

Liberation and Technology

Development possibilities in pursuing
technological autonomy

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*To my compass, M. M. Taha,
to Amilcar Cabral,
to Ursula Franklin,
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Abbreviations

CNC	computer numerical control
DFI	direct foreign investment
GDP	gross domestic product
GII	Global Innovation Index
ICT	information and communications technology
ITK	indigenous technical knowledge
NIE	Newly Industrializing Economy
NIS	national innovation system
NTC	national technological capabilities
OECD	Organization of Economic Co-operation and Development
R&D	research and development
S&T	science and technology
STI	science, technology and innovation
TAI	Technology Achievement Index
T&S	technology and science
UNCBD	United Nations Convention on Biological Diversity
UNDP	United Nations Development Programme
WCD	World Commission on Dams
WTO	World Trade Organisation

Introduction

“Technology has built the house in which we all live.”

–Ursula Franklin¹

In the documentary series, *The Africans: A triple heritage*, prepared and hosted by the late Ali Mazrui, in one part he took the viewers through big, state-of-the-art industrial factories in two West African countries. Those factories were built right after political independence was gained, and they were built from the ground-up paid for by their respective states. They were built to represent a proud leap forward by these newly independent countries towards the era of modern industrialization. However, people and products were missing from the floors of those factories. Mazrui walked through these empty factory floors and told their story. They were decommissioned plants that lasted for only short periods of time before the governments realized they were running at a cost higher than their return, with no change foreseen in that situation in the near future. These were high-tech plants, not only commissioned and built by western corporations, but also operated by them on contracts with the government. The plants were foreign plants on African soil, and they were unable to serve the developmental priorities of their host countries. In the end a tough lesson was learned (hopefully) the hard way.

These days, decades after political independence, it is not a rare sight in any developing country, in urban areas, to find most, if not all, the high-tech products the world offers today, whether in stores and along streets, or in buildings, hotels, and factories. You find new cars

¹ In *The Real World of Technology*. CBC Massey lectures, November 1989.

on tarmacked roads, modern electronics and other products in these supposedly technologically-challenged societies. It is not the absence of advanced technological products in their markets, and some of their industries, that is the problem, but rather the matter of quality and how ubiquitous such products are. Quality is often compromised in that most of the contemporary technological products found in developing societies are imported and not subject to sufficient regulatory scrutiny. Less commonly, but to the same effect, products are designed somewhere else – especially the complex parts – and assembled locally due to this weak regulatory environment as well as lower labour costs and taxes. Such products are rarely local products in any real sense. There is also no full integration of these contemporary technologies into the lives and work of the majority of the population. The limited quantity of these technological products and services sees the majority of the population living in conditions of absence of essential products and services that the populations of industrialized countries enjoy and might take for granted. Those essential products and services include access to electricity, clean water, civil infrastructure, contemporary healthcare systems and aiding machinery, as well as formal education.

The modern world is a spectrum characterised by two extremes of which one part is lacking the basics of a modern life aided by contemporary technological systems, while the other part, on the other hand, is what can be called hyper-technologized, or ultra-technologized. Between these two extremes, there are other parts where there is a presence of industrialization and material progress that is not inclusive of the entire area, and parts with fairly industrialized societies. The issue is not materialist in essence, however. It is not about whether having more contemporary technology is a good or a bad thing in itself. The issue is rather about what each society's relationship with technology today says about the quality of the lives of the people of that society.

Processes of technological change pose many challenges for developing societies. They tend to be complex and multi-faceted, involving numerous variables, agents, and contexts. However, they are a critical part of economic and human development for all societies. Historical evidence shows a strong correlation between technological development and human development (Hill and Dhanda 2003). The United Nations Development Programme (UNDP) shows how seminal advances in human development in the 20th century were largely attributable to technological improvements and breakthroughs, in different sectors (e.g. health and hygiene, agriculture, transportation,

etc.) (UNDP 2001), with the term ‘industrialized economies’ coming to be widely used to refer to advanced, wealthy countries where these technological developments occurred.

