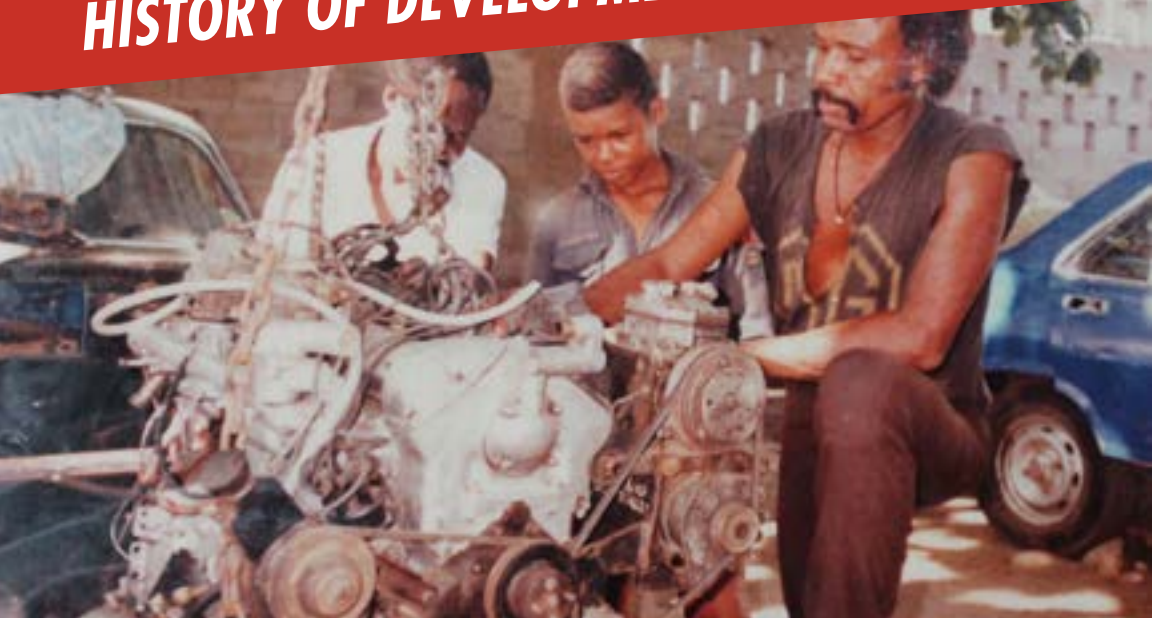




AFRICAN MOTORS

TECHNOLOGY, GENDER, AND THE
HISTORY OF DEVELOPMENT **Joshua Grace**



AFRICAN MOTORS

BUY





*Here and overleaf:
Apprentices from the
Ufundi soccer team
learning and working
in a state garage.*

AFRICAN MOTORS



*TECHNOLOGY, GENDER, AND THE
HISTORY OF DEVELOPMENT*

Joshua Grace

DUKE

DUKE UNIVERSITY PRESS — *Durham and London* — 2021

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modified British Zephyr. Bottom photo: Brian Ibrick (right),
son (middle), and unidentified individual performing
mechanical work. Photo from the collection of Brian Ibrick.

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ACKNOWLEDGMENTS

This book began with a breakdown. In 2007 our 1992 Dahaitsu Feroza, the first car we had purchased in Dar es Salaam, Tanzania, needed more serious attention than previously thought as its engine missed a cycle and overheated. Our mechanic, Abdu, said the cylinders in the block needed to be rebored and then paired with resized pistons. It sounded serious and expensive to me. As part of a generation of Americans for whom shop class had been deemphasized and even denigrated, I knew very little about cars. And so I was surprised that Abdu described this as a fairly routine fix that would actually improve the vehicle and its value. My very American approach to vehicles—which privileged factory originality and might have led to the engine being scrapped—left me skeptical, but because other research had to stop, I asked to hang out in the garage over the week it took to fix the vehicle. Unlike some of the engine work explored in this book, the rebor-ing occurred at the Department of Engineering at the University of Dar es Salaam. But the rest of the work occurred in a garage whose density of people, things, and activity took me by surprise even though I knew gar-ages were a common fixture of life in the city. That rebuilt engine purred, and Abdu joined me to stand by his work when we sold the vehicle (albeit for the same price as we purchased it). That process led me to archives, to roadsides, and back to garages to try to understand the history that allowed the Feroza to find new life.

Like that fixed Feroza, this book had many hands in its construction and in the many repairs necessary to get it working and keep it going. Laura Fair coaxed this project out of me and then provided steady guidance, patience and encouragement, methodological creativity, honesty, and much more. I could not have asked for a better adviser in matters of academia or life; not a week passes when I don't think of a personal or academic lesson or inspiration Laura provided. The late David Bailey first accommodated my

interest in the history of technology through individual studies I enjoyed and grew from immensely. I had always hoped that I could give him a copy of this finished book and that it would find its way into the unending stacks and piles of books one navigated upon entering his office. I'm thankful to have the many questions he asked me then—and that I failed to answer and still likely cannot now—as a memory of him and those times. Walter Hawthorne, Peter Alegi, and David Wiley supported this research throughout my time at Michigan State University. I'm particularly grateful for their close reading of my work. I started studying cars just as Lewis Siegelbaum published *Cars for Comrade: The Life of the Soviet Automobile*, and I greatly appreciate the time and resources he shared with me. Greater East Lansing's *babu*, Mwalimu Deo Ngonyani, was the heartbeat of the academic Kiswahili-speaking community at Michigan State University. Much more than a linguist and language teacher, Deo is a fabulous historian in his own right and has provided valuable feedback and answered many questions over the years. He and Philomena embody the Kiswahili term *karimu*.

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I dedicate this book to my best friend, Bre, with love and thanks for the past seventeen years of life. She has been a constant source of joy,

inspiration, love, grace, steadiness, and brilliance. Bre read more of this project than anyone else and listened to me during the highs and lows of writing and research. I'm so lucky to call her a partner in life. Silas and Bennett spent their first years with this manuscript in the background of their lives. They've questioned how long it took me to complete and somehow tied this book's publication to getting a dog. So there you go, Si and Benny—you get a dog now. You both have brought me more joy than I knew possible.



Introduction

Africa, Motors, and a History of Development

FRANK TAYLOR'S CAR may not be the only Nissan with headlights from the former Yugoslavian company Saturnus (see figures I.1 and I.2). I would not be surprised to find other Nissan rally bodies sporting these pre-1970s Saturnus headlamps, popular among rally drivers for their strong beams, reaching two to three times farther than other lights in darkness. But add its Toyota engine and its Ford Escort dashboard, and Taylor's rally car becomes a one-of-a-kind vehicle that tells a unique story about Africans and mechanical creativity. That story ends with a championship. Driven by his son and navigated by his wife, the vehicle earned TayComm Rallies, the family's rally team, a first-place finish in the 2018 national competition for two-wheel drive. But let's begin the story by taking a big step back in time. Since the combustion engine's invention in the late 1800s, car manufacturers and users from the Global North, a geography that claims the motor vehicle as its own, have considered automobiles and Africa incompatible. Cars, most colonial officials believed, signaled the cutting edge of industrial progress, born of centuries of scientific and technological advances. Their ideas about Africa evoked the complete opposite. "The image of Africans as irrational took root in the Enlightenment and took off during the imperialism that followed," writes Gabrielle Hecht. "Europeans built political philosophies premised on the radical Otherness of Africans. Armed with Maxim guns and industrial goods, they saw artisanally produced African

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1.1-1.2 Yugoslavian headlights on Frank
Taylor's champion Nissan rally car.
(Photos by author.)

technologies as proof of a primitive existence. ‘Africa’ became seen as a place without ‘technology.’”¹

Indeed, as car use grew in East Africa in the early 1920s, colonial motoring literature described an almost insurmountable technological gulf between European motorists and African societies. The Royal East Africa Automobile Association (REAAA), which published pamphlets of its motor trials for colonial and metropolitan audiences, paired motoring maps and pictures of vehicles with images of unstable stick bridges, mud houses, unclothed women, and superstitious “witch doctors.”² In 1927 the association’s director, Frederick Galton-Fenzi, helped a journalist from the *New York Times* sell this mythical technological absence as a desirable travel experience for American car enthusiasts. The article detailed auto tours over “roads [that] have been pushed right through the heart of the tropical jungle. Herds of giraffe are frequently seen and many varieties of antelope.” The REAAA assured readers that when one is motoring over “old paths and elephant trails,” bamboo bridges “feel insecure, as the bridge sways,” but they do not merely hold. They also feel like “motoring over a carpet stretched in midair.” As for their African audiences: “The natives are terrified at first, but within a day or so they are filling the tank and holding out one hand for a tip. At present they are providing tea and bread and butter for tourists in their little refreshment stands, but soon, if we are to believe Mr. Galton-Fenzi, there will be shacks devoted to hot dogs and coffee.”³

Portrayed as confused, shocked, scared, unclothed, or stationary assistants whose work, despite their quick appropriation of station culture, is limited to helping motorists with fuel, coffee, and hot dogs, Africans and their built worlds appear in these sources as worlds apart from European and American cultures of technology. As Michael Adas demonstrates, the ability to invent and produce machines created “perceptions of the material superiority” of European cultures that supplemented and reinforced, but did not replace, colonial hierarchies of biological race. The presence or absence of tools of industrialization like motor vehicles, railways, and wheels—including the new cultures of space, time, and speed they created—provided a “measure of men” that “[distinguished] civilized people from savages and barbarians.”⁴ Cars, for example, required fuel sources, engines with a variety of hardened metals, and tires made from rubber. While the rubber may have come from the Congo Free State (and later, the Belgian Congo) as raw material, tapped under brutal conditions, it was transformed into a finished product through the know-how and tools found in American and European factories. In this version of history, Africa

at best provided the raw materials for a variety of production processes that evidenced Europe's "material superiority" over colonized societies.

An early biofuel scheme during World War I clarifies this view of Africa and other colonies as spaces of absolute technological lack. When German U-boats cut off oil supply lines to the Middle East during World War I, a committee tasked with finding energy alternatives proposed creating "Alcohol for Motor Fuel" from farms in British colonies. With a seemingly endless supply of vegetation, "tropical" colonies offered fuel solutions because "the natural increase of native population is retarded by civil war, pestilence, and disease, so that large areas are available, almost for the asking."⁵ The project never gained traction. But it exemplifies a sociotechnical chasm many British thinkers and automobile enthusiasts took for granted.⁶ Fed by travel writing that described "tropical" societies as technological voids, the plan suggested that non-European societies could not produce significant agricultural surpluses, let alone the "revolution in engineering" the car represented.⁷ At best, with British aid, its land could supply metropolitan fuel needs. There are no considerations of when such passive contributions to metropolitan needs would lead to an African motoring society. European and American motoring cultures were still in their infancy at this time and still largely confined to the upper classes. With such limited diffusion at home, in these sources it appeared unthinkable that Africans could adopt, let alone shape, a motoring culture.

And yet they did. From a fleet of 14 colonial cars in 1914, the number of motor vehicles reached 30,000 by Tanzanian independence in 1961 and grew to nearly 600,000 by 2000. During the same time, the total miles of roads grew by a factor of ten, and the number of registered Tanzanian drivers increased from 6 to an estimated 400,000.⁸ Some might correctly read those as low numbers in a comparative context and suggest that Tanzania makes an odd place for studying cars and society. But that would miss an important point: Tanzanians shaped vehicles and car culture without feeling a need to match—or appropriate—Northern trends of use. For much of the independent period, users and planners explicitly aimed to avoid those trends by putting automobiles and society together differently—a phenomenon most have either missed or misread, as a photo (figure I.3) taken during the East African Safari Rally in 1977 demonstrates. In the photo two independent Africans feature only as bystanders as a machine made in Europe, the United States, and East Asia flies by. Like the REAAA pamphlets, the car's presence evokes a world history of technology in which other societies innovate to move forward while Africans stand hopelessly still, mired in



1.3 Two Maasai men watch a vehicle whiz by on a dirt road during the 1977 East African Safari Rally. Rally organizers intentionally sought out rough sections of road to test both vehicles and drivers. (Author's collection.)

the same technological state, or simply looking on as others innovate, as shown in the upper right of figure I.4. Though clear change has come to automobiles in the fifty years between Galton Fenzi's 1920s promotion of European and American motoring in East Africa and the rally, nothing African, whether the people or the road, seems to have changed at all.⁹

This brings us back to Taylor and his rally-winning vehicle, a combination of different makes and models from around the world. He attached the Saturnus lights for their beam strength, and the Toyota engine for its durability and power. The Ford dash had less of an impact on performance, and Taylor simply trusted his judgment and skill to make the parts work together not just as a functioning vehicle but as a rally-winning automobile. He assembled it at home in a garage mechanics call *bubu* ("muted" or "silenced") or *nyumbani* ("home"). The son of a British agricultural officer and a Chagga mother, Taylor initially learned about mechanics working with his brothers on sisal estates in the 1970s. "I admired that job. I really loved it."¹⁰ After working as a long-haul trucker, he opened three garages with his brothers in Dar es Salaam. In 2012 at the home garage where he

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1.4 An advertisement from Columbus Shock Absorbers and Levelers of Dayton, Ohio, that equates 3,100 miles of driving in East Africa to 60,000 miles of "normal driving" in the United States. (Author's collection.)

