or excessive *hongo*, and following supply points, networks of kinship and joking relations (*utani*), as well as good commercial prospects.³⁴ 'Caravan routes', Rockel observes, 'were ultimately selected according to their utility for trade and the ability of resident communities to produce a large enough surplus to feed the armies of porters that traveled them'.³⁵

The possibility to choose also implied that caravan routes could shift their shape if existing structures did not meet these requirements.³⁶ In cases where many caravans avoided specific areas, untravelled paths fell into disuse and vanished under grass, as described by Portal. Moreover, whereas major nodal points, such as the trade centre Tabora, were mostly fixed, new spatial links emerged through the mobility of caravan travellers. Rockel illustrated this process for the central

M. Pawełczak, *The State and the Stateless: The Sultanate of Zanzibar and the East African Mainland; Politics, Economy and Society, 1837–1888* (Warsaw, 2010), 219–21. This toll is recorded as early as the 1840s. See MacQueen, 'Notes', 373.

²⁸Mwenye Tshande, 'Meine Reise'.

²⁹Chande describes multiple instances in which negotiations escalated into violence. See Mwenye Tshande, 'Meine Reise', 3, 8, 47, 50.

³⁰Rockel, 'Forgotten', 17–20; Rockel, *Carriers*, 140, 152–5; R. Reid, *War in Pre-Colonial Eastern Africa: The Patterns & Meanings of State-Level Conflict in the Nineteenth Century* (Oxford, 2007), 108–10.

³¹Rockel, 'Caravan porters', 210–1.

³²See also Rockel, *Carriers*, 99–103.

³³G. Portal, *The British Mission to Uganda in 1893* (London, 1894), 162. Very similar descriptions are given by numerous travellers, see, for instance, H. M. Stanley, *In Darkest Africa: Or, the Quest, Rescue and Retreat of Emin, Governor of Equatoria, Volume I* (New York, 1891), 134; and R. F. Burton, 'The lake regions of central equatorial Africa, with notices of the lunar mountains and the sources of the White Nile', *Journal of the Royal Geographical Society*, 29 (1859), 1–454, here 104.

³⁴Rockel, 'Caravan porters', 13–4, 25–7, 34–5; Rockel, *Carriers*, 99–103, 199–208; Sissons, 'Economic prosperity', 96.

³⁵Rockel, *Carriers*, 99.

³⁶*Ibid.*

trade corridor, in which a branch route running through south-central Tanzania lost its importance after the 1840s, when the inhabitants could no longer supply enough food for travellers, and was replaced by another route running through the above-mentioned region of Ugogo.³⁷

The provision of infrastructure in precolonial East Africa, to conclude this section, was socially organised on the ground, as the preceding discussion has demonstrated in at least three ways. First, the footpaths were the immediate result of human circulation on them. Second, critical supply infrastructure was provided by the interior population. Third, as a result of these different activities, the network itself underwent processes of adaptation and reorientation. Its makeshift character notwithstanding, infrastructure production was integrated into complex relations between travellers and groups residing in the interior. Being produced by human interaction, the infrastructural arrangements catered to the needs of their users, their rationality lying in safe passage and, as Rockel concludes, in 'the most basic and prosaic human requirements of food and water, as much as commercial and political considerations'.³⁸

Paving roads over well-trodden paths

In the second half of the nineteenth century, missionaries and self-proclaimed explorers from Europe entered East Africa in increasing numbers.³⁹ While they made extensive use of the infrastructure of caravan travel, these travellers soon came to perceive the existing arrangements as highly problematic, claiming that slaves were often employed as porters and that caravan routes were populated by slave raiders.⁴⁰ To future colonial entrepreneurs, the existing arrangements also appeared as a hindrance to economic exploitation. Because the paths allowed for human movement only, all goods had to be carried by porters. In this way, the development of a plantation industry beyond the coastal belt was impossible because products of comparatively little value, such as coffee, could not reach the coast without financial losses.⁴¹ These alleged moral and commercial shortcomings demanded European intervention. In line with the proclaimed 'civilising mission', as Joshua Grace remarks, the structures predating European arrival, 'required a robust technological intervention capable of replacing the economic and social networks that caravan infrastructures sustained. This is where the road and the wheel came in'.⁴²

In the decades leading up to colonial occupation, different private European ventures invested in replacing existing infrastructure with broad, paved roads. In mid-1877, the Imperial British East Africa Company completed the first kilometres of the 'Mackinnon Road', a road construction intended to allow for wheeled traffic between Dar es Salaam and the interior. The project was suspended with only a portion of the road completed.⁴³ As Karin Pallaver demonstrates based on the company's archival records, one reason for this construction freeze was that the local population was reluctant to construct and maintain the road.⁴⁴ Other European ventures suffered a similar

³⁷Rockel, 'Caravan porters', 21–34.

³⁸Rockel, 'Forgotten', 11.

³⁹For a critical evaluation of European exploration, see D. Kennedy, 'Imperial parasitism: British explorers and African empires', in K. Nicolaidis, B. Sèbe, and G. Maas (eds.), *Echoes of Empire: Memory, Identity and Colonial Legacies* (London, 2015), 19–33; and S. Rockel, 'Decentering exploration in East Africa', in D. Kennedy (ed.), *Reinterpreting Exploration: The West in the World* (Oxford, 2014), 172–94.

⁴⁰Rockel has demonstrated that slaves designated to be sold were of marginal importance as porters. See Rockel, *Carriers*, 16–20; Grace, *African Motors*, 37–40.

⁴¹K. Pallaver, 'Donkeys, oxen and elephants: in search for an alternative to human porters in 19th century Tanzania', *Africa*, 65, 1–4 (2010), 289–309, here 295; W. Biermann, *Tanganyika Railways – Carrier of Colonialism: An Account of Economic Indicators and Social Fragments* (Münster, 1995), 23.

⁴²Grace, *African Motors*, 39. See also Rockel, *Carriers*, 15–6.

⁴³J. Gray, 'Dar es Salaam under the Sultans of Zanzibar', *Tanganyika Notes and Records*, 33 (1952), 1–22, here 13; Grace, *African Motors*, 40–1.