Development in different sectors requires different stimulants and interventions depending on the social and cultural context. For example, in Africa, where agriculture is historically of great importance, slow rates of adoption of new technologies and minimal increases in productivity are the norm. Researchers have pointed to subjective and social challenges facing agricultural technology adoption in Africa, such as farmers’ negative perceptions of technological changes, or cultural barriers to accepting them.² Dercon and Christiaensen (2011) demonstrate that besides a more general subjective resistance farmers consider crude cost-benefit analyses and the multitude of household priorities, which lead many of them to avoid adopting new technologies. The story of Africa and agriculture resonates, in varying degrees, with other developing regions such as Southeast Asia and Latin America.³

In contrast, information and communication technologies (ICTs) have in a relatively short period experienced rapid adoption in a variety of other sectors in developing societies around the world. ICTs have been adopted in healthcare, tourism, small and medium-sized enterprises, and in education.⁴ Between the two extremes of a lack of new technology adoption in agriculture and the fast uptake of ICTs in a variety of sectors, there are varying degrees of technology adoption within other sectors in developing societies, such as in water and sanitation, alternative energy, and small industries.

Moreover, processes of technological change and industrialization across societies show varying patterns and degrees of success. Measures of technological innovation capacity and output such as the Global Innovation Index (GII) and the Technology Achievement Index (TAI)⁵ suggest that there is no roadmap appropriate for all countries pursuing technological progression. The historical paths of industrialization followed by the USA, the UK, Germany, Russia, China, Japan, India

2 Stamp 1990; Simalenga 1999; Adesina 1995; Rauniyar 1992.

3 Binswanger 1986; Adeel et al. 2008; Martinez-Torres et al. 2010.

4 UNDP 2001; Lekoko and Semali 2012; Rensburg et al. 2008; Nasir et al. 2011.

5 The TAI is used by the UNDP to measure a country’s technological capacity and progress in comparison to other countries. The TAI uses four dimensions of technological capacity: creation of new technology; diffusion of recent innovations; diffusion of old innovations that are still fundamental for industrialization; and the building of a human skills base for technology origination and adoption. Each one of the dimensions has two statistical sub-indicators (Desai et al. 2002).

and Brazil are dissimilar and largely influenced by local variables, including factor endowments, socioeconomic institutions, market relations, policies and sociopolitical histories. In addition, these indices show that some developing regions have made almost no technological progress over long periods of time, leaving a huge gap between them and countries that have progressed (Desai et al. 2002).

In spite of this gap between technologically advanced and technologically challenged societies, the indices suggest that technological change is building up globally. Despite serious setbacks in some contexts, technological knowledge and skills of local populations and global interconnectedness of technological markets, procedures and research and development (R&D) methods are increasing overall (Desai et al. 2002; Nasir et al. 2011).

There are good reasons why most technological capacity assessments focus on national scales, since indicators at national levels rely on more accessible data inputs. Yet it also makes sense to assess technological capacity (and achievements) with smaller and more ‘organic’ social aggregates – i.e. aggregates formed around ecological or socioeconomic relations such as communities of geo-ecological regions and industrial clusters. Some attempts at explaining this phenomenon refer to evidence that such social aggregates tend to correlate with ‘technological hubs’ within countries. According to the Global Development Index Report, these hubs – such as Silicon Valley-type industrial clusters – are usually responsible for painting the entire country’s technology mode or level, suggesting that the mode is evenly distributed across the whole country when it is actually concentrated in a few places (Dutta and Lanvin 2013). For example, the Silicon Valley industries make the state of California, and indeed the whole USA, appear as a global leader in ICT technology, when in fact it is really the Silicon Valley cluster that is the global ICT leader.