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made the rally vehicle, he told me, “This is about love. I feel happy. This is my hobby. I don’t just do it to get money; I like my job.”¹¹ Although Taylor possessed financial resources few Tanzanian mechanics had, his approach to cars nevertheless drew from a long history of African garage work that valued modification because it made cars work, was enjoyable, and offered mechanics an opportunity to change themselves and their livelihoods, too. Far from being passive observers of global technological trends, mechanics like Taylor have poured themselves into shaping automobiles and parts from several different nations—and even different time periods—into their own African vehicles.

African Motors charts the myriad ways users, makers, and maintainers like Taylor transformed motor vehicles from a tool of imperial rule into an African technology.¹² Covering 150 years from the 1860s to the 2010s, it follows the auto mechanics, drivers, passengers, and oil traders who built their lives and their communities around the automobile and its accompanying infrastructure, including roads, repair garages, urban transport systems, and oil economies—a suite of systems often called *automobility*. Automobility takes car scholarship beyond motor vehicles themselves to the myriad technological systems and sources of labor, knowledge, and energy that allow a driver to produce movement by stepping on a gas pedal. Mimi Sheller and John Urry, two of the field’s founders, refer to these inputs as a “machinic complex.” Automobility, they write, is “constituted through the car’s technical and social interlinkages with other industries, including car parts and accessories, gasoline refining and distribution, road-building and maintenance, hotels, roadside service areas and motels, car sales and repair workshops, suburban house building, vehicles as new retailing and leisure complexes, advertising and marketing, urban design and planning.”¹³ Largely a product of a rich field of scholarship on European and American mobilities since the late 1990s, some of the specifics of these “technical and social interlinkages” translate poorly to historical experience in East Africa.¹⁴ For this reason, I approach automobility not as a theory but as a historical method that encourages scholars to open the black box of car-based mobilities in order to explore the various ways African users put car, road, energy, and society together.¹⁵

In particular, scrutinizing the details of who and what made things move and how centers the multitude of users, spaces, knowledges, and things that made automobiles an integral part of everyday life in Tanzania by the end of the twentieth century. In the following pages, tracing the history of this vernacular machinic complex takes readers to some of the traditional sites

of automobile scholarship, such as garages, oil trading, and urban transport. But it rests on the nineteenth-century caravan paths and vernacular labor institutions, such as *gereji bubu* (“muted garages”), through which motorized transport took root in the early to mid-1900s among laborers on both plantations and city streets. For instance, mechanics like Taylor often refer to bubu garages as a *kiwandani*. Generally translated as “factory” in recent decades, the term emerged between the fourteenth and fifteenth centuries to describe a place of social exchange and/or work just outside Swahili homes.¹⁶ That precar vernacular institutions and spaces shaped automobiles does not simply confound the dichotomy, and supposed incompatibility, between East Africans’ longer technological histories, on the one hand, and automobiles, on the other.¹⁷ It also gestures toward a broader historical point: because car and society can be put together differently across places and times, African history provides an opportunity to explore and reflect on alternatives to the better-known forms of automobility that took root during the twentieth century.¹⁸

Moreover, and this is the book’s main theme, such a vernacular complex, machinic or not, opens new avenues for writing African-centered histories of development. In addition to establishing the fact of African mechanical creativity—evident in Taylor’s car—automobility helpfully situates such creativities and competencies across different technologies and technological spaces, practices, scales, periods, and identities in Tanzania’s past. *African Motors* uses these multiscalar competencies to anchor a history of development in users’ and makers’ own experiences and ideas about not just automobile use, oil, or mass public transit but also expertise, gender, mobility, and well-being.¹⁹

The Kiswahili word for “development,” *maendeleo*, makes this link between cars and development more explicit.²⁰ *Maendeleo* comes from the verb “to go” (*kwenda*) and its cognate, “to continue” or “to progress” (*kuendelea*); the addition of *ma*, denoting the plural, gives the term a literal translation akin to “progresses,” “continuations,” or “improvements.” Moreover, the addition of the causative (*sha*) turns going (*kwenda*) into *kuendesha gari*, literally “going by car,” while *kuendeleza* is one of the Kiswahili verbs used to describe maintenance—literally, keep something going. Though originally referring to spatial movement, like its English equivalent, *maendeleo* denotes a metaphorical movement from one socioeconomic condition to another.²¹ In the 1940s, African intellectuals translated and popularized the term as “civilization” and connected it to “improvement,” progress, and, during the fight against colonialism, the opposite of disorder.²² By independence

in 1961, the term had become “the new watchword of public discourse,” and its usage more closely approximated midcentury concepts of development rooted in economic growth, rising production, and expanded social services.²³ During this period, politicians applied it to those who loved *maendeleo* (*mpenda maendeleo*)—and thus answered the state’s calls regarding production and social ordering—and those who opposed it (*wapinga maendeleo*). Heeding the state’s call helped “drive the nation” (*kuendesha taifa*)—literally causing the nation to go places it had not under colonial rule.²⁴ *Maendeleo ya haraka* (“fast development”) asserted a need for this to occur quickly, while the more steadying phrase *songa mbele* (“move forward”) encouraged steady forward movement.²⁵

Maendeleo not only found use among elites in public discourse but also worked, and was shaped, by everyday users.²⁶ Hawa Ramadhani, one of the few women drivers in the decades after independence, titled her unpublished memoir “The Life and Development of Hawa Ramadhani” (“*Maisha na maendeleo ya Hawa Ramadhani*”), while her male colleagues spoke in interviews of their careers as mechanisms to “drive” themselves (*kujiendeleza mwenyewe*) by offering mobile networks and resources they could depend on in good and bad times alike.²⁷ In such personal contexts, *maendeleo*’s meanings and actions overlapped with a more extensive language about well-being that included “searching for life” (*kutafuta maisha*) and blessing (*riziki*), the achievement of respect (*heshima*), adulthood (*mzima*), ability/heft/capacity/power (*uwezo*), or claims to be civilized (*mstaarabu*).²⁸ These terms also provided individuals and communities with a language of debate and critique in historical newspapers or interviews. The same drivers, passengers, and mechanics who used *maendeleo* and the associated verbs to discuss personal achievements also used the term to identify the specific institutions and actors who kept development from happening in desired forms or kept it for themselves in Tanzania’s history. *Maendeleo*’s lexicon thus points to a more exciting—and likely denser—history of development, as Laura Fair has shown, than top-down or rise-and-decline narratives of development allow.²⁹

Moreover, anchored in literal acts of spatial movement and their relationship to concepts of well-being and power, *maendeleo* and its root verbs gesture beyond a search for local equivalents to development as a transnational concept rooted in the twentieth-century West—or as process that arrived with European rule—and toward a host of vernacular practices, technologies, and ideas about movement, its meanings, and its longer histories.³⁰ It thus provides ways to explore development as a historical

process Africans made, unmade, remade, and even maintained in specific technological ways.³¹ In his seminal *Encountering Development: The Making and Unmaking of the Third World*, Arturo Escobar showed that representations of non-Western societies as simple, weak, and backward fueled the “making” of development “as a discourse” rooted in Western/Northern ways of knowing and doing. The “unmaking” came later, he asserts, as the promises of development failed to arrive or to last. With *kwenda* and its built worlds, *African Motors* takes inspiration from, and retools, Escobar’s language for “making” and “unmaking” development. Its premise is quite simple: built worlds of mobility reveal how African users made development in their own ways, how these ways had to be maintained or transformed under new circumstances, and, finally, how unmaking in the form of failure or breakdown could lead to new things. And thus Taylor’s car offers a material metaphor for a history of development in which things and ideas can be taken apart and put back together differently.

This nexus of making, unmaking, and repairing reflects a broader process contained in the book’s title, *African Motors*. As already noted, the invention of the continent in the late 1800s as an undesirable place in need of European guidance rested on assumptions about its technological lack. “Africa” excels at craft and curios, things and skills found in much earlier episodes of European history, colonial officials charged, but needed centuries to approach anything close to a vernacular motoring society. Similarly, as both the engine that moves cars forward and an industrial sector, “motors” historically signal a society’s technoeconomic worth, potential, and maturity. Places that produce their own automobiles have useful knowledge, institutions, and skills. They have obvious technological histories and large economies that count in world histories of development. Conversely, places that did not invent motors or motoring economies, such as Tanzania, are defined by lack and by their need to follow the steps toward technological maturity established by a motoring core. Following these steps, moreover, does not guarantee arrival at a technological place of grace.³² As Johannes Fabian observes, placing others behind in linear temporalities of progress often implies that catching up is not possible because something about that society keeps change from either occurring or occurring correctly. The reasons a society originally fell behind, whatever they were, meant it would likely always be behind.³³

African Motors charts alternative understandings of both of the words in its title, and it explores the long, often intimate relationship between them. Africa and African, though rooted in an “invention” of the continent

as dark, primitive, and backward, were also repurposed and redefined by historical actors who used and repaired automobiles and who saw nothing incommensurate about their racial and cultural identities and automobility. As the opening two chapters illustrate, drivers, travelers, and mechanics rejected the racial presuppositions of European rule, including the idea that Africans could not or would not shape built worlds of movement or the automobile itself. Indeed, drivers and mechanics alike asserted that the combination of an African user and an automobile enhanced both person and vehicle. More practically, because automobile use was not dominated by any of Tanzania's 120 ethnic identities—and because independent citizens remade this term—African (*mwafrika/waafrika*) provides a broad category used by historical actors to establish the presence of machinic agency and identities throughout society during three periods: late pre-colonial, colonial, and independent.³⁴ Similarly, my use of *motors* departs from studies that limit technological worth to invention and to mass industrial production in official (*rasmi*) spheres and to knowledge that comes from these historical epochs.³⁵ Instead, I use the term to argue that the unofficial and uncertified, as well as acts of maintenance and repair, provide sites, institutions, bodies, and ideas for locating systems and cultures of mechanical expertise in Tanzania's past, such as Taylor's home garage.