⁴⁴Pallaver, 'Donkeys, oxen and elephants', 303–6.

fate, such as the ‘Stevenson Road’ in today’s Zambia, a project that was cancelled after a few kilometres.⁴⁵ From May to August 1877, the Church Missionary Society also engaged in road building for vehicle traffic between the Tanzanian coast and its new station in Mpwapwa on the central route. To populate this road, the missionaries experimented with oxen, following a successful test-drive with an ox-drawn cart between the coast and Mpwapwa by the London Missionary Society in the previous year.⁴⁶ Of the animals employed by the Church Missionary Society, however, almost all died of trypanosomiasis.⁴⁷ By the onset of German colonial rule, there was still no beast of burden that could replace portage. Lacking adequate users, the few vehicle-ready road segments built by Europeans had entirely vanished again, their tracks overgrown with vegetation.⁴⁸

In 1891 the German Empire took over control of what is now mainland Tanzania, Rwanda, and Burundi. Continuing the quest for a new infrastructure system, works on a first railway line began as early as 1893 in the coastal town of Tanga but advanced very slowly. Only forty kilometres of track were laid before the construction company filed for bankruptcy a few years later.⁴⁹ Large-scale infrastructure programmes were simply not affordable for the colonial project which was run as cheaply as possible by the German metropole.⁵⁰ For the time being, porter caravans thus remained at the centre of all logistical and commercial operations in German East Africa: not only did the established caravan trade boom immediately after the German takeover, with ivory accounting for a large share of the colonial economy, but state agents also organised thousands of (voluntary and involuntary) porters for state-run caravans and military campaigns.⁵¹

Utilising vernacular patterns of movement, German authorities bound colonial mobility to pre-colonial networks. When the colonisers founded their first military outposts in the interior, they did so by proceeding along the footpaths of trade caravans. Later, the administrative stations in every district were located at already developed caravan hubs.⁵² To the new administrators, however, it soon became apparent that the capacity of existing infrastructure was insufficient to host colonial mobility. Its fragility and annual breakdown after the rainy seasons, when paths became washed-out and impassable, brought colonial logistics to a standstill and put the state in a very precarious position: there could be no network of stations without reliable communication channels between them and no military dominance without fast and safe access to the hinterland in case of insurgencies.

Early on during their reign, on 17 August 1891, the colonisers had to learn that footpaths could indeed pose a danger to the colonial project. That day 5,000 warriors of the Wahehe, a group resisting the German expansion, ambushed a military expedition and killed 10 European officers, 290 soldiers, and 200 porters on a path near the town of Iringa.⁵³ To forestall such destructive events for the future, the colonial authorities had to make the existing route network usable for colonial

⁴⁵J. McCarthy (ed.), *The Road to Tanganyika: The Diaries of Donald Munro and William McEwan of the Stevenson Road* (Zomba, 2006).

⁴⁶R. Price and J. Mullens, ‘A new route and new mode of travelling into Central Africa’, *Proceedings of the Royal Geographical Society*, 21:4 (1896/7), 233–48.

⁴⁷P. Gooding, ‘Tsetse flies, ENSO, and murder: the Church Missionary Society’s failed East African ox-cart experiment of 1876–78’, *Africa*, N.S.1:2 (2019), 21–36; K. Pallaver, ‘Donkeys, oxen and elephants’; T.O. Beidelman, ‘The organization and maintenance of caravans by the Church Missionary Society in Tanzania in the nineteenth century’, *International Journal of African Historical Studies*, 15:4 (1982), 601–23, esp. 605.

⁴⁸H. Rosenhainer, *Verkehrsgeographie der deutschen Schutzgebiete in Afrika* (Jena, 1904), 54.

⁴⁹F. Baltzer, *Die Kolonialbahnen mit besonderer Berücksichtigung Afrikas* (Berlin/Leipzig, 1916), 35.

⁵⁰For Germany’s hesitant investments, see L. Gann, ‘Economic development in Germany’s African empire, 1884–1914’, in P. Duignan and L. Gann (eds.), *The Economics of Colonialism* (London, 1975), 213–55.

⁵¹For ivory trading after 1891, see B. Gissibl, *The Nature of German Imperialism: Conservation and the Politics of Wildlife in Colonial East Africa* (New York, 2016), 67–105. For portage under colonial rule, see Greiner, *Human Portage*.

⁵²Pesek, *Koloniale Herrschaft*, 41–2.

⁵³E. Mann, *Mikono ya damu – ‘Hands of Blood’: African Mercenaries and the Politics of Conflict in German East Africa, 1888–1904* (Frankfurt, 2002), 136. For the Hehe Wars, see also A. Redmayne, ‘Mkwawa and the Hehe Wars’, *The Journal of African History*, 9:3 (1968), 409–36.

purpose, as one of the few survivors demanded, declaring ‘that we will only fully be able to protect ourselves against such raids by upgrading the most important routes to broad roads’.⁵⁴

The major impetus of public works in the first years of colonial occupation was to make the existing network of caravan trails less dangerous to use for Europeans and more accessible for future vehicles. According to this agenda, important footpaths were to be transformed into highways, officially called *barabara*.⁵⁵ If we follow the dictionary originally compiled by missionary Edward Steere, since at least the 1880s this Kiswahili term had been used in Zanzibar to describe ‘a broad open road’.⁵⁶ The concept of a broad road was also applied in the Tanzanian interior: according to German planners, the ideal highway was three or more metres wide, had drainage channels on either side and was paved.⁵⁷

With the meagre sum of 120,000 marks, officials began in 1893 to construct the first *barabara*. Building efforts initially centred around two highways starting in the coastal towns of Tanga and Dar es Salaam. In the latter town, the new colonial capital, a force of 300 African residents worked on the first segment of a six metres wide road. To enlist them, the state authorities took advantage of a locust plague that ravaged the area in the same year, offering famine relief in exchange for labour.⁵⁸ Different station commanders in the Tanzanian interior simultaneously ordered local dwellers to rework existing footpaths to make them more accessible, for instance through bridge construction and bush clearing.⁵⁹ Labelled as *Fronddienst* (corvée), local authorities conscripted these people — men, women, and children — from the vicinity of their stations with the help of local intermediaries. It was the duty of allied chiefs, village headmen, and newly-imposed Kiswahili-speaking paramount chiefs, so-called *Akidas*, to round up corvée workers for road construction and maintenance.⁶⁰

This mobilisation of African labour notwithstanding, German building efforts soon faced serious challenges. Work on the road out of Dar es Salaam was halted after a few kilometres in 1894 as a result of budget deficits.⁶¹ Achievements on most other roads were short-lived as during the periods of rain — the main season from March to May and the lighter season in November — they became impassable and vanished again.⁶² Those roads that survived into the dry season were covered by thick thorn bush and grass and thus impassable.⁶³

To clear the road at least two times per year was expected as part of the local population’s corvée. However, as Michael Pesek has demonstrated, shortages of resources and manpower caused the exercise of colonial power to restrict itself to the few inland stations and their immediate

⁵⁴W. Wolfrum, *Briefe und Tagebuchblätter aus Ostafrika* (Munich, 1893), 101.