Different indices confirm that there are indications of a statistically significant, positive correlation between technological achievement and human development—this is apparent in a comparison between the UNDP-initiated indices: Technology Achievement Index and Human Development Index (Hill and Dhanda 2003, 29). The technology divide between countries of the world appears to be a strong indicator of the human development divide as well.

From this broad overview, several general positions take shape: 1) that technological change is important for development, 2) that it evolves in multiple ways; 3) that it can be measured in a variety of ways; 4)

that there may be alternative ways to explain the main features of its evolution and diversity; and 5) that sustained economic development requires increasing local capacity to use, control and maintain technosocial systems. Such technosocial systems refer to people and technologies working in combined efforts that form functional wholes (Woodhouse and Patton 2004).

Discussions continue in international development circles about the importance of developing and increasing endogenous technological capacities (see for example Shaw 2002; Adeel, Schuster and Bigas 2008; Nasir et al. 2011). The discussions are not so much about whether endogenous capacities are important, but about what levels of such capacity are needed to advance the economic and human development agenda. This book takes the position that higher levels of endogenous technological capacity are necessary to achieve development in key sectors, such as science and education, agriculture, energy, water supply, health and hygiene, infrastructure and basic industries.⁶

Thesis

The main thesis of this book is that if developing societies seek genuine human and socioeconomic development then they need to seek technological autonomy. Technological autonomy refers to the attainment of a sufficient level of self-determination in generating and managing technological phenomena for that society. It means acquiring an endogenous capacity to generate, transfer and administer technologies, as well to guide policies and manage innovation, industrial sectors, local and foreign trade, and priorities of development. Such autonomy also, of course, implies a relative independence from external manipulation; particularly from other societies with greater economic, political and military power. Technological autonomy, therefore, is a concept that identifies a policy and sociopolitical approach, with key consideration for technical and economic factors, to the issue of technological change and development. Consequently, it is an approach that involves institutional as well as technological affairs.

On a broader perspective, there exists a consensus that technology has an omnipresent power in all contemporary societies. Whether in developing or developed contexts, the power of technology in contemporary lives everywhere is a power with measurable and penetrating authority—like a fifth estate.

6 Mazrui 1986; Haug 1992; Nyerere 1968 and 2011; STIPRO 2010; Page 2016

This claim is not made lightly. The terminology of a fourth, fifth, etc. estate came to use to refer to a phenomenon where a particular sector in modern society has a strong and observable influence in that society but without the direct allocated powers the ‘first’ three estates – or branches of government: the executive, legislative and judicial – possess. Obviously, the notion of additional estates (or authorities) assumes the presence of state systems that run along the doctrine of the separation of powers, a condition not applicable to all societies today. Nonetheless the term has taken on a life of its own, unbound by the context from which it sprang. Today everywhere in the world we can say ‘the fourth estate’ and be understood as reference to the press and media. Recently, there has been a competition over the title of the fifth estate, with some crediting it to the new independent and global cyber media (e.g. bloggers, e-journalists, hacktivists, and non-mainstream media outlets) which is more decentralized than conventional media and press in terms of control, and more influential, some argue, than these traditional institutions. I would argue that these new media forms certainly bring something qualitatively new to the table, but not to the point of establishing a fifth estate separate from the fourth. These new media forms represent a revolution within the fourth estate itself, a revolution that should actually be credited largely to technology; particularly ICT.

Rather, I would argue that it is more sensible, and high time, that the omnipresence and influence of technology in our lives today be recognized and addressed in ways more cognizant of that reality. We know that “it is largely by technology that contemporary society hangs together” (Franssen et al. 2013), so why should we not be explicit? The fifth estate is technology. By that we mean that the various decentralized and interrelated institutions and agents that create and regulate technology in our societies operate and define the apparatus of the fifth estate. These institutions and agents have visible, wide and deep power, albeit ‘unofficial’, in shaping our lives.

Guided by this broad perspective on the place of technology in society, this book addresses the implications this has in the context of technological change in developing societies.

The existing literature on technological change is relatively diverse and abundant, yet not sufficiently integrated