MATERIAL MAENDELEO AND EFFECTIVE GENDER: CREATIVITY, SILENT AGENTS, AND THE POLITICS OF ABSENCE

Had we watched Taylor turn Saturnus, Nissan, and Ford into a rally-winning vehicle, we likely would have heard elements of a Kiswahili technological lexicon that largely predated the car's invention. Although, as chapter 2 details, mechanics never thought it practical to translate the automobile and its parts into Kiswahili—as some technical schools thought prudent—a dynamic vernacular about actions, thoughts, and things not only drove garage work but also applied to other topics explored in this book. This lexicon informs three main themes:

- 1 Creativity, innovation, and making: *ubunifu/kubuni, kutengeneza/matengenezo*
- 2 Vernacular technological institutions: *bubu, mtaani, chini ya mwembe/mti, pembeni*
- 3 Scarcity and absence: *uhaba, upungufu, hamna, adimu*

The first theme comes from a word for creativity and innovation, *ubunifu*, derived from the verb *kubuni*. Although it is most commonly translated as “creativity,” its usage defies distinctions in contemporary Western lexicons that situate invention, production, and building as agentic activities associated with white and masculine pursuits—and consequently as connected to disciplines of science, technology, and engineering—while marking repair/maintenance, craft and artisanship, and the appropriation of outside ideas as nonwhite and feminine.³⁶ Indeed, Kiswahili speakers use *kubuni* to talk about a range of activities, including invention, fixes large or small, and the act of building/constructing itself. For our purposes, the term captures everything from the complete remaking of an automobile in garages, where mechanics laid claim to “creative” (*mbunifu*) as an identity premised on their creativity (*ubunifu*), to acts of routine maintenance (*kudumisha*, *kutengeneza*, or *kuendeleza*) of vehicles or urban transport systems that nevertheless required extensive thought, labor, and resources and that, in some cases, led to new or parallel systems on citywide and national scales.³⁷ *Ubunifu* is paralleled by *kutengeneza*, a verb for “making” that similarly covers both production and repair—two acts captured by the word *matengenezo*. Historic elements of Kiswahili technical worlds, both terms anticipate recent calls in science and technology studies to take consideration of historical agency beyond invention and mass production to the intellectual and physical labor necessary to repair and maintain. Steven Jackson calls this process “broken world thinking,” and like the dual meaning of *matengenezo*, he emphasizes the productive nature of repair. Instead of a simple return to a previous state of function (the before of breakdown), repair often makes something work again by making it work differently. No matter how small, those changes constitute a creative, productive act.³⁸

In this book, repair’s productivity helps situate technological agency across time and place and for a range of things and activities. Though it may seem obvious, automobility’s “machinic complex” never presented itself to African users as a finished project with a bounded and tested manual, so to speak, for prospective users to simply appropriate by following preset guidelines forged elsewhere. Instead, from garage to street to oil economy, users cited the changing circumstances for both creating and maintaining car-using societies across place and time since the early 1900s. For example, mechanics observed and responded to changes in car design (such as increased electric wiring or the inclusion of fuel pumps); after interviews, they gave me pieces of paper and sent phone text messages listing

models they had repaired to establish their ability to competently react to the challenges of repair as new models arrived and/or as parts became scarce. Both issues—changing models and dynamic parts worlds—meant maintenance might always (and repeatedly) require mechanics to produce cutting-edge knowledge to get pistons pumping and wheels moving.³⁹

The same breakdown-creativity process also applied to a much different technological world: oil economies. Not only did quadrupled fuel prices in 1973 press an already capital-stretched nation to explore unconventional means to simply maintain the previous year's oil supplies or to attempt to replace oil's role in their economy with another energy source. It also placed Tanzania's national oil company in an undesirable position in global energy economies as bureaucrats tried to obtain petroleum without sustained—that is, economically maintained—financial resources. Chapters on driving, urban transport, and road making lead to a similar conclusion: invention and manufacture did not close the design process; on the contrary, maintenance and repair proved the primary task through which a variety of African users, fixers, and maintainers forged vernacular cultures of automobile use, amplifying and constantly repeating a process Madeleine Akrich calls the “de-description of technological objects.”⁴⁰ Akrich offers *de-description* as an alternative to *inscription*: the sociotechnical composition of things created through invention, design, and manufacture. Inscription anticipates particular types of users and thus locates technological power at sites of invention. She shows that technology transfer requires de-description by users capable of translating something designed far away (where the script is born) into existing sociotechnical matrices.

In this book, such de-scripting occurred most often through routinized acts of *matengenezo*. Even more, this maintenance/repair sometimes removed the social and technological scripting about how cars and their parts should be combined, oil obtained and moved and used in economies, or human-machine networks of movement created across space. By this, I mean that social and technological elements of inscription from sites of car production in Europe and the United States, and later in Japan, Korea, and India, failed to cohere into something that traveled intact to East Africa and presented itself to prospective users as a script. On the contrary, breakdown and remaking occupy a central part of this narrative because African communities so commonly witnessed automobile dysfunction during the car's early history in colonial Tanganyika. Consequently, the first generations of men who became mechanics and drivers did not read automobiles as a measure of European superiority that needed to be translated

from colonial culture into African life. Rather, seeing fragile technologies regularly rendered helpless (as a large colonial photo archive attests), mechanics took their place at the proverbial design table to make and remake technologies that clearly needed assistance. Noting that this nexus of unmaking and making drove his passion for mechanical work, Taylor later adopted this open approach to vehicle design to make his rally car in the era of independence.⁴¹

The details of *matengenezo* make it possible to write an African-centered history of automobiles that matters on its own terms—thus sidelining the implications of northern invention narratives. The latter privilege northern places, institutions, inventors, and ways of knowing. Traditionally, such narratives approach a Southern society which uses something from the North as copiers, appropriators, and followers and thus as places defined, at best, by their ability to receive ideas and things forged elsewhere and *after* inscription—after Northern ingenuity sets historical processes in motion.⁴² Such narratives gain power by overlooking the technical details of the mechanical work that produced cars like Taylor's. Though no doubt invented and originally manufactured in other places, most of the cars mechanics saw in the 1910s and 1920s had been remade so many times that the original script had been lost. In broader historical terms, then, African mechanics made, designed, and tested vehicles coterminous with, not after, users around the world who contributed to car culture by (re)making automobiles in shops, on farms, in junkyards, along streets, and on assembly lines, as a rich historiography demonstrates.⁴³ This should overturn narratives in which Africa is merely a backdrop to design, as chapter 2 explores, and in which Africans merely watch, instead of shape, world technological histories—as earlier photos suggest.⁴⁴

African automobile design acts as the heart of this book's argument about creativity and agency, but automobility, by definition, asks us to take analysis beyond the car itself and therefore leads to one of this book's main contributions: composed of different technological registers, automobility's machinic complex provides a multiscalar history of African creativity.⁴⁵ In addition to mechanics like Taylor who made a variety of African vehicles, urban bus passengers in Dar es Salaam initiated debates about making mobile systems in their socialist city work better. They then set about building a network of vehicles to make it happen. Long-haul truck drivers did the same in the 1970s and 1980s. When state distribution (*usambazaji*) networks slowed to halt, they used their regional and national mobility to create networks of distribution that brought important

goods to Tanzanian homes in a period of scarcity. Similarly, oil traders at the Tanzania Petroleum Development Corporation (TPDC) found ways to keep hardship from becoming worse in the wake of price hikes in 1973 that left Tanzania, as an oil importer, with few options for creating self-reliance during the second decade of independence. In other words, as it pertains to car history, creativity emerged among individuals as well as collectives of different sizes; it can be found in rural and urban spaces as well as among those who inhabited both, such as drivers; and it makes up histories of good and bad times alike.⁴⁶

Instead of homogenizing creativity, locating ubunifu in multiple technological registers helps account for its diversity and its uneven efficacies. Because fixing a car is different from fixing an urban transport system or an oil economy, the improvisation that made and repaired African cars in city garages did not produce similar national-scale results for the TPDC.⁴⁷ Sometimes creative work failed owing to wrong choices. At other times it came up against structural obstacles that made success unlikely or significantly altered previous technological horizons.⁴⁸ But such failures do not void the thoughtfulness or complexity of innovative work. Indeed, in some cases, failed creativities provide opportunities to scrutinize automobility's affordances as a social and technological system that became synonymous with development and well-being in much of the world. Despite myriad forms of innovation at the TPDC, the OPEC (Organization of the Petroleum-Exporting Countries) crisis made the fulfillment of the technopolitical imaginations of the 1960s much less likely in Tanzania because so many basic tasks, including those linked to rural modernization, required petroleum and a machinic complex of roads, pipelines, and railways to move it. Here the corporation's struggle to innovate out of an oil crisis it did not, and likely could not, control exposes the sociotechnical breakdowns that accompanied one manifestation of automobility-as-development (and a fairly minimalist one, at that). Such limits to ubunifu and matengenezo certainly suggest a need to take seriously the constraints for sustaining technological nation building in the second decade of independence. They also bring variation to actor experiences of economic decline and the possibilities that came out of them; technologically speaking, decline was rarely a linear process.⁴⁹

Creativity acts as a bridge to our second theme: the centrality, depth, and complexity of the so-called informal. *Informality* entered scholars' lexicon in the late 1970s when researchers recognized that official reports and statistics failed to capture the breadth of economic and political action.

Studies of economic informalities expanded the types of actions, actors, and spaces scholars and policy makers considered in their evaluations. But in many studies, informality acted as a form of making do. It signaled a constrained agency circumscribed by precarity that, in a best-case scenario, needed to give way to something better because it was an undesirable telos.⁵⁰ Though much fewer in number than studies of economic action, studies of informalized technology took a similar approach, with researchers writing about it as “localized learning.” Economist Joseph Stiglitz has argued that such localization mitigated against the knowledge “spillovers” that many economists associate with specialization in official economic and educational institutions.⁵¹ He had no problem identifying pockets of creativity in postcolonial economies. But he also argued that creativity’s existence outside official channels such as schools and institutes made it incapable of driving economic and technical change on national scales. It therefore did not constitute a vernacular basis for building meaningful and large-scale sociotechnical worlds that could have political and economic impact.⁵² Clapperton Mavhunga observes that this two-step process of identifying skill and then denigrating it began in the colonial period when officials marked all vernacular knowledges as the equivalent of informal, simply because they were not European.⁵³

In this study, the main problem with the formal/informal divide is not definitions of informality per se but the determination of when and how things count as *formal* in histories of development—and therefore as useful, powerful, effective, and desirable and as an end point (telos) of change.⁵⁴ Historians of science and technology know this issue well. The core of both historiographies uncovers the emergence of terms such as *science*, *technology*, and *engineering* to mark a broad set of ideas and practices as exclusive domains of upwardly mobile white men between the eighteenth and twentieth centuries. Sharing common sets of ideas and practices with the mechanical arts and *techne*, disciplines associated with engineering, technology, and science nevertheless claimed monopolies on “useful knowledge” and the institutions and practices that generated this status.⁵⁵ Development ideologies have performed similar work by invoking mythic histories of science and technology from Europe and the United States as the foundation of universal ideologies of economic and social well-being. The best-known expression of this view of “knowledge as power,” as it is often called, is probably Harry Truman’s 1949 Point Four Program speech. Truman announced that science and technology opened development to all peoples regardless of nationality or race. As a discourse of progress

making universal claims, however, it rested on incredibly narrow definitions of the types of knowledge, bodies, and things that counted as powerful, a phenomenon that Bruno Latour calls “particular universalism” and that Tania Li notes accounts for a sliver of the practices and things associated with development.⁵⁶

In this context, *African Motors* demonstrates that a variety of vernacular institutions created deep bodies of car-based knowledge and action. These places, things, and knowledge worlds go by several terms in Kiswahili. At the most general level, actors call these spaces “muted” or “silent” (*bubu*—the term I use most often for clarity), “not official” (*siyo rasmi*), “place of work”/“factory” (*kiwandani*), and “street” (*mtaani*). Technologists can also describe more particular places—“under the mango tree” (*chini ya mwembe*), “in/on the corner” (*pembeni*), and “street” (a specific *mtaani*)—as well as actions: “secretively” (*kisirisiri*) and “cleverly” (*kiujanjaujanja*).⁵⁷ Terms such as *siyo rasmi* and even *bubu* sometimes mark bodies of knowledge as distinct from an official sphere, no doubt. But that distinction carries a much different meaning from the many academic and professional uses of *informality*.⁵⁸ As general categories, “silent,” “not official,” and “street” signaled that a garage, car, or action was likely not registered and perhaps illegal; it was there, a fixture even, and yet not advertising itself in the same way as a government workshop or technical institute. Yet there was nothing pejorative about this and, at times, nothing consequential. Indeed, historical actors often saw colonial and national institutions, the normative formal, as the weak, the shallow, and the uncertain, while describing “under the mango tree” and “street,” more specific categories of *bubu*, as the deep and complex, the exciting and cutting-edge—in other words, as a space of knowledge generation and spillover.⁵⁹

They also saw these spaces as a durable part of everyday life and even as an end point of a process of sociotechnical change. Recall Taylor’s winning rally car. He, like many of the mechanics in the following pages, approached knowledge and things formed on streets, under trees, and at homes as both the beginning and the end of historical processes of sociotechnical change. This should not surprise us because, historically speaking, mango trees, street sides and corners, and *kiwandani* have proven themselves as places of thought, innovation, and work for centuries. They echo Jane Guyer’s astute observations about monetary institutions in Nigeria, where, given the historical instability of banks, the question is not why large numbers of people invest in unofficial institutions but rather why anyone would trust their money to formalized institutions given the region’s entropic economic

histories: “Trusting the rational-legal framing of economic life can be dangerously irrational for individual actors. In some sense, it is the formalities that seem to work at face value that become the most challenging of all to understand.”⁶⁰ James Scott makes a similar point in the conclusion of *Seeing like a State*.⁶¹ Using the term *metis*, he gestures toward deep and flexible bodies of expertise and world-making rooted in citizens’ everyday lives instead of in the state and market institutions that take center stage in many stories of twentieth-century development.⁶² The connection between *metis* and bubu histories in this book is not just that expertises come from unexpected places, bodies, and institutions, but also that such knowledges spread across place and endure over time in ways that challenge the “discursive creation of a ‘top’ consisting of planners, governmental agencies, and international agencies that is then set against a ‘bottom’ of ordinary people,” as Ato Quayson puts it.⁶³