⁵⁵L. Meyer, ‘Vom Wegebau in Deutsch-Ostafrika’, *Kolonie und Heimat in Wort und Bild* (1 Oct. 1908), 4–5.

⁵⁶E. Steere, *A Handbook of the Swahili Language, as Spoken at Zanzibar* (3rd edn, London, 1884), 254. This is the first edition to contain an entry for *barabara*.

⁵⁷For the common standards defined for the construction of highways, see Tanzania National Archives, Dar es Salaam (TNA) G1/102, ‘Runderlass’, Dar es Salaam, 12 July 1897, 89. See also the brochure ‘Grundsätze für den Wegebau in Deutsch-Ostafrika’, attached to the circular.

⁵⁸‘Denkschrift betreffend das ostafrikanische Schutzgebiet im Jahre 1893/4’, in *Verhandlungen des Reichstages: 9. Legislaturperiode 3. Session, 1. Anlageband* (Berlin, 1895), 381–416, here 385.

⁵⁹*Ibid.*; Mann, *Mikono ya damu*, 205.

⁶⁰Koponen, *Development*, 344–5; Sunseri, *Vilimani*, 66. See also H. Roemmer, *Das Gouvernement von Deutsch-Ostafrika in seiner geschichtlichen Entwicklung und gegenwärtigen verwaltungsrechtlichen Gestaltung* (Munich, 1916), 46.

⁶¹‘Denkschrift über die Entwicklung der Deutschen Schutzgebiete im Jahre 1896/7’, in *Verhandlungen des Reichstages: 9. Legislaturperiode, 5. Session, 2. Anlageband* (Berlin, 1898), 917–94, here 954.

⁶²Bundesarchiv, Berlin (BAB) R 1001/6467, ‘Jahresbericht’, [1897], 263–9; ‘Denkschrift über die Entwicklung der Deutschen Schutzgebiete im Jahre 1894/5’, in *Verhandlungen des Reichstages: 9. Legislaturperiode, 4. Session, 2. Anlageband* (Berlin, 1896), 855–945, here 886; W. Werther, ‘Die Erschließung des Innern Deutsch-Ostafrikas’, *Deutsche Kolonialzeitung*, 7:1 (1894), 2–5.

⁶³‘Wegbau in Deutsch-Ostafrika’, *Deutsches Kolonialblatt*, 15:16 (1904), 477–8; ‘Unerträgliche Zustände’, *Deutsch-Ostafrikanische Zeitung* (14 Mar. 1903), 3; and J. Benndorf, *Der koloniale Verkehr Deutsch-Ostafrikas: Ein wirtschaftsgeographischer Versuch* (Weida, 1918), 77.

surroundings.⁶⁴ Away from these administrative and military outposts it was very difficult for officials to check whether the villages really had sent *corvée* workers to carry out road works, allowing groups along the routes to ignore their duties.⁶⁵ In January 1896, all road construction in the colony was suspended for lack of financial means and engineers with only a few kilometres of roads being surfaced.⁶⁶

Colonial labour mobilisation and worker agency

When Eduard von Liebert became the new governor of German East Africa in 1897, he made road construction a primary task of the colonial administration.⁶⁷ Engineers were delegated from the colonial capital to supervise construction works in different parts of the colony.⁶⁸ While some of these projects reworked existing structures, others implied a departure from existing spatial links. In southern Tanzania, for instance, road building commenced in 1897 from Kilwa and Lindi to the interior. Meanwhile, work on the road out of Dar es Salaam was resumed while new roads were planned between Lake Nyasa and Lake Tanganyika as well as between Tabora and Mwanza at Lake Victoria.⁶⁹

A new tax order helped the Germans obtain the enormous amount of cheap labour required for these different construction sites. From April 1898 on, the government introduced a so-called hut tax of 3 to 12 rupees to be paid per annum in either cash or produce by every house and hut owner in the 'pacified' parts of the colony.⁷⁰ While the task to clear nearby roads was still expected as a tribute from local residents, additional road works were henceforth to be performed by tax defaulters, who were forced to work for the government.⁷¹ A system applied by police commander Eugen Styx on the road from Lindi to Masasi proved particularly 'efficient'. There, Styx had introduced a shift system in which one hundred tax workers per day were employed and replaced by the hundred workers of the next village as soon as they had worked off the village's tax debts.⁷²

Even Styx's labour regime, however, could not prevent the non-compliance of those pressured into road works. In eastern central Tanzania, the population of Kisaki opposed his command, reportedly proclaiming: 'are we the slaves or debtors of Europeans? Each day taxes and public works, why oh why?'⁷³ Different groups across the colony defied the pressure to work for the state. In the Tabora district, a group of villagers refused to engage in road construction so that the local district office outfitted a military expedition in May 1899.⁷⁴ In the same year, the Moshi district at Mount Kilimanjaro, in which the overwhelming majority of colonial subjects paid their taxes in labour, witnessed unrest, too.⁷⁵ As the source of grievances, the missionaries of the local Leipzig Mission station identified the simultaneity of *corvée* and tax burden:

The main reason for the people's distaste was the way in which the natives were enlisted for *corvée* regardless of their financial needs. Without doubt, the maintenance of roads, bridges,

⁶⁴Pesek thus calls these stations 'islands of colonial rule'. See Pesek, *Koloniale Herrschaft*, 190–265.

⁶⁵C. Lent, *Tagebuch-Berichte der Kilimandjaro-Station* (Berlin, 1894), 23 [130 in the book]; 'Denkschrift 1894/5', 896.

⁶⁶'Denkschrift über die Entwicklung der Deutschen Schutzgebiete im Jahre 1895/6', in *Verhandlungen des Reichstages: 9. Legislaturperiode 4. Session, 5. Anlageband* (Berlin, 1897), 2937–3011, here 2979.

⁶⁷See TNA G1/102, 'Runderlass', Dar es Salaam, 19 May 1897, 77.

⁶⁸BAB R 1001/786d, 'Runderlass', Dar es Salaam, 12 Sep. 1898, 120; BAB, R 1001/786d, 'Runderlass', Dar es Salaam, 25 May 1899, 253.

⁶⁹Denkschrift 1896/7', 954–60.

⁷⁰BAB R 1001/1053, 'Verordnung betreffend die Erhebung einer Häuser- und Hüttensteuer', 1 Nov. 1897, 48–50. See also Koponen, *Development*, 215–23.

⁷¹Denkschrift über die Entwicklung von Deutsch-Ostafrika 1898/9', in *Verhandlungen des Reichstages: 10. Legislaturperiode 1. Session, 4. Anlageband* (Berlin, 1900), 2865–924, here 2878. See also Sunseri, *Vilimani*, 64–7.

⁷²BAB R 1001/220, Zache, 'Reisebericht', 23 Jan. 1900, 21–2.

⁷³BAB R 1001/1053, Styx, 'Bericht über Ermordung von 2 Ombasha', Kisaki, 6 Dec. 1900, 182.

⁷⁴BAB R 1001/1053, Stuhlmann to Foreign Office, Dar es Salaam, 21 Nov. 1900, 94.

⁷⁵See 'Denkschrift 1898/9', 2896.

etc. cannot be accomplished without their labour. Still, the question remains whether it is justified to demand these works from those who have already paid their hut taxes.... In the natives' eyes, their enlistment without compensation strikingly resembles slavery.⁷⁶

If we follow the missionaries' report, the people in Moshi voiced the same sentiment as those in Kisaki. They identified the obligation to construct and maintain roads as a form of 'slavery by another name', to refer to Eric Allina's description of labour regimes in colonial Mozambique; systems of unfree labour whose 'practices had more than a passing resemblance to the exploitation of the now disavowed chattel slavery'.⁷⁷

But while the state apparatus responded to such open revolt with violence, for instance through a military campaign against the inhabitants of Kisaki in spring 1901, its representatives could not prevent the mere ignoring of their orders.⁷⁸ Even by the turn of the century, pressure to work on the state's construction sites was still inevitably reduced to the areas close to the coastal centres, the seats of loyal chiefs, as well as the interior stations. The nomadic presence of colonial officials and their allies allowed many actors along the routes to avoid or ignore their maintenance duties.⁷⁹ Evidence can be drawn from the hitherto unused source material produced by German travellers, such as the field journal of Georg von Prittwitz und Gaffron, who served in the colonial army and travelled from Mohoro in the coastal hinterland to the Iringa region in 1898. On one of his first marching days, he observed that 'on the roadway the grass was cut on a width of two meters. This had been done at the behest of the Wali [the deputy officer] of Kilwa'.⁸⁰ Six days later, farther inland, the officer learned that the maintained road stopped 'because the Wali's influence does not extend beyond the village of Kungulio'.⁸¹

In reaction to such neglect, it became a common practice of state officials travelling in expeditions to either outfit their own porters with hoes and axes or to spontaneously recruit residents to march ahead and clear the roads.⁸² Once the officials were gone again, however, this enthusiasm tailed off immediately, as even Gustav Adolf von Götzen, von Liebert's successor in the governor's office, acknowledged, speculating that the interior population 'will, of course, vow obedience but think at the very same moment ... that the district official is far away and so they will neglect their assigned duties'.⁸³

The consequence of this negligence was that even after the turn of the century colonial spatial infiltration remained limited and patchy. Of the planned highway out of Dar es Salaam, for instance, only the first seven kilometres were navigable with vehicles.⁸⁴ While there are no statistics on the total number of vehicle-ready kilometres around 1900, there is no doubt that the few existing segments of colonial roads represented only the smallest fraction of German East Africa's vast route

⁷⁶British Library, Endangered Archives Programme (BL) EAP099/1/2/10/2, 'Kollegialschreiben I', Schwartz to Foreign Office, Leipzig, 16 Sep. 1901, 141–2.

⁷⁷E. Allina, *Slavery by Any Other Name: African Life under Company Rule in Colonial Mozambique* (Charlottesville, VA, 2012), 10.

⁷⁸BAB R 1001/1053, Götzen to Foreign Office, Dar es Salaam, 13 Apr. 1901, 184.

⁷⁹For the nomadic or peripatetic rule of German officials, see Pesek, *Koloniale Herrschaft*, 31–4, 211. Non-compliance with colonial interventions in day-to-day activities is also found in other contexts in German East Africa. Mari K. Webel's research on disease control, for instance, shows that villagers at Lake Victoria not only transgressed the spatial boundaries of medical camps but also evaded their medical examination by resettling into the neighbouring British colony or avoiding checkpoints. See M. K. Webel, 'Medical auxiliaries and the negotiation of public health in colonial north-western Tanzania', *The Journal of African History*, 54:3 (2013), 393–416.

⁸⁰Leibniz-Institut für Länderkunde, Leipzig (IFL) 245/1, Prittwitz, Journal July 1897–Aug. 1898, entry of 9 June 1898.

⁸¹*Ibid.*, entry of 15 June 1898. For similar observations, see also Meyer, 'Wegebau', 5; and P. Samassa, *Die Besiedlung Deutsch-Ostafrikas* (Berlin, 1909), 256.

⁸²IFL 245/1, Prittwitz, Journal July 1897–Aug. 1898, entry of 11 Nov. 1897; IFL 247/3, Prittwitz, Journal Feb.–Apr. 1902, entry of 5 Mar. 1902; IFL 247/7, Prittwitz, Journal May–Oct. 1905, entry of 13 June 1905; IFL 848-2/350, Jaeger, Journal May–Aug. 1906, entry of 3 Aug. 1906.

⁸³BAB R 1001/1054, Götzen to Foreign Office, Dar es Salaam, 8 Dec. 1903, 140.

⁸⁴R. Fitzner, *Deutsches Kolonial-Handbuch* (Berlin, 1901), 277, 327.

network, which continued to be made of footpaths. Moreover, even the prestigious segments regularly broke down under bad weather conditions, displaying the same shortcomings as the roads built a decade earlier.⁸⁵ When Governor von Götzen, who had followed von Liebert in 1901, reviewed the efforts made under his predecessor and in the first years of his own term, he conceded in 1904 that every year during the rainy season most of the colonial roads succumbed to the rains: ‘travellers, then, are forced to march knee-deep in water or mud for hours and, sometimes, even to swim’.⁸⁶

From 1904 on, colonial infrastructure works received financial resources and metropolitan investment on an unprecedented scale. The German parliament granted a concession to build and run a railway line between Dar es Salaam and Morogoro, 180 kilometres inland, to a consortium headed by *Deutsche Bank*.⁸⁷ The parliament also granted von Götzen the massive sum of 10,800,000 marks, to be invested over a period of 18 years, for a grand-scale extension of highways across the colony. While preliminary works on the so-called Central Railway began, the government planned the construction of nineteen state roads. They included sections of the central caravan route, which was to be reworked, as well as roads from Kilwa to the rubber reservoirs in its hinterland, from Lindi to the Ruvuma River, and roads connecting Lake Tanganyika with Lake Nyasa and Lake Victoria respectively. These roads were to be prepared for year-round traffic with carts (Fig. 2).⁸⁸