Beyond explaining mechanics’ function, expanding the institutions and places of expertise carries important implications for gendered constructions of technological personhood. Reworking Jamie Palmer’s term *ineffective masculinities*, *African Motors* uses these vernacular categories of car work to chart alternative regimes of expertise and personhood. In a study of American perceptions of Cuban political leaders, Palmer observes that media outlets in the United States presented the latter as “deficient yet not feminine” in ways that foreclosed the possibility of them meeting “the expected, if ideal, standard of hegemonic masculinity.” She adds that US news outlets described Cuba’s political elite as “simultaneously (a) *hypermasculine*, that is, motivated by anger, violence or idealism and (b) *hypomasculine* or displaying inadequacies in either their professional efforts and/or their physical characteristics.”⁶⁴ A similar process has played out in Tanzania’s twentieth century. Both colonial and national authorities saw some promise in bubu and mtaani technological identities but still described the mechanics as hypomasculine because they had not learned or practiced in the formal spaces/institutions that marked sociotechnical change as legitimate or ideal. Simultaneously, at least three types of African technologists—mechanics, drivers, and oil traders—also appear as destructive and violent hypermasculine figures whose gendered technological identities have harmed their communities.⁶⁵

Personifying technological misuse, the latter two social groups, drivers and oil traders, play central roles in narratives of modernization’s failure during the 1970s.⁶⁶ As epidemiologists blamed the former for spreading HIV-1 through a motorized culture of sexual privilege, creating the nation’s

worst public health crisis of the independent period, oil-trading bureaucrats occupied a fraught location in analyses of economic downturn. Citizens and scholars alike suspected that the demise of state institutions resulted from ministers and bureaucrats using national resources to enhance their own status as powerful men by purchasing luxury items such as cars. Instead of investing in their own communities, they pursued a masculine status they did not deserve and could not achieve without using corrupt means that harmed others. In Palmer's language, this ineffective Tanzanian masculinity desired too much technological power (hyper-masculinity) while not offering the national community enough in return (hypomasculinity). By answering such constructions of "ineffective men" with their opposite, effective men, I am not arguing that all African technologists who worked in ministries or with vehicles in bubu spaces were excellent at their jobs.⁶⁷

Rather, effective technological masculinity means that for men to make claims on social mobility over their lifetimes, their knowledge, tools, spaces, bodies, and minds needed to work/function in a manner that allowed them to pursue gendered adulthood by gaining trust and followers.⁶⁸ The details of credibility vary in each occupation, of course. But throughout the century this book explores in the greatest detail, the 1900s, the aim of men remained consistent: to use access to motor vehicles and their accompanying infrastructure to attain social mobility or security. This is where effect and affect intersect: creating identities as mature men who could care for themselves and others rested on an ability to care for technological things through repair and maintenance.⁶⁹ African men not only accessed this dual form of care most easily in bubu and mtaani spaces but also considered it the best for creating gendered respectability at both home and work—in some cases, a redundant phrasing. As in Jennifer Hart's study of Ghanaian drivers, cars gave men opportunities to pursue a variety of ideas of manhood across ethnic, religious, and political lines, what she calls *plural masculinities*.⁷⁰ The technological basis of these plural and dynamic masculinities is what I call *effective manhood*. In most cases, the men in this book defined manhood through a "normative framework" of masculinity rooted in an ability to build houses and families, collect things and knowledge, and care for dependents, who then cared for them as they aged.⁷¹ Owing to the density of automobiles in towns, this process often involved rural-to-urban migration. Interlocutors described it through two Kiswahili phrases: "to build life" (*kujenga maisha*) and "to

search for blessing” (*kutafuta riziki*). Regardless of the phrase used, working gender required things that work.

This book’s main contribution to gender scholarship comes in the *how*, *where*, and *what* of this work as it pertained to technological personhood. I have already referenced parts of the how and where through the significance of vernacular institutions located on street sides and at homes. Needless to say, men building lives did not stumble over the absence of certificates, degrees, or books in their pursuit of gendered adulthood. A big part of that comes from the what: the dense thinginess of their claims to both expertise and gendered personhood.⁷² Men inhabited and built their lives around particular hard materialities of car use that provided the literal substance of their claims to expertise and social mobility. In part and scrap worlds like Taylor’s garage, mechanics staked their reputations on the ability to turn used or broken parts into something new and functioning—even if just until its next repair or maintenance checkup. Scrap piles and the things that could be made out of them, in this sense, provided the literal stuff of a mechanical masculinity that could always be made and maintained (in the social sense) as long as there were enough broken things that needed to be, and could be, transformed.

Similarly, drivers and passengers built “risk cultures” around details of the surface conditions of roads and their inhabitants, whether spirits, cattle, or humans.⁷³ They also relied on the hardware of cars themselves. Distrusting colonial mechanisms of evaluation, African drivers hitched their reputation to the condition of the automobiles they drove. They felt a functioning car validated the care and skill of its driver in ways that colonial departments with racialized pay scales could or would not. This process, which distributed drivers’ personhood onto a technological thing, was by no means unique. Citizens and leaders during the independent era linked new forms of community and personhood to the construction and maintenance of new built worlds. This included buses, regional trucking networks, and that building block of decolonization that made all of these things go: oil. In each case, different users and builders attached gendered ideals of themselves and others to specific parts of the material worlds they inhabited.⁷⁴

In turn, these hard material things provide a technological lexicon of gendered work and creativity. *Modification*, *overhaul*, *short-* and *long-term* fixes, *experimentation*, and *maintenance* were uttered in oral histories and written in documents to reference some form of technological work. But

they provide critical insights into gender history as well. Whether one was maintaining a car, an oil economy, or one's body while moving at rapid speed on roads, maintenance required forms of care, caution, and competence not associated with working-class Tanzanian masculinities at any point in the twentieth century.⁷⁵ Nevertheless, keeping things in working order—or getting them there—and maintaining or achieving a gendered respectability went hand in hand. The same goes for overhaul, modification, and experimentation. Both occur when something—and, generally, many things—break. Yet dysfunction, instead of a disappointing end point of failed modernizations, provided opportunities for users to redesign and remake not only built worlds but also themselves. As already noted, Jackson calls this productive and generative approach to maintenance or repair “broken world thinking.”⁷⁶ In the following pages, it applies to gender as well.

Precisely because things broke in good and bad times alike, both men and women who labored to reconstitute technologies and networks also reshaped, and sometimes completely overhauled, what counted as respectable gendered personhood. As they built and repaired cars and systems, some made claims to expert knowledge that directly challenged dominant ideas about who could create or acquire useful automotive knowledge. Others used motorized mobilities to maintain their and their family's social standing in difficult economic times as poverty rates worsened. Taylor, who loved his job, shows that we should not reduce this process to socioeconomic need. Yet the following chapters demonstrate that technological repair, maintenance, and overhaul facilitated gendered mobility and security for those who described themselves as individuals lacking economic, social, or educational resources. There were, of course, limits to this gendered work. Because both colonial and national institutions considered car work men's labor, maintenance, repair, and care have largely been structured—and maintained—as masculine labor. This book highlights the way women challenged ideologies of immobility by taking to the roads as walkers, passengers, and drivers. But it also demonstrates that a masculine culture of repair and use has persisted—a form of social maintenance that excludes, structurally distancing much of Tanzania's population from reworking social and technological function since at least the early 1900s.⁷⁷

For the third theme, related to the combination of austerity and material absence, *African Motors* shifts gears from locating agency to exploring the various forms of infrastructural constraint that accompanied automobility. Motor vehicles, though most often considered a tool of colonial

industrial power, gained administrative popularity in the 1920s because they produced dry-weather mechanized mobilities on roads cleared by conscripted laborers whose work significantly reduced the government's infrastructural costs. Unlike railways, sometimes called "the permanent way," automobiles became a tool of empire because they operated on "temporary" infrastructure that Tanganyika's British government chose repeatedly not to make into all-weather roads (as chapter 1 shows in detail).⁷⁸ Important in their own right, decisions to not build also set the context for debates about the possibilities and limits of technological nation building after colonial rule. In contrast to the technological optimism and spectacle found in several varieties of Cold War modernization, Tanzania's nationalist leader, Julius Nyerere, approached infrastructural projects ambivalently. He understood that creating new economies and social services that were postcolonial in a literal sense—in that roads, bus systems, and oil economies produced a type of citizenship that did not exist during the colonial period—required the construction of technological systems and a commitment to their maintenance, both costly projects.⁷⁹

Indeed, in 1962, just a year after independence, Nyerere tried to persuade Tanzanian citizens that they had not fully grasped the true nature of nation building. Arguing against an idea he cast as popular opinion, he said nation building was not a literal project in the construction of new built worlds. "To build a nation," Nyerere declared, "is not just a matter of producing tarmac roads. . . . To build a nation in the true sense, a task into which we must throw ourselves wholeheartedly, is to build the character of its people—of ourselves; to build an attitude of mind to enable us to live together with our fellow citizens of Tanganyika, and of the whole world, in mutual friendship and co-operation."⁸⁰ The absence of things, though noteworthy after his pivot toward character, did not stem from an antitechnological approach to development. Nyerere liked machines (and tarmac roads), linked oil refineries to self-reliance, and called for creativity with each.⁸¹ I argue, instead, that Nyerere's unease about nation building—as-hardware cannot be fully understood without exploring what Noemi Tousignant calls the "problem of capacity."⁸² Delivering new built worlds on a national scale after decades of colonial infrastructural austerity would have linked the nationalist project to an extremely costly, difficult, and likely long—at least longer than most expected—technological project.

I highlight these absences across temporal divides not only because they are found throughout colonial and independent archives but also because they shaped the possibilities and constraints of nation building

in underappreciated ways.⁸³ For Nyerere and other political leaders, infrastructural absence in earlier periods meant that the decisions they made in the first decades of independence were connected to and hemmed in by administrative cultures of austerity from colonial rule even as they, African nationalists, hoped to make up for what was not previously constructed as part of a “civilizing mission.” This positionality—thinking with and through absence—inverts foundational scholarship on the ways technology shapes society. In the history of technology, large technological systems such as electricity or automobile infrastructure gain social and political power—sometimes called *momentum*—through the huge number of material, economic, political, and social investments that allow them to work and become part of everyday life—in other words, through their presence.⁸⁴ Thomas Hughes describes these systems as “both socially constructed and society shaping.” The latter part refers to the momentum that dense networks acquire after long periods of construction, maintenance, and use.⁸⁵

African Motors explores a process in which decades of not building permanent infrastructure also gained momentum by shaping political imaginations and policies decades after decisions not to build had become a bureaucratic norm.⁸⁶ *Uhaba* (“scarcity”), *upungufu* (“shortage”), and *hamna* (“none”), three commonplace words for “absence,” play a role in each chapter, sometimes even providing the foundation of creativity. But I explore the momentum of absence most thoroughly through the impact of the 1973 petroleum crisis on national oil economies and pursuits of technological self-reliance. I take seriously Nyerere’s belief that an incredibly meager infrastructural “colonial inheritance” combined with the quadrupling of petroleum prices to narrow Tanzania’s pursuit of technological sovereignty into a twelve-year period between 1961 and 1973. To be clear, I am not slamming the door on the possibilities of a postcolonial infrastructural sovereignty or linking the challenges of independence exclusively to historical processes that began in previous eras as underdevelopment theory once did. Historians have rightly pointed out that dependency theory robbed African actors of agency during the independent period by locating historical possibility in processes originating during the slave trade and the colonial period.⁸⁷

Yet absences, as well as concerns about overcoming them, shaped actors’ positionalities in important ways.⁸⁸ In addition to influencing Nyerere’s definitions of “self-reliance” and African socialism, bridging technological gaps created during colonialism informed one of the most popular phrases of the early independent period. “We must run while

others walk,” or *mbioni* in Kiswahili—the locative of the noun for being in a race—emerged in the early 1960s as a rallying cry to literally build the nation in ways British and German colonial governments had not over eight decades. This infrastructural hurry came not only from a desire to deliver to citizens the promises of nationalist campaigns but also from fears that technological capacity and protection of sovereignty went hand in hand in a political context in which Rhodesia announced its Unilateral Declaration of Independence in 1965 and in which popular leaders such as Patrice Lumumba had been assassinated by world powers a few years earlier.⁸⁹ Moreover, and more to Nyerere’s original point, tracing out absences and the processes through which leaders and technologists attempted to overcome them situates the imperatives that accompanied technological nation building as a project tied to oil and costly infrastructure—in other words, a form of automobility. Decades before John Urry wrote that “the car is simultaneously immensely flexible *and* wholly coercive,” Nyerere had identified the hard limits of automobility as development.⁹⁰ He did so not just with cars but also with petroleum’s place in “modern agriculture” for a predominantly rural society—an important and often overlooked component of automobility’s machinic complex. I thus hope to provide a hard material (and technological) dimension to one of the departure points of Tanzanian history since the 1960s: that colonial rule’s creation of dependent economies in East Africa shaped the form, debates, and tools of maintaining sovereignty in subsequent decades.⁹¹

I call the sum of these three themes material *maendeleo*, to emphasize the thinginess of *maendeleo*’s root and connected verbs—*kwenda* and *kuendelea*. Building on rich scholarship in African history and studies, I explore the social, cultural, and political dimensions of *maendeleo* with a specific focus on the way that everyday movements took on larger political meanings—or, as Anna Tsing observes, the possibility of spatial movement becoming political movement(s): “movement as mobility and mobilization.”⁹² But let me make a seemingly strange case for a more detailed technological approach to development histories. I say “strange” because an avalanche of scholarship on development theory and discourse—including the brilliant “postdevelopment” critiques of the topic that inspire this work—has used tech-based terms such as *technology*, *technocrats*, or *technicist* (hereafter aggregated as *tech-*) to make points about modernization and development. Much the way Antina von Schnitzler points out that apartheid was literally technopolitical—in that it was imagined and enacted through infrastructure—the pairing of *tech-* and

development occurs so often as to be redundant and perhaps even alarming.⁹³ I appreciate the reasons this occurs: many writers have associated technology as a set of both tools and ideas—and successful use of it: the heart of this narrative—with the idea that midcentury forms of modernization from the Global North represented the highest form of social and economic life.

Yet little work on development has paid close attention to how tools, systems, and their users work, especially from African perspectives.⁹⁴ This “black boxing,” an approach that minimizes both the social and material complexities of technological systems—which become “opaque to scrutiny from the political system”—not only stands in contrast to the centrality of technopolitics in development as both theory and practice but also forecloses alternative configurations of tools, knowledge, power, and well-being.⁹⁵ But if we take Mavhunga’s approach to technology as ways of knowing, doing, and moving—a definition not tied to developmental histories linking powerful knowledge to specific places, times, and institutions—a different technological history of *maendeleo* emerges.⁹⁶ Instead of a *tech-* approach that leads to developmentalism or ignores situated actor perspectives, material *maendeleo* illustrates that Africans actively shaped the things and ideas of twentieth-century development, whether a car, an oil system, or a definition of an expert (*fundi stadi/sana or mtaalum*). In turn, their continual ability to put spaces, ideas, and things together differently alerts historians to alternative ideas about well-being. For instance, the opening chapters show not only that the material foundation of a vernacular machinic complex lay in walking paths but also that the incorporation of automobiles into life did not lead to mass car consumerism or a thorough motorization of African life.⁹⁷ Instead of incorporation—can Africans appropriate development and its tools?—this leads to a focus on how development has been done differently.⁹⁸

There is not a single materiality or technology in the following chapters. We look at paths, dirt and mud, engines and bodies, piles of used parts, calloused hands that certified mechanical knowledge, systems of urban transport, oil and pipelines, and motoring landscapes composed of spirits and incredibly specific road conditions. In each instance, I do not use materiality as something distinct from the social, political, economic, and cultural but rather as a *method* for exploring processes that are simultaneously human centered—and thus dense with evidence for more traditional social and cultural histories of Africa⁹⁹—and not those in which the details of technological systems and their hardware take center stage.¹⁰⁰

The latter, what Timothy LeCain calls the “matter of history,” should not be understood as a division between human and technological worlds.¹⁰¹ Rather, Hughes’s oft-cited phrase about large technological systems—that they are “socially constructed and society shaping”—applies to the range of materialities explored here. A key contribution of this book is to show that both social and technological shaping applied differently for garage work and urban transport—where things could be reworked into viable, even desirable, worlds of sociotechnical interaction—than in oil trading, whose hard limits I referenced earlier. I am intrigued by how some built worlds offered possibilities for decentralized groups of users to repair and remake systems—sometimes at quite large scales—whereas the dysfunction of others (again, oil carries most of this narrative) led politicians to think less about technological reconfiguration than the intransigence of historic global economic inequalities.¹⁰²

Focusing on things, in this sense, goes beyond recognizing the limits of human agency or their distribution in technological systems (actants), as much scholarship in science and technology studies has shown. Methodologically, it helps unearth overlooked and othered built worlds and spaces of innovation and action, thus rooting histories of technology and development in local processes and epistemologies, what Donna Haraway calls “situated knowledges.”¹⁰³ That, in turn, shifts the focus from the centralized and containerized top-down approaches to cognition that have informed much of the history of development as well as scholarship on infrastructure, as Chandra Mukerji observes. She makes the case for a “distributed cognition” and “distributed reasoning” in the construction of large technological projects. As I show in the following chapters, this distribution and its materiality not only matter to the details of mechanical function but also provide the foundation for writing social and cultural histories of technology and development through the “unaccountable intelligence,” as Mukerji calls it, that was nevertheless critical to basic function.¹⁰⁴

BUBU HISTORIES AND ARCHIVES: METHODS AND CHAPTER OUTLINE

Oral history and archival sources inform all six chapters of *African Motors*. In Tanzania I conducted over two hundred oral interviews in Kiswahili with men and women drivers, passengers, migrants, roadbuilders, and mechanics. I did not use a single approach to oral history in

the following chapters because words related differently to interlocutors' perceptions of credibility depending on the technological action involved. Mechanics, though happy to talk at length about their life histories and creativity, generally mistrust words divorced from action or materiality. In the garage, "driver of words," an undesirable title, refers to a person who makes baseless claims about innovation without showing through action—or with material evidence—that they can do so.¹⁰⁵ Drivers and passengers who had mobilized contraband economies (*magendo*) in the 1970s, on the contrary, extended the verbal strategies they had used to pass through police checkpoints into the interview by openly lying about their involvement in extralegal activities in initial interviews before opening up about their involvement in subsequent meetings.¹⁰⁶ Given this variety, I include a methodological discussion in each chapter. When possible, I paired oral histories with the personal collections Karin Barber terms "tin trunk archives" and with historical demonstrations of past repair work that I video-recorded and pictured.¹⁰⁷ I also joined a bubu garage in Dar es Salaam as an apprentice in order to better understand the social and technological worlds of car repair.¹⁰⁸

This combination of oral history, personal archives, and mechanical fieldwork moves the history of development beyond a focus on theory, discourse, and elites to the perspective of multiple types of African automobile users.¹⁰⁹ It also performs additional epistemological work regarding the politics of archives and technological agency. Neither colonial nor national archives provide much detail about car repair or driving because the colonial and national bureaucrats who created much of the documentary archive that historians read were often highly constrained technological actors themselves. In most cases, they could not repair their own vehicles and did not possess deep knowledge about regional trucking networks or urban infrastructure.¹¹⁰ Composed of both people and things, bubu spaces like Taylor's garage thus offer the densest historical archives about the social and material details of technological work. In addition to providing sites of oral history, they offered built worlds composed of vehicles, parts, and roads—much of them absent from documentary evidence—that brought the words of oral history to life. Critical for social and technological historians alike, in this book, bubu archives shift focus from "the development apparatus"—or the official spaces and actors of development found in written documents and archives—to "archives that Africans themselves have produced" and the "alternative epistemologies" they contain.¹¹¹

Bubu, I must stress, is neither completely hidden nor necessarily hard to find. In fact, its most common political use refers to widely agreed-upon social facts. *Miradi bubu*, what novelist Gabrielle Ruhumbika translates as “invisible projects” in his book of the same name, stood in for the transnational back channels that, many believed, allowed corrupt ministers and bureaucrats to gain personal wealth through public projects during the latter years of socialism, leading directly to its demise. For this reason, the term *miradi bubu* has become a staple in neoliberal accusations of corruption. In both cases, *bubu* refers to social truths that gain explanatory power precisely because something is not being said, shown, or advertised by those in positions of power—or, as Ruhumbika puts it, is being made invisible. In this sense, its usage by interlocutors in this book comes closer to “muted” than to “mute”; it comes from a choice to make things heard or not in specific political conditions or with specific political goals. In turn—and this is where we can pivot from invisible projects to bubu garages—bubu suggests that not all meaningful action speaks, speaks loudly, or even needs to speak to matter to those who already know. Bubu thus rarely turns up in the archive while also gesturing to deep bodies of knowledge, complex histories, and a multiplicity of places that do not advertise themselves yet provide plentiful historical material to reconstruct pasts.

I also draw on eleven different archives in the United Kingdom and Tanzania. In the United Kingdom, documents about road and vehicle experimentations in colonial Tanganyika provide critical insight into East Africa’s unsung role in metropolitan car and road design, while collections from regional engineers and the district officers responsible for touring and building roads allow us to dismiss outright colonial ideologies of African technological backwardness from German and British officials’ own experiences of vernacular infrastructural agency. In Tanzania I combined research at three branches of the Tanzania National Archives (Dar es Salaam, Dodoma, and Mwanza) and at Zanzibar’s National Archive with materials found at former socialist parastatals. Questions at Usafiri Dar es Salaam, a national bus company that played a significant role in urban socialist modernization, yielded unarchived operational documents on the floor in an unused office, while requests at the TPDC led to an incredibly organized collection of documents about post-OPEC-crisis oil trading. I believe I am the first to see or write a history of the TPDC with this archive. In both cases, documents at parastatals open the black box of state labor to help us better understand the work lives of the bureaucrats whose actions became a focal point in discussions of postcolonial failure after the 1970s.¹¹²

Six thematic chapters move chronologically from the 1860s to 2015. Chapter 1 introduces readers to the main components of this book's machinic complex: cars, roads and paths, and African walkers and drivers. In addition to showing that colonial automobility relied overwhelmingly on vernacular ideas and labor, it provides the basis for the book's argument about cars as a tool of technopolitical austerity. The chapter concludes in cities where African drivers forged their own institutions of training and validation on street corners and loading docks. Extending this urban African culture of vehicle use, the second chapter provides an eighty-year history of car repair in these same cities and townships. Though colonial and, later, national officials aimed to create male African car experts who trained in and abided by European industrial standards, government and private garages nevertheless provided both the most, and the most accessible, opportunities for young African men to remake themselves and cars and to forge alternatives cultures of expertise. In addition to providing details about the men and cars overhauled in garages during both the colonial and national periods, this chapter explores what I call an *infrastructure of expertise*: the specific material worlds, embodiments, and accompanying pedagogies through which mechanics created, recognized, and validated expert knowledge even as they built cars and lives as men. Both chapters unearth materialities and built worlds that confound the discourse of incommensurability between Africans and automobiles explored earlier in this introduction.

A history of urban mobility in Dar es Salaam during the socialist period, chapter 3 narrows the book's focus to technologies of nation building and citizenship after independence. It illustrates that details about automobiles, including their types and condition, provided city residents evidence to engage their state over the nature of postcolonial and socialist citizenship in state-controlled newspapers. As the marquee infrastructural project of socialist urban modernization, the city's bus system expanded to create new mobilities in what planners and residents hoped would be a newly decolonized and socialist city space. When it struggled to meet demand, urbanites not only wrote about their frustrations with lost time, immobility, and mashed bodies trying to get a seat but also built an alternative that, despite its illegality, helped them fulfill state demands by becoming more efficient workers and more humane socialists, they argued. I call this back-and-forth discursive and material process *technological citizenship* and use it to establish the relationship between infrastructural repair and political repair. Chapter 4 extends technological citizenship to the link

between refined petroleum and rural modernization. It moves the farthest away from the automobile to demonstrate that rural modernization did not offer a respite from automobility's infrastructure and from the need to refine and move large amounts of petroleum throughout the country. The chapter may seem out of place given not only its focus on oil and refining but also its jump from streets and garages to the world of bureaucrats.