Labour for this mammoth project was to be drawn from taxpayers. In March 1905, the Germans introduced a new tax of three rupees to be paid cash by every male colonial subject.⁸⁹ At the same time, it was decreed that any man could be forced to work in road construction for free – in addition to the existing road maintenance duties.⁹⁰ This burden added more tension to the already smouldering conflicts in German East Africa. In April 1905, the Dar es Salaam-based weekly *Deutsch-Ostafrikanische Zeitung* warned that in the Kilwa district frustration grew among the Ngingo people: ‘Quite apart from the unpaid cleaning of the barabara – a practice common to all districts – the new construction of large, public thoroughfares seems a risky step that may serve to embitter the Wangindo because it conflicts with their rubber collection and field preparation [activities]’.⁹¹

In mid-1905, the Maji Maji War broke out in southern Tanzania, from where it spread over large parts of the colony. The uprising had many causes: heavy taxation, the breakdown of patron-client relations, and a loss of control over the economy and environment through the imposition of cotton cultivation and wildlife ordinances all played a role.⁹² Compulsion to work in road construction and maintenance was another crucial factor in the conflict.⁹³ Evidence is found in the Lindi and Kilwa districts, where the uprising first broke out. As the *Deutsch-Ostafrikanische Zeitung* had predicted, Ngingo communities were among the first to revolt against German oppression.⁹⁴ During the war,

⁸⁵For a description, see ‘Der Zustand der Straßen’, *Deutsch-Ostafrikanische Zeitung* (21 May 1904), 3.

⁸⁶Cited in ‘Wegebau’, 477. See also TNA G4/6, Götzen to Foreign Office, Dar es Salaam 28 Dec. 1903, 6.

⁸⁷Biermann, *Tanganyika Railways*, 28.

⁸⁸G. Götzen, ‘Denkschrift betreffend den Ausbau des Wegenetzes im Ostafrikanischen Schutzgebiete’, in *Haushalts-Etat für die Schutzgebiete: auf das Rechnungsjahr 1905* (Berlin, 1904), 63. ‘Bekanntmachung betreffend Festlegung eines Wegebauplans,’ 28 Mar. 1904, in *Die Deutsche Kolonial-Gesetzgebung: 1904* (Berlin, 1905), 84–5.

⁸⁹‘Verordnung betreffend die Erhebung einer Häuser- und Hüttensteuer’, *Amtlicher Anzeiger* (1 Apr. 1905), 1–3.

⁹⁰‘Verordnung betreffend die Heranziehung der Eingeborenen zu öffentlichen Arbeiten’, *Amtlicher Anzeiger* (1 Apr. 1905), 7.

⁹¹‘Die wirtschaftliche Lage und Sklavenhandel in Donde’, *Deutsch-Ostafrikanische Zeitung* (22 Apr. 1905), 1–2. The translation is taken from L. Larson, ‘The Ngingo: exploring the center of the Maji Maji Rebellion’, in J. Gibling and J. Monson (eds.), *Maji Maji: Lifting the Fog of War* (Leiden, 2010), 71–114, here 100.

⁹²See T. Sunseri, ‘Famine and wild pigs: gender struggles and the outbreak of the Maji Maji War in Uzaramo (Tanzania)’, *Journal of African History*, 38:2 (1997), 235–59; T. Sunseri, ‘Statist narratives and Maji Maji ellipses’, *International Journal of African Historical Studies* 33:2 (2002), 567–84; J. Monson, ‘Relocating Maji Maji: the politics of alliance and authority in the southern highlands of Tanzania, 1870–1918’, *Journal of African History*, 39:1 (1998), 95–120; F. Becker, ‘Traders, “big men” and prophets: political continuity and crisis in the Maji Maji rebellion in southeast Tanzania’, *The Journal of African History*, 45:1 (2004), 1–22; Gissibl, *Nature of German Imperialism*, 109–40; as well as the essays in Gibling and Monson (eds.), *Maji Maji*.

⁹³See BAB R 1001/726, Haber to Götzen, Dar es Salaam, 9 Sep. 1905, 85; BAB R 1001/726, ‘Bericht’, Dar es Salaam, 4 Dec. 1905, 98; BAB R 1001/726, ‘Bericht’, 11 Dec. 1905, 106; BAB R 1001/767, Haber to Foreign Office, Dar es Salaam, 9 May 1906, 64.

⁹⁴See Larson, ‘Ngingo’.



Fig. 2. Ocker, 'Road construction in Mufindi', n.d.

Source: Image Collection of the German Colonial Society, Frankfurt am Main University Library, 016-1283-10.

they did not only fight the state's representatives but also its physical landscape, reportedly sabotaging the kilometre marker stones along the Kilwa–Liwale road which previously they had been forced to build.⁹⁵

The Maji Maji War ended in August 1907. The gradual suppression of the war initially facilitated labor recruitment and helped promote the extension of highways as the state authorities drew on a cheap force of chained penal workers.⁹⁶ However, when von Götzen was dismissed from the governor's office in consequence of the uprising, the focus of colonial engineering shifted from roads to railways.⁹⁷ From 1907 on, the central railway was extended with public funds to Lake Tanganyika. Simultaneously, the railway line in northern Tanzania, on which construction had slowly continued after the German state bought up the existing tracks in 1899, was extended to Moshi at Mount Kilimanjaro.⁹⁸ With all this energy being devoted to developing these two lines, von Götzen's road construction scheme was discontinued. Before long, most of the remaining highways fell

⁹⁵'Die Reise des hochwürdigen Herrn Bischof Thomas Spreiter nach Matumbi und Kwiro', *Missions-Blätter von St. Otilien* 13:6 (1908/9), 82. See also Sunseri, *Vilimani*, 59. I am much obliged to Thaddeus Sunseri for sharing this source with me.

⁹⁶K. Streit, 'Beyond borders: a history of mobility, labor, and imperialism in southern Tanzania' (unpublished PhD thesis, University of Houston, 2016), 103–5.

⁹⁷After 1906, the German Empire restructured the administration of its colonies. The new Colonial Secretary Bernhard Dernburg proclaimed reform and economic development as new guiding principles. For this phase, see J. Iliffe, *Tanganyika under German rule, 1905–1912* (Cambridge, 1969).