Yet it provides a critical vantage point for assessing the intersection of infrastructure, energy, and pursuits of national-scale self-reliance from the 1960s through the mid-1980s. Arguments about economic contraction in the 1970s, including much of the "state failure" literature, rest on assumptions that a big, bloated state bureaucracy ruined postcolonial economies—and an otherwise clear path to economic sovereignty—by pursuing costly technological projects willy-nilly, enriching themselves instead of literally spreading the wealth to fellow citizens.¹¹³ Yet these assessments relied on abstract evaluations of technology that minimized or completely ignored oil's articulations with rural modernization as well as the impact of global oil markets on petroleum-importing agriculturally based economies like Tanzania. This chapter, which ends with the state voicing its concerns about getting oil and other basic commodities to communities around the nation, sets the stage for chapter 5. A social and cultural history of postcolonial driving from the 1960s through the 1980s, this chapter uses oral histories to illustrate that both men and women created mobile lives on regional roads over decades in order to produce domestic, settled lives at home for their families. Such *motorized domesticities*, as I call them, required not only intimate knowledge of regional transport landscapes but also what drivers and passengers called a "cowardly" approach to motor mobilities.

More than sketching out a culture of independent motor travel, this chapter explores the economic turbulence of the late 1970s from the street level. As Tanzania's socialist state struggled to circulate oil and goods after the late 1970s, networks of truckers and passengers filled in. The state lumped most of these actions into categories of economic sabotage. But those who distributed salt, food, soap, and clothes made the case for the importance of their movement not just to families but to a larger socialist family that was struggling and that, they argued, could be remade through new forms of distribution. The conclusion, "Motoring Out of Time," shows that an African motoring age blossomed just as automobility, and "southern" automobility in particular, morphed from a national achievement reflecting technological maturity into a global threat. Through stories

about terrorism, climate, and pollution, it weaves many of the accomplishments from the chapters into the international development discourses that pathologize the nation's motoring culture as an undesirable alternative to modernity. Building on the vernacular machinic complex sketched out here, I take on these disqualifications and argue that Tanzania's approach to *maendeleo* provides historical alternatives to the relationship between cars and societies.

This book covers about 150 years and much of what constitutes present-day Tanzania but does not have the space to cover many places, times, or themes equally or in as much depth as they deserve. I did not begin this journey aiming to take on this temporal or geographic scope but rather stumbled into such a framing by casting a wide net in the collection of archival and oral evidence. In doing so, I got happily stuck in places such as Morogoro and Tabora where I had not intended to spend much time but found deep interest among driver and mechanic communities in the project. The trade-off to this approach is incomplete regional representation. I have nevertheless tried to write a sort of interscalar history by moving between micro, mezzo, and macro scales to establish general patterns across space and time.

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Abbreviations

BN A	British National Archives
IBEAC	Imperial British East Africa Company
RHO	Rhodes House Archive, Oxford University
SMLA	Science Museum Library and Archives at the National Collections Centre, Wroughton
SOAS	School of Oriental and African Studies, London
TNA	Tanzania National Archives in Dar es Salaam
TNA Dodoma	Tanzania National Archives in Dodoma
TNA Mwanza	Tanzania National Archives in Mwanza
TNL	Tanzania's National Library, Dar es Salaam
TPDC	Tanzania Petroleum Development Corporation
TS	Tanganyika Secretariat
UDA	Usafiri Dar es Salaam
WBGA	World Bank Group Archives
ZNA	Zanzibar National Archive

Introduction: Africa, Motors, and a History of Development

1. G. Hecht, *Being Nuclear*, 16.
2. REAAA, "The New Southern Equatorial Route: Nairobi to Lake Nyasa" (Nairobi: East African Standard, 1924), SMLA. Michael Adas notes that nakedness, a common focus of the photographer's gaze in these sources, did not always lead to colonial othering, though most observers still considered that African technology "was at best primitive." Adas, *Machines as the Measure of Men*, 126.
3. "Motoring in East Africa," *New York Times*, March 15, 1927.
4. Adas, *Machines as the Measure of Men*, 153–55.

5. E. W. Hickes, "Power Alcohol," 162, October 12, 1923, CO 323/930, BNA.
6. Chapters 1 and 2 explore specific elements of this mythic antagonism as they relate to motor mobility and car design. Myriad primary-source examples include articles from *Jambo*, a periodical of British East African soldiers that included denigrations of African driving, and car periodicals such as the *Morris Owner* or the *Commercial Motor*.
7. "The Fuel Problem," *Daily Telegraph*, July 13, 1914, CO 323/695, BNA.
8. Hofmeier, *Transport and Economic Development*; and World Health Organization, *Global Status Report on Road Safety*.
9. Ford press release, 1977, author's collection. For more on this topic in Tanzania, see Grace, "Heroes of the Road."
10. Like the drivers who had cars in their blood in Jennifer Hart's *Ghana on the Go* (104).
11. Frank Taylor, interview, Dar es Salaam, August 27, 2012.
12. Igor Kopytoff first wrote about the car as a methodological object of inquiry for African studies in "The Cultural Biography of Things." Jan-Bart Gewald, Sabine Luning, and Klaas van Walraven's "Motor Vehicles and People in Africa" first placed automobiles in African historiography.
13. Sheller and Urry, "City and the Car," 738–39.
14. As Gijs Mom argues in *Atlantic Automobility*, this applies to historical approaches in many places. Jason Henderson shows the need for and stakes of "de-essentializing automobility" in "Secessionist Automobility" (esp. 295, 296). For excellent examples of how parts of this machinic complex have been taken apart in African studies, see Hart, *Ghana on the Go*; Green-Simms, *Postcolonial Automobility*; Scheele, *Smugglers and Saints*; and Mutongi, *Matatu*. More broadly, see Franz, *Tinkering*; McShane, *Down the Asphalt Path*; Gilroy, "Driving While Black"; and Henderson, "Secessionist Automobility," among many others.
15. Though I have taken much inspiration from scholarship on automobility, readers will notice I have nevertheless limited my use of the term *automobility*. Critical work on this topic has repeatedly shown the necessity of moving beyond the types of technological movement and subjectivities expressed by the term's invocation of "self" (auto) motion or mobility. This includes expectations of automobility as a technological phenomenon capable of producing autonomous, self-generating movement, on the one hand, and as a social and political phenomenon that links concepts of well-being (whether freedom, development, or modernity) to autonomous, individual mobilities, on the other. For example, Sheller and Urry's invocation of automobility's "machinic complex" brings attention to the manner in which the social categories of movement (such as *auto*'s centering of the "self," often read as "individual") are produced by far-flung systems of energy, technology, and capital—an assemblage that overwhelms most definitions of self; see Sheller and Urry, "The City and the Car"; and Featherstone, "Automobilities." Moreover, studies of race, gender, and mobility have demonstrated that the emergence of self-movement (spatially) as an indication of freedom (political autonomy) during the twentieth century

problematically centered white, male, and socially mobile forms of movement as a baseline. Such dominant forms of automobility, studies have shown, often emerged in tandem with marginalized communities' immobility—including the construction of built worlds, legal regimes, and state strength that greatly reduced access to automobility-as-autonomy (and thus, social power) (see Gilroy, "Driving While Black," and Packard, *Mobility Without Mayhem*).

This gets clunky in Kiswahili, too, where one invocation of self, *binafsi*, has an already established negative connotation of bureaucrats and politicians using vehicles only for themselves—only a sliver of the history that follows—and is often associated with more recent histories of privatization. *Kujiendesha*, literally "to drive oneself/selves" (whether mobility or socioeconomic pursuits) loses many of its meanings when channeled into such a specific sociotechnical system. At the same time, the term *automobility* risks locking analysis only into auto-, vehicle-, and transport-centered paradigms of mobility, as Mavhunga has argued and shown by moving beyond "banal" mobilities (*Transient Workspaces*, 26). In sum, following through on Lindsey Green-Simms's example of a "misplaced" automobility may also require distance from the term's apparent invocation of autonomous personhood and self-contained technological function (*Postcolonial Automobility*, 16). When I discuss mobilities that combine car, road, and energy, I stay as close as possible to vernacular terms or their English equivalencies while building on the lessons of scholarship on automobility. I do use the term *automobility* when highlighting clearer links between visions of development and systems of automobility.

16. See Kusimba, *Rise and Fall of Swahili States*, 149–50; and Wynne-Jones, "Public Life of the Swahili Stone House," 769. On the importance of stretched histories of technoscience, see Seth, "Colonial History and Postcolonial Science Studies," 75–76.

17. Schoenbrun, "Conjuring the Modern."

18. Govind Gopakumar made this argument in *Installing Automobility*, 212–20.

19. As Leander Schneider notes in *Government of Development* (21), Tanzanian history has a rich historiography on vernacular concepts of development, progress, and well-being. This also applies to what Andreana Prichard terms "composition of community." Prichard, "Let Us Swim in the Pool of Love," 106.

20. On linkages between cars and modernization theory in different settings, see Patterson, *Automobile Politics*; Green-Simms, *Postcolonial Automobility*; Wolfe, *Autos and Progress*; and Hart, *Ghana on the Go*.

21. Hunter, "History of Maendeleo," 100–101; Hunter, *Political Thought*, esp. chap. 1; Ahearne, "Development and Progress"; Feierman, *Peasant Intellectuals*, 140–50; Koponen, "From Dead End to New Lease on Life"; and Becker, *Politics of Poverty*. As a vernacular category of development, see Decker and McMahon, *The Idea of Development* (5–6). For Kenya, James Smith provides an extensive analysis of maendeleo's meanings as a vernacular category that "permeates all levels of existence, encompassing everything from geopolitics to ice cream." Smith, *Bewitching Development*, xii.

22. Brennan, *Taiifa*, 147.

23. Brennan, *Taifa*, 133. Julius Nyerere's early volume of speeches, *Freedom and Development/Uhuru na Maendeleo*, invoked the term as a core part of the independent process.
24. The causative of "to continue" or "to progress," *kuendeleza*, carried similar meanings.
25. In addition to *maendeleo ya haraka*, politicians used the phrase *maendeleo katika muda mfupi* ("development in a short time").
26. In "Drive-In Socialism," Fair provides an example of this multiscalar experience of development.
27. Hawa Ramadhani, "Maisha na maendeleo ya Hawa Ramadhani," unpublished memoir, n.d.
28. Giblin, *History of the Excluded*, 9. He notes the use of *kujenga maisha* (to build life) and a similar term in Kibena and their connection to travel. On "searching for life" (*kutafuta maisha*), see Monson, *Africa's Freedom Railway*; and Callaci, *Street Archives and City Life*.
30. On uses of *uwezo*, see Myers, *Verandahs of Power*, 14; and Prestholdt, *Domesticating the World*, 46–48. On *heshima* (respect), see Moyd, *Violent Intermediaries*. The antonym *maisha magumu* ("life is tough") also applies here. See Vavrus, *Desire and Decline*, 2–3.
29. Fair, "Drive-in Socialism," 1079–83.
30. Dorothy Hodgson observes that ideas and practices later termed *development* and later considered part of development scholarship had been around since the 1860s. Hodgson, *Once Intrepid Warriors*, 10. Juhani Koponen adds that these practices did not arrive in Tanganyika as a package in the late 1800s (or after). Koponen, "From Dead End to New Lease on Life," 38. Both observations open important space to write histories of development outside of European intellectual genealogies. Moreover, unlike the Kiswahili translations for "modern"—which rest on breaks with "tradition" (*desturi*) or the need for newness (*wa kisasa*)—breaking *maendeleo* into movement and its tools/practices does not. On longer histories of ideas and structures of well-being, see Schoenbrun, "Conjuring the Modern," 1410; and Feierman, *Peasant Intellectuals*, 105, 254–56.
31. Centering practice instead of discourse and theory is a central component of recent scholarship in historiographies of both Africa and development and modernization. See Cooper and Packard, introduction to *International Development*; and Miescher, Bloom, and Manuh, "Introduction," esp. 2, 4, 9, and 13. The second part of Joseph Morgan Hodge's "Writing the History of Development" details this move in interdisciplinary literature on development. Ivan Karp and D. A. Masolo, in "African Discourses on Development," and Kwasi Wiredu, in "Our Problem of Knowledge," open intellectual trajectories to tell and imagine long-term histories of development.
32. On perceptions of technological lack, see Landes, "Why Are We So Rich?"; Acemoglu and Robinson, *Why Nations Fail*; and Mokyr, *The Lever of Riches* (vii).
33. J. Fabian, *Time and the Other*, 32–35.
34. Scholars have shown that race played a central role in debates about who/what constituted *African* identities and culture after independence. Those debates do not diminish the term's remaking or its salience for speaking about citizens and technologies in a sovereign African nation. Evidence in this book most closely aligns with Richa Nagar's,

Laura Fair's, and Ronald Aminzade's approaches—recognizing not only the power of racial categories in the colonial and postcolonial periods, but also the way communities and individuals remade, reinterpreted, or simply never (fully) bought in to political categories of race (themselves, contested) in everyday life, technological work, and other concerns related to maendeleo. See Richa Nagar, "The South Asian Diaspora in Tanzania"; Andrew Ivaska, *Culture States*; James Brennan, *Taifa*; Laura Fair, *Reel Pleasures*; Jonathon Glassman, *War of Words, War of Stones*; and Ron Aminzade, *Race, Nation, and Citizenship* (esp. 47).