⁹⁸On the construction of the Central Railway, see D. van Laak, *Imperiale Infrastruktur: Deutsche Planungen für eine Erschließung Afrikas, 1880 bis 1960* (Paderborn, 2004), 137–42.

into a sorry state of neglect.⁹⁹ Only those highways which could serve as feeder roads to the railways were still considered worth maintaining by the government, such as a road from the railway station in Mombo to the town of Lushoto in the Usambara Mountains, on which the colony's first regular motor service with a lorry was inaugurated in 1910.¹⁰⁰

User engagement with colonial highways

The construction of vehicle-ready highways in German East Africa had begun early on in the German colonial period. But even a decade and a half into colonial rule, little of the ambitious programme had been achieved. By the time the Germans decided to focus on railways instead of cross-country roads, only about 250 kilometres of highways were completed or had at least seen some preliminary works.¹⁰¹ Open resistance to labour coercion and the residents' refusal to maintain roads, as the preceding section has highlighted, were important factors in slowing down the process of colonial spatial appropriation.

If we follow the interviews conducted in Lindi by P. M. Libaba, a member of the Maji Maji Research Project (1968) of the University of Dar es Salaam, opposition to road works was not only the result of unfree labour demands but also because of the alleged purpose of colonial highways. Libaba's interviewees suggested that colonial subjects 'thought that clearing roads was meant to facilitate the movements of tax collectors whom they hated much. Generally the clearance of roads was understood to make German government effective – more chainings, more beatings, more portage and everything hateful. So that they hated clearing roads'.¹⁰² Connected with this perception that colonial roads served colonial travellers are questions of who the roads were built for and who was in fact using them. The remainder of this article engages with the role of road users in the process of colonial infrastructure expansion. Adding to the findings of the previous section, it shows that the agency of local residents was only one reason why the state authorities were unable to make infrastructure durable. As we will see, a second crucial reason was the way many African travellers engaged with colonial roads in their everyday practice — if they engaged with them at all.

German colonisers envisioned that new means of transport would circulate on their roads: pack animals, carts, and potentially automobiles. Beginning under Governor von Liebert, state authorities officially embarked on the quest for a new pack or draught animal.¹⁰³ From 1897 on, several district offices and military stations bred donkeys which they used as riding animals, albeit mostly on a local level.¹⁰⁴ The government also sponsored several test-drives with ox-wagons, and in 1900 the first regular ox-wagon service (between Dar es Salaam and Kilosa) was planned by the settler Alfred Pfüller.¹⁰⁵ His business was suspended the following year as soon became apparent 'that traffic with a light, well-harnessed cart was possible on a good surface. Heavy loads, however, caused

⁹⁹Koponen, *Development*, 449; 'Der Zustand unserer Strassen', *Usambara-Post* (21 Sep. 1907), n.p.; 'Wegebau Mkomassi-Same', *Deutsch-Ostafrikanische Zeitung* (22 Apr. 1911), 3; 'Ungenügende Mittel für Strassenbau', *Kilimandjaro- und Meru-Zeitung* (16 Oct. 1913), 79–80; 'Unbenutzbare Wege in Deutsch-Ostafrika', *Deutsche Kolonialzeitung*, 31 (1914), 530–31.

¹⁰⁰'Regelmäßiger Automobilverkehr Mombo-Wilhelmstal', *Deutsch-Ostafrikanische Zeitung* (16 Aug. 1911), 3.

¹⁰¹See Dernburg, speech of 26 Feb. 1909, in *Verhandlungen des Reichstages: 12. Legislaturperiode 1. Session, Band 235* (Berlin, 1910), 7178.

¹⁰²Maji Maji Research Project, 7/68/2/1, Libaba, 'The Maji Maji Rising in the Lindi District', 6, printed in *Maji Maji Research Project, Collected Papers* (Dar es Salaam, 1968).

¹⁰³See TNA, G1/102, 'Runderlass', 19 May 1897, 77–8.

¹⁰⁴'Denkschrift 1896/7', 947; 'Denkschrift 1898/9', 2873. According to Koponen, donkey transport remained limited to a few coastal towns and the southern parts of the colony. See Koponen, *Development*, 456.

¹⁰⁵'Denkschrift 1896/7', 959; 'Denkschrift über die Entwicklung der Schutzgebiete in Afrika und in der Südsee im Jahre 1900/1', in *Verhandlungen des Reichstages: 10. Legislaturperiode, 2. Session, 5. Anlageband* (Berlin, 1902), 2907–3146, here 2915.

the cart to get stuck at the first obstacle and the loads had to be carried on by porters'.¹⁰⁶ Years later, the first motor vehicles arriving in German East Africa faced a similar fate. In 1907, the German Paul Graetz embarked on a motorised trans-Africa journey. His automobile, however, could not stand the terrain and had to be carried by porters for most of its journey.¹⁰⁷ Equally unsuccessful was the lorry service between Mombo and Lushoto, which was suspended one year after its inauguration.¹⁰⁸

While German colonisers dreamed of transferring technology to their colony, the reality was that only a fraction of German East Africa's transport system drew from models introduced by European outsiders. Its predominant characteristics had developed from within the world region. Caravans remained the main users of German East African transportation infrastructure throughout the period under consideration. By the turn of the century, about 100,000 porters continued to arrive every year in the coastal towns at the Indian Ocean.¹⁰⁹ Although the number of long-distance caravans declined after 1900, owing to a slump in ivory trading, their labour remained in high demand, especially for the booming rubber trade.¹¹⁰ In 1907, European observers still estimated the number of caravan porters in the central Tanzanian trade corridor at an annual 40,000 to 60,000 people.¹¹¹

Ignoring the predominance of human-powered mobility, many of the German building efforts under von Liebert and von Götzen broke with established spatial patterns. Even where colonial infrastructure works built on established pathways, the planners corrected road courses to meet the requirements of future vehicle traffic. While caravan trails often ignored slopes and climbed hills straight, for instance, engineers laid out hairpin bends. The opposite was done on many routes running through plains: colonial highways were often planned as straight-lined thoroughfares. District official Karl Charisius, for instance, reported that road works in Tabora 'generally followed the shortest path according to compass reading.... We did not take [the avoidance of] difficult terrain into consideration'.¹¹² Although Charisius insisted that the district authorities had laid out the roads in a way that 'they touch populated areas at intervals to ensure supply for caravans',¹¹³ not all planners did pay attention to established structures and often ignored existing wayside markets and nutrition points for the sake of shortened distances.

How did caravan travellers respond to this attempted departure from the economy of caravan travel? German official Karl Ewerbeck observed in 1900 from the central Tanzanian route corridor that many porters 'are not grateful for the new barabara because in many cases these roads ignore waterholes and supply of provisions and run through pori [wilderness] simply to shorten distances'.¹¹⁴ If we follow the official's observation, African travellers responded to the fractional spatial interventions by avoiding the new roads whenever necessary: the report continued that on the road from Kilimatinde to Mpwapwa, 'hundreds of porters are seen every day within reach of the two towns. Two days' march away, however, the barabara is deserted. Instead, caravans prefer two alternative routes running parallel to the barabara'.¹¹⁵

¹⁰⁶H. Fonck, *Deutsch-Ost-Afrika: Eine Schilderung deutscher Tropen nach 10 Wanderjahren* (Berlin, 1910), 102. See also [untitled], *Deutsch-Ostafrikanische Zeitung* (28 Apr. 1901), 3.

¹⁰⁷Grace, *African Motors*, 43–5.

¹⁰⁸'Regelmäßiger Automobilverkehr Mombo–Wilhelmstal', *Deutsch-Ostafrikanische Zeitung* (16 Aug. 1911), 3.

¹⁰⁹BAB N 2303/11, F. Stuhlmann, 'Professor Schweinfurth's Kritik über afrikanische Eisenbahnen', [c. 1900], 4. For a discussion of the numbers, see Pawelczak, *The State*, 84–5.

¹¹⁰See P. Krajewski, *Kautschuk, Quarantäne, Krieg: Dhauhandel in Ostafrika 1880–1914* (Berlin, 2006), 135–162. For the slump in ivory, see Gissibl, *Nature of German Imperialism*, 70–3.

¹¹¹Kolonialpolitisches Aktionskomitee, *Die Eisenbahnen Afrikas: Grundlagen und Gesichtspunkte für eine koloniale Eisenbahnpolitik in Afrika* (Berlin, 1907), 195.

¹¹²TNA G1/38, Charisius to Colonial Government, Tabora, 30 July 1906, 2.

¹¹³*Ibid.* See also BAB R 1001/5499, Rechenberg, 'An sämtliche Bezirksämter und Militärstationen', Dar es Salaam, 5 Nov. 1906, 114.

¹¹⁴TNA G1/35, Ewerbeck to Colonial Government, Lindi, 22 Jan. 1900, 223.

¹¹⁵*Ibid.*

Colonial road building complemented vernacular infrastructure, but it did not fully replace it. With a plethora of footpaths still running to every destination, the new infrastructure system had to contend with alternative arrangements running either parallel to or branching off from the new roads. As Ewerbeck's report suggests, it remained the decision of caravan leaders or headmen on which of these different structures to guide their caravans. Traveller's preference of vernacular infrastructure systems was witnessed by German officials and travellers in different parts of German East Africa. Geographer Fritz Jaeger, for instance, noted during his 1906 expedition in northern Tanzania that the *barabara* between Moshi and Arusha was empty while another route running in the same direction was much-used.¹¹⁶ In like vein, Mombo district commissar Max Siegel observed that 'the natives in the [Usambara] Mountains are far from following the European-style roads because they deem their shenzi [i.e. "wild"] paths sufficient and shorter, and favour them over designed roads'.¹¹⁷

Scattered archival evidence suggests that the same holds true for wayside infrastructure. Beginning in 1899, the government made efforts to attach at least some of the new roads in south-eastern Tanzania to the needs of caravan travel. To establish artificial marketplaces, district officials forced entire groups to resettle along the new highways.¹¹⁸ At these marketplaces, the new settlers either sold their own grain or products provided by the German stations to caravan travellers, who had to pay in rupees, the colonial currency.¹¹⁹ The official markets, however, were not the only available supply points as groups residing on nearby caravan trails continued to sell their agricultural surplus to travel parties. Although the available sources do not reveal much information, evidence from the district of Neu-Langenburg (today's Tukuyu) suggests that at least in the region west of Lake Nyasa caravan travellers did not make much use of the German supply facilities. Instead, as a local official observed, 'porters prefer to buy their provisions cheaper. This method is also applied by the Askaris [African soldiers], who do not buy on the markets but send their boys into the villages, where they could buy foodstuff for half the price compared to the market'.¹²⁰

The result of the outlined disuse of colonial infrastructure by African travellers was that the scattered highways remained prone to collapse. Echoing Gerald Portal's above-cited description of vernacular paths, German officer Georg von Prittwitz und Gaffron observed in 1902 that an important road in southeastern Tanzania, in theory connecting Kilwa with Songea, had vanished again due to insufficient traffic: 'the old *barabara* from Songea to Barikiwa is completely overgrown again because it is only used very rarely'.¹²¹ While the colonial road system depended on political decisions on where and how to invest in roads, rather than on porters voting with their feet, it shows that footwork remained a crucial aspect of infrastructure production: because many villagers and tax defaulters defied their assigned duties to clear the roadways, colonial infrastructure was often only maintained by the people's circulation, without which it could not persist.

Even where caravans marched on the highways, the movement of these travel parties posed an obstacle to the permanence of colonial infrastructure. Apart from the scattered German stations, no regulatory power could enforce any 'appropriate' use of the converted roads. Where colonial road builders had applied hairpin bends to manage the steep slopes of mountain roads, for instance, porters were reported to 'prefer climbing the hills on [straight] trodden paths instead of following the

¹¹⁶IFL 848-3/351, Jaeger, Journal Sep.–Dec. 1906, entry of 7 Sep. 1906.

¹¹⁷BL EAP099/1/2/10/4, Siegel to Dannholz, Mombo, 26 Aug. 1913, 211. For similar observations, see, for instance, IFL 247/3, Prittwitz, Journal Feb.–Apr. 1902, entry of 16 Mar. 1902; IFL 180/45, H. Meyer, Journal Oct.–Nov. 1911, 2.

¹¹⁸BAB R 1001/786e, 'Runderlass', 14 Dec. 1899, 64. For examples, see BAB R 1001/220 Zache, 'Reisebericht', 23 Jan. 1900, 41; BAB R 1001/220, 'Vertrag', Lindi, 20 Sep. 1900, 102–5.

¹¹⁹BAB R 1001/6468, 'Denkschrift [draft]', 1898, 268; BAB R 1001/6473, 'Jahresberichte', 1900, 293; 357–58; BAB R 1001/6474, 'Jahres-Bericht [draft]', 1901, 2; BAB R 1001/224, Lambrecht to Government, Kilosa, 12 Jan. 1901, 12; BAB R 1001/224, 'Bericht über Wegeverhältnisse', Kilosa, 1903, 28.

¹²⁰BAB R 1001/5750, Scherschmidt, 'Beschreibung der Station Neu-Langenburg', 1913, 353.