35. I have in mind the type of Fordist production found in much automobile scholarship. Matthew Patterson provides a good description of this phenomenon in *Automobile Politics*. On the historical and geographic reach of this concept of motors, see Siegelbaum, *Cars for Comrades*; Grandin, *Fordlandia*; and Wolfe, *Autos and Progress*.

36. Oldenziel, *Making Technology Masculine*, 19–42; McGaw, "Why Feminine Technologies Matter," 15–17; P. Edwards, "Industrial Genders"; Edgerton, *Shock of the Old*, xi; Mavhunga, introduction to *Transient Workspaces*, 5–7.

37. Douglas Harper places repair and making on the same "continuum." Harper, *Working Knowledge*, 21. See also Russell and Vinsel, "After Innovation," 5–6; Jackson, "Rethinking Repair"; and Edgerton, *Shock of the Old*.

38. Jackson, "Rethinking Repair," 221–22. On improvisation as a "daily imperative" in cancer wards, see Livingston, *Improvising Medicine*, 181.

39. Miescher, Bloom, and Manuh, "Introduction." This approach has long informed social and cultural histories of Africa. See Terence Ranger's *Dance and Society in Eastern Africa, 1890–1970*; and Nancy Rose Hunt's concept of "mixing" in *A Colonial Lexicon*.

40. Akrich, "De-scription of Technical Objects."

41. I draw inspiration here from Jojada Verrips and Birgit Meyers's recognition that earlier scholarship gave "virtually no attention to car in its materiality." Verrips and Meyers, "Kwaku's Car," 157.

42. For a critique of this view, see Francesca Bray, "Technics and Civilization in Late Imperial China."

43. Historians stress the openness of vehicles to change by users and maintainers at least through the 1930s. See Franz, *Tinkering*; Kline and Pinch, "Users as Agents"; Borg, *Auto Mechanics*; and Lucsko, *Junkyards, Gearheads, and Rust*. Daniel Miller, "Driven Societies," stresses the interpretative flexibility in automobiles. This proliferation of meanings and material compositions echoes Abena Dove Osseo-Asare on histories of "priority"—who or where comes first?—as a problematic horizon; Clapperton Mavhunga's approach to innovation; Emily Osborn on aluminum and narratives of singular points of origin; and Jeremy Prestholdt's definition of "domestication." Osseo-Asare, *Bitter Roots*, 13–14; Mavhunga, "Introduction," 4–10; Osborn, "Casting Aluminum Cooking Pots"; Prestholdt, *Domesticating the World*, 8. With cars in West Africa, Jojada Verrips and Birgit Meyer in "Kwaku's Car" rightly anchor monolithic approaches to automobiles in Western consumers' "alienation" from vehicle production and maintenance.

44. Including narratives in which Africans having “their backs against the wall,” even during difficult times, becomes the entirety of their lives, as David Hecht and Maliqalim Simone point out; see D. Hecht and Simone, *Invisible Governance*, 144.
45. Like doctors who must “continually improvise and work empirically.” Livingston, *Improvising Medicine*, 20.
46. Mavhunga makes a case for locating the multiplicities of African innovation in much of his work. See, in particular, Mavhunga, “Introduction.”
47. On the need for such interscalar approaches, see Gabrielle Hecht, *Being Nuclear*, 22–23, and for things inhabiting “multiple scales,” Jessica Barnes, *Cultivating the Nile*, 27.
48. Berlant, *Cruel Optimism*, 19; and Knight and Stewart, “Ethnographies of Austerity.”
49. On “impossible choices,” see Livingston, *Improvising Medicine*, 177. For approaches to bureaucratic work, see Bierschenk and de Sardan, “Studying the Dynamics of African Bureaucracies,” 4; and Eckert, “‘We Must Run While Others Walk,’” 217. Feierman explores nationalists’ desire for a bureaucracy in *Peasant Intellectuals* (235–44).
50. James Ferguson links informality directly to precarity in *Give a Man a Fish* (15–20). Kenneth King’s 1977 *The African Artisan* charts innovative cultures of reuse in Kenya, especially with motor vehicles, but presents them as a constrained technological sphere born of and likely ending with economic precarity; interestingly, it concludes by highlighting the limits of formal/informal as an analytic approach to technical learning (196–97). In *Transient Workspaces*, Mavhunga makes the case for expanding what counts as technology/infrastructure owing to the tendency for colonial practices to become formal while everything else is lowed and othered as informal. Hart opens *Ghana on the Go* by noting the problems with both formal and informal, astutely observing that motor vehicles “operated in the interstices of these binaries” (18). Hart also takes this on in “Of Pirate Drivers and Honking Horns” and in “Informality, Urban Transport Infrastructure, and the Lessons of History in Accra, Ghana.” In “The Popular Niche Economy,” Michael Stasik covers problems with terminology in detail while adding that transport economies contributed to the original formulation of informal economies. Citing Mavhunga, Hecht and Breckenridge—but particularly Hecht—call for scholars of technology to reevaluate the assumptions embedded in formal/informal through frameworks such as tacit knowledge, in Serlin’s interview “Confronting African Histories of Technology” (100). Judith Scheele’s research on trans-Saharan transport networks explores exchange through existing vernacular categories and idioms, thereby situating continuities between truck use and much earlier mobilities; see Scheele, *Smugglers and Saints*. In *Markets of Dispossession*, Julia Elychar provides a short history of how informality became part of the developmentalist and academic lexicon; Janet Roitman, in *Fiscal Disobedience* (18), observes that even when *formal/informal* are used well, the boundaries between them often serve as a catchall instead of a sharp analytic term. I’ve taken much inspiration from a rich literature in Tanzania on informal spheres, including Aili Mari Tripp’s *Changing the Rules*, the first book I read on Tanzania, which opens with an illegal bus (I’ve been hooked since that day). But I, too, find the language of economic informalities limiting

for situating technological histories and for undercutting developmentalist expectations about what sociotechnical change should look like and who, what, or where influences it. Like Mavhunga, who has called on scholars to pay close attention to languages of practice and analysis, I think vernacular lexicons such as *bubu*, *siyo rasmi*, *mtaani*, and others used here provide a sharper analytic tool kit than *formal/informal* while drawing attention to the robustness of Tanzania's institutional technological landscape. The latter, in some ways, helps address Asef Bayat's "Un-Civil Society," which recognizes the problematic role of civil society paradigms that "belittle or totally ignore the vast arrays" (55) of activities caught up with the word *informal*. Emily Brownell in *Going to Ground* points out that urbanization often glossed as informal is directly connected to institutional planning, and furthermore, that some spaces that have that generalized informal aesthetic are sometimes government initiatives (64 and 147–48).

51. Stiglitz, "Markets, Market Failures, and Development," 198.

52. Stiglitz, "Markets, Market Failures, and Development," 198. For an update, see Stiglitz and Greenwald, *Creating a Learning Society*. For expanding what counts as a site of analysis in contemporary African history, particularly as it relates to the independent period, I draw from Geiger, *TANU Women* (esp. critiques of linear modernist narratives); Keletso Atkins, *The Moon is Dead! Give Us Our Money*, especially "indigenous imperatives," 54, and continuity of Nguni institutions (60); Moodie and Ndatshe, *Going for Gold*, 2, especially the ideas male migrants brought with them to mines; Schoenbrun, "Conjuring the Modern"; and Englebert, "Pre-Colonial Institutions."

53. Mavhunga, introduction to *What Do Science, Technology, and Innovation Mean from Africa?*, 10.

54. Englebert, "Pre-Colonial Institutions." See also T. J. Tallie's combination of queer theory and indigenous studies in *Queering Colonial Natal*, especially the role of "queering" to "unsettle the presumptions of a settler state" ("queering settlement") and the marking off of forms of indigeneity, including readings of institutions and practices, as "queer" by colonial authorities (7).

55. Lerman, "Uses of Useful Knowledge," 40; and Marx, "'Technology.'"

56. Latour, *We Have Never Been Modern*, 105; Li, *The Will to Improve*, 10; Rist, *History of Development*, 70.

57. For *siyo rasmi*, see David Mfume, interview, Iringa, December 21, 2011; and Marechulumu Sambala, interview, Iringa, December 21, 2011. David Schoenbrun traces the history of *mtaa* to neighborhoods connected by streets around AD 500 in the lakes region. Schoenbrun, *A Green Place, a Good Place*, 93. It had joined a coastal Kiswahili lexicon by the 1800s where, as Randall Pouwels demonstrates, a mosque stood at the center of social life for a *mtaa*. Pouwels, *Horn and Crescent*, 79 and 95.

58. On using Kiswahili terms to explore "local frames of awareness," I follow Myers, *Verandahs of Power*, 13–15; and Mavhunga, "Language of Science, Technology, and Innovation."

59. Echoing Ato Quayson's concerns about what constitutes a "top" or "bottom" in urban research and Shadreck Chirikure's negative answer to the question "Should Western

Concepts Always Have Western Equivalents?” (73). Quayson, *Oxford Street, Accra*, 5; and Chirikure, “Metalworker,” 73.

60. Guyer, *Marginal Gains*, 164–69. She further notes that the “uniformity” associated with the formal, in contrast to the “diversity” of the informal, “seems so unlikely as to be bewildering” and offers a “coral reef of separate formalities” in place of the “modernist struggle (166–69). Bayat notes in “Un-Civil Society” (54) that such practices are “not extraordinary” but are treated as if they were.

61. James Scott’s *Seeing like a State* has rightly received critiques for definitions of authoritarian high modernism. See Cooper, *Colonialism in Question*; and Schneider, *Government of Development*, for good examples. Yet among these critiques, Scott’s pivot in the section “The Missing Link” has received much less attention for charting alternative creativities and forms of power.

62. Scott, *Seeing like a State*, 318–29.

63. Quayson, *Oxford Street, Accra*, 6.

64. Palmer, “Ineffective Masculinity,” 457–58.

65. I establish the specific contours of these identities in chapters 2, 4, and 5.

66. Laura Fair, Emily Callaci, and Margrethe Silberschmidt chart the dynamic and often difficult political and economic contexts for attaining respectable masculinity in both the colonial and national periods. See Fair, *Reel Pleasures*, 153–77; Callaci, *Street Archives and City Life*, 104–6, 173–75; and Silberschmidt, “Poverty, Male Disempowerment.”

67. As statistics on corruption cases show. See Maliyamkono and Bagachwa, *Second Economy*, 143. Indeed, this historical task requires many more sources than are currently available.

68. In emphasizing the relationship between gendered social work and technological function, I draw from a rich history of gender and labor in African studies, including Lindsay, *Working with Gender* (especially notions of laborers “working with gender”); Moodie and Ndatshe, *Going for Gold*, especially descriptions of “practical integrity” and migrant masculinity, 2–3; Miescher, *Making Men in Ghana*, 2–5; and Miescher and Lindsay, introduction to *Men and Masculinities*, especially discussion on the limits of hegemonic masculinities and the continual contestation of their meanings, 16. Kenda Mutongi links men, buses, and pursuits of respectability, and both Fair and Callaci carefully excavate men’s identities in antiurban contexts that pathologized the lives of many young men and women. Mutongi, *Matatu*, 63–68; Fair, *Reel Pleasures*; and Callaci, *Street Archives and City Life*, 170–75.

69. On this intersection of social and technological processes, including affect, see de Luna, “Inventing Bushcraft,” 55–57. Earlier examples of the intersection of expertise and gendered personhood include Jeff Guy and Motlatsi Thabane’s “Technology, Ethnicity, and Ideology” and Sara Berry’s work on mechanics in *Fathers Work for Their Sons* (chap. 6).

70. Hart, *Ghana on the Go*, 99. Hart anchors this approach to drivers in Stephan Miescher’s foundational work on plural masculinities, *Making Men in Ghana*.

71. This is Lisa Lindsay's term for recognizing commonalities among diverse expressions of manhood in southern Nigeria. Lindsay, *Working with Gender*, 32. See also Moyd, *Violent Intermediaries*, 3; and Weiss, *The Making and Unmaking of the Haya Lived World*, 29.
72. Callaci explores this process through consumer items in *Street Archives and City Life* (104). She notes a form of demasculinization through an absence of things that provides an interesting context for situating mechanics' huge collections of parts. See chapter 2 in this book.
73. U. Beck, *Risk Societies*.
74. Cultural and social history have long noted a relationship between commodities and personhood. See Kopytoff, "Cultural Biography of Things." In Tanzania's history, see Fair, *Pastimes and Politics*; Glassman, *Feasts and Riot*; and Meier, *Swahili Port Cities*.
75. Note Silberschmidt, "Poverty, Male Disempowerment"; and Callaci, *Street Archives and City Life*. See Fair, *Reel Pleasures*; and Hodgson, *Once Intrepid Warriors*.
76. Jackson, "Rethinking Repair." Kevin Borg's *Auto Mechanics* and Douglas Harper's *Working Knowledge* demonstrate that repair/maintenance, and thus breakdown, is part of normal technological life cycles, albeit rarely made visible. Jenna Burrell, in *Invisible Users*, observes that Africanist scholarship—including that of Brian Larkin and Jojada Verrips and Birgit Meyer—pushed forms of this argument when "mainstream STS" approached dysfunction as "out of the ordinary, as sudden and transitory events" instead of an aspect of everyday life (14–15). While crediting Larkin's contributions to repair/breakdown cultures, Burrell also notes a "nonspecificity about form" that risks subsuming myriad breakdowns into a "generic entropic inevitability of things falling apart." Burrell, *Invisible Users*, 15. See also Larkin, *Signal and Noise*, 233.
77. Andrew L. Russell and Lee Vinsel note social continuities in maintenance regimes in "After Innovation" (8–9).
78. In contrast to Daniel Headrick's *The Tools of Empire* or the reprise, *The Tentacles of Progress*.
79. On concerns about actualizing promises in the independent period, see Osseo-Asare, "Scientific Equity," 715; and Cooper, *Citizenship between Empire and Nation*, 3–9, 174–188. Mamadou Diouf, "Senegalese Development," observes that "development was counterpoised to colonial exploitation in deliberate manner" (293).
80. Nyerere, "President's Inaugural Address," in *Freedom and Unity*, 178. His need to redefine nation building suggests scholars should not assume the ideological/discursive nature of nation building as the starting point of analysis. See Callaci, *Street Archives and City Life*, 18–19, for the more intimate social contours of this material-discourse relationship.
81. Nyerere, *Our Economy*, 14; and Bjerk, "Sovereignty and Socialism in Tanzania," 283–84.
82. Tousignant, *Edges of Exposure*, 4–5, and, on the consequences of stretched capacity, 56–57.
83. Lynn Thomas notes the reasons "agency as argument" has long influenced African history and also encourages use of agency as a conceptual tool, rather than a "safety" argument." L. Thomas, "Historicising Agency," 328–29.

84. On time, “scale as method,” and infrastructure, see P. Edwards, “Infrastructure and Modernity,” 191–94.
85. Hughes, “Evolution of Large Technological Systems,” 51. I first thought of this process with Katherine Verdery’s *What Was Socialism and What Comes Next?*, as chapter 3 shows.
86. This is a form of what Verdery describes as power “constituting itself through the effects of austerity.” Verdery, *What Was Socialism and What Comes Next?*, 48. See also Howe et al., “Paradoxical Infrastructures,” 551. Not building aligns with what Ann Laura Stoler calls an “imperial formation,” including its ability to act after the end of empire. Stoler, “Rot Remains,” 2, 7–8.
87. This is also a concern of apartheid infrastructure in Antina von Schnitzler’s *Democracy’s Infrastructure*, in what she calls “the materiality of political claims” (8). See also Cooper, “Africa and the World Economy,” 8–13; and Berman and Lonsdale, *Unhappy Valley*.
88. As Daniel Knight and Charles Stewart chart in “Ethnographies of Austerity,” and as Ronald Aminzade shows for Tanzania in *Race, Nation, and Citizenship* (93, 131–137).
89. Bjerk, *Building a Peaceful Nation*, 248; Schroeder, *Africa after Apartheid*, 18; and P. Lal, *African Socialism*, esp. chap. 1.
90. Urry, *Mobilities*, 119.
91. See, for example: J. Rweyemamu, *Underdevelopment and Industrialization in Tanzania*; on the enduring impact of struggles to accumulate capital, see Aminzade, *Race, Nation, and Citizenship*, 31–37; and Becker, *Politics of Poverty*, esp. chap. 4.
92. Tsing, *Friction*, 214.
93. Von Schnitzler, *Democracy’s Infrastructure*, 8–9.
94. As noted by G. Hecht, *Being Nuclear*; Mavhunga, *Transient Workspaces*; and Donovan, “‘Development.’” A large amount of critical development scholarship glosses over technological details, including Escobar, *Encountering Development*; Cowen and Shenton, *Doctrines of Development*; Sachs, *Development Dictionary*; and Rist, *History of Development*. This is even true of what James Ferguson calls “the ‘development’ apparatus,” “institutional apparatus,” and the “state apparatus.” Ferguson, *The Anti-politics Machine*, 18, 87, and 194. On notions of “work,” see Guyer, *Marginal Gains*, 6.
95. MacKenzie and Wajcman, “Introductory Essay,” 22.
96. Mavhunga, *Transient Workspaces*, 15–20.
97. I build here on an axiom of car scholarship challenging the inevitability of late twentieth century northern automobilities. *Car Cultures* emphasizes the car’s flexibility over space and time. Others include McShane, *Down the Asphalt Path*; Kirsch, *Electric Vehicle*; Wells, *Car Country*; and Mom, *Atlantic Automobility*.
98. I take inspiration from Hodgson’s temporal framing of development in *Once Intrepid Warriors*. Jamie Monson was one of the first to take such an approach in *Africa’s Freedom Railway* (9). In *Reel Pleasures* and “Drive-In Socialism,” Laura Fair has extended this

approach to show the national subjectivities of development discourse among planners, politicians, and citizens. Kenda Mutongi calls for more approaches that “descend to street level.” Mutongi, *Matatu*, 261.

99. Prita Meier, extending other archaeologists of the Swahili coast, makes this case in *Swahili Port Cities* (15–22); Stacey Langwick makes a powerful case for “pluralizing our conceptions of materiality” to explore alternative ontologies of healing; Emily Callaci explores the materialities found in, on, and through popular texts, while Jeremy Prestholdt links *uwezo* (ability and power) to objects in the nineteenth century. Langwick, *Bodies, Politics, and African Healing*, 152; Callaci, *Street Archives and City Life*, 13; Prestholdt, *Domesticating the World*, 46–48.

100. I draw on various approaches to STS materialities often associated with actor network theory (ANT). I hope this book shows there is not a single built world or infrastructure that should occupy our time in thinking about Africa’s technological past (and I take inspiration from Mavhunga’s *Transient Workspaces* here). With Sheller and Urry’s machinic complex, I generally have in mind Anna Tsing’s idea of the “open-ended assemblages of entangled ways of life” in *The Mushroom at the End of the World* (20). As Burrell notes in *Invisible Users*, some Africanist scholars have expressed concern about the absence of social and cultural analysis in STS literature because of a “tendency for ANT’s human actors to be rendered mute” (16). See also Larkin, “Poetics and Politics of Infrastructure” and “Promising Forms.” Indeed, as Warwick Anderson and Vincanne Adams observe, ANT can lead to a “semiotic formalism” (190) that invokes the local without deeply exploring it—an approach that keeps the method from “[embracing] its postcolonial condition.” Anderson and Adams, “Pramoedya’s Chickens,” 191. Still, Jenna Burrell and Richard Rottenburg note respectively that these critiques focus extensively on one form of STS materialism—Bruno Latour’s approaches to ANT—and in pushing back against Latour, such critiques sometimes create what Burrell calls “weak materiality.” Rottenburg, “Social and Public Experiments,” 423; Burrell, *Invisible Users*, 11–12; Latour, *Reassembling the Social*. Since the mid-1980s, STS scholars have raised and written about similar issues—including important questions about where society, politics, technology, and infrastructure begin or end. See MacKenzie and Wajcman, “Introductory Essay,” 22; and Bijker, Hughes, and Pinch, *Social Construction of Technological Systems*. The version of ANT popularized by Michel Callon and John Law likely offers a more natural framework for the type of sociocultural analysis of power common in African studies. Callon and Law, “Agency and the Hybrid Collectif.” Burrell’s use of Law’s relational materiality offers one example. Burrell, *Invisible Users*, 15–16. William Storey provides a brief overview of these fields, including hard and soft determinisms, in *Guns, Race, and Power in Colonial South Africa*. For a recent take on the virtues and limits of “people as infrastructure,” see Fredericks, *Garbage Citizenship*, 60–68. For a broader discussion, see Paul Edwards et al., “AHR Conversation.”

101. LeCain, *Matter of History*.

102. See Mika’s exploration of this topic in “The Half-Life of Radiotherapy and Other Transferred Technologies.”

103. Haraway, “Situated Knowledges,” 583–90.

104. Mukerji, *Impossible Engineering*, 2–12. Osseo-Asare and Mavhunga describe similar processes. Steven Feierman importantly notes that “knowledge was not collective” or centralized but rather distributed according to different roles. Eglash notes a tendency to approach the “professional as the producer.” Osseo-Asare, *Bitter Roots*, 13, 45; Mavhunga, *Transient Workspaces*; Feierman, “On Socially Composed Knowledge,” 15; and Eglash, “Appropriating Technology,” viii.
105. On fusing oral history, technological practice, space, and oral history, see Schmidt, *Iron Technology in East Africa*; Osborn, “Casting Aluminum Cooking Pots”; and G. Hecht, *Being Nuclear*, 341. Luise White, Stephan Miescher, and David William Cohen noted the porousness of the oral and written in their *African Words, African Voices*; so does White in *Speaking with Vampires*. Another interplay occurs between action, training, knowledge production, and history telling.
106. White, Miescher, and Cohen, *African Words, African Voices*; and Thompson, *Voice of the Past*, 233–34.
107. Barber, “Introduction,” 18.
108. I draw from Harper, *Working Knowledge*; K. Beck, “Art of Truck Modding”; and Osborn, “Casting Aluminum Cooking Pots.”
109. On the “(in)visibilities of history,” see G. Hecht, *Being Nuclear*, 341; and G. Hecht, introduction to *Entangled Geographies*, 2–4. I also have in mind Julius Nyerere’s statement about “the mass of localized unwritten historical knowledge, which has to be searched for, collected, checked, and written into a comprehensive story.” Nyerere, “Congress on African History,” in *Freedom and Socialism*, 82.
110. This is a classic issue in histories of technology. Lerman, “Uses of Useful Knowledge”; and Borg, *Auto Mechanics*.
111. Mavhunga, *Transient Workspaces*, 25. Callaci, *Street Archives and City Life*, makes a similar move (58). I draw on Haraway, “Situated Knowledges” (583–90) as well.
112. Allman, “Phantoms of the Archive,” 107. This is also taken up in Thomas Bierschenk and Jean-Pierre Olivier de Sardan’s *States at Work* and is a key part of what Schneider calls “the world of officials.” Schneider, *Government of Development*, 100.
113. See Dumont, *False Start in Africa*; Scott, *Seeing like a State*; and popular postsocialist novels, such as Ruhumbika, *Miradi Bubu ya Wazalendo*.

Chapter 1: Walking to the Car

1. “Carnival Procession Is Week’s Climax,” *Tanganyika Standard*, June 8, 1953; “Africa through a Lens: Tanzania,” CO 1069-160-66 and CO 1069-160-74, BNA.
2. I use Tanganyika to refer to the geographic boundaries of the colony established after the Paris Peace Conference. Though I explore the German period, I do not include the parts of German East Africa that later came under Belgian rule.