¹²¹IFL 247/3, Prittwitz, Journal Feb.–Apr. 1902, entry of 19 Mar. 1902.

many hairpin bends of artificially created roads'.¹²² In a similar fashion, the colony's annual report of 1897 complained with regards to the Tabora district that '[e]ven though the station as well as a number of Sultans [chiefs] have laid out broad roads, the natives do not see any advantage in them and instead march on these roads in one single file'.¹²³

Caravan travellers walked on the broadened roadways in the same manner they usually marched on smaller trails (Fig. 3). Because the maintenance of colonial roads depended on movement on them, this behaviour had immediate effects on colonial infrastructure: if they had walked side by side, they would have suppressed vegetation growth across the entire width of the roadway. Retaining a vernacular type of movement, by contrast, accelerated the roads' decay. This was observed by von Prittwitz und Gaffron in the following year. Travelling with his expedition in the said Tabora district, he remarked in October 1898 that the 'barabara Tabora-Ujiji [is] a native path, only slightly better trodden than the others'.¹²⁴

Further evidence of the insistence on known patterns of movement and its effects on colonial roads is provided by Fritz Jaeger, who noted in his field journal that between Moshi and Korogwe 'the barabara consists of a roadway carved out on six metres in width, in whose centre runs a winding foot-path on which the porters march in one single file'.¹²⁵ Soon, complaints were voiced that any efforts to broaden and maintain the highways were thwarted by porters not complying with the physical movement they were supposed to execute. Different state officials recommended methods to actively involve porters in infrastructure maintenance, such as forcing them to march on a broad front or equipping them with axes and hoes. These ideas, however, were discarded as infeasible before long and the problems remained.¹²⁶ Fig. 4, below, depicts the resulting process of decay in an early stage: only the paths meandering along the *barabara* proved durable because they were used frequently and thus kept free of vegetation while the edges of the roadways often vanished again under grass.

Conclusion

This article has shed new light on infrastructure development and its limits in German East Africa by focussing on questions of continuity and change in the transition from the precolonial era to colonial rule. In the world of precolonial long-distance trade, groups residing near caravan routes and caravanners marching along them engaged in the production of trails and their adjunct infrastructure. After the colonial takeover, the German administration made road construction an official task. The decision about when, where, and for whom to build infrastructure was taken out of indigenous hands.

And yet, the actor-centred analysis of this article has demonstrated that throughout the period under consideration, colonial infrastructure remained substantially shaped by social interaction and production in day-to-day activities. A focus on those Africans building and maintaining colonial roads (or being expected to do so) and those primarily using them has helped to explain why most of the roads remained short-lived. Further research is required to assess the commonness of these phenomena across German East Africa and to explore regional differences. Still, the variety of regions covered in the presented source material does already suggest that the described responses can be found in all three major route corridors.

¹²²W. Rathenau, *Reflexionen* (Leipzig, 1908), 184.

¹²³'Denkschrift 1896/7', 962.

¹²⁴IFL 245/2, Prittwitz, Journal Aug.–Oct. 1898, entry of 5 Oct. 1898.

¹²⁵IFL 849-1/2, Jaeger, Journal June–Nov. 1904, entry of 24 July 1904. See also H. Schweinitz, *Deutsch-Ost-Afrika in Krieg und Frieden* (Berlin, 1894), 32; Werther, 'Erschließung', 3; 'Denkschrift 1895/6', 2979; 'Der Karawanen-Verkehr: Eine Gefahr für unsere Kolonie', *Deutsch-Ostafrikanische Zeitung* (27 July 1901), 1; Meyer, 'Wegebau', 4; IFL 180/43, H. Meyer, Journal Sep.–Oct. 1911, 41 & 152.

¹²⁶See TNA G1/35, Engelhardt to Colonial Government, Tabora, 22 Nov. 1897, 107; TNA G1/35, District Office to Colonial Government, Bismarckburg [Kasanga], 4 July 1900, 248.



Fig. 3. Georg von Prittwitz und Gaffron, 'Porters', 8 August 1903.
Source: Saxon State and University Library Dresden, 71794297.



Fig. 4. Hans Meyer, 'On the trail', n.d.
Source: Saxon State and University Library Dresden, 71792075.

A second finding of the article is the persistence of vernacular infrastructure systems, with which the new roads had to coexist and compete. That caravans could ignore colonial roads illustrates that these structures did not possess any power in themselves, nor did they offer any incentives to non-European travellers. Official infrastructural policy sought to channel colonial mobility into spatially-defined segments. Reading the official records against the grain, however, has revealed more than the weak capabilities of the colonial state. The available evidence also shows that East Africans retained their own visions of space and travel. Because there were usually several arrangements to choose from, caravans could instead use the trails they found most suitable. They still based their itineraries on the accessibility of travel routes, the availability of food and water, and economic and social relations existing along the routes. This East African notion of infrastructure as a means of engaging and networking with pathside people stood in stark contrast with the German understanding of infrastructure, especially railways, as an efficient means to shorten distances or connect two distant points.

Vernacular structures and patterns of mobility proved resilient against German rule while the agency of those Africans subjected to colonial space simultaneously subverted its transformation: taken together, this article has demonstrated that colonial infrastructure development (and, through it, spatial appropriation) in the German colony was not a streamlined process, but a contested field in which infrastructure schemes planned from office desks were constrained by and collided with established structures and practices on the ground.

Beyond the East African test case, these findings have at least two wider implications for the ongoing historiographical debate concerning African engagement with technology in the colonial period. First, the preceding analysis contributes to the shift away from an understanding of infrastructure as a tool to dominate colonised societies towards more nuanced interpretations of these systems. Adding to the recent scholarship on African mobility and consumerism, its findings underline that infrastructure and technology were shaped by the spatial practices of their users, their enduring commitment to established patterns of usage, their economic and social motivations and, in general, by fluidity rather than stasis.

Secondly, more than simply adding to the growing body of literature in Science and Technology Studies and the history of technology, this article has challenged the still-vibrant conceptual focus of infrastructure in Africa as a European invention. Although different scholars have recently explored practices of adoption and adaptation by African users, their research often still revolved around imported technologies. Instead pointing to the centrality of vernacular ideas and technologies for colonial infrastructure expansion, this article has explored continuities as much as ruptures and has illuminated that practices of adoption, adaptation, as well as non-compliance were not unilateral. Infrastructure systems in East Africa preceded colonialism, some of them by centuries, with the case under consideration here dating from at least the mid-nineteenth century. Studying the trajectories of these arrangements in depth provides an important step towards reframing the concepts of infrastructure and technology themselves, moving away from their exclusivist European association with seemingly 'modern' engineering. As the case of colonial road building in East Africa demonstrates, historians must pay close attention to African actors, as their concepts and activities are at the very centre of the continent's infrastructure history.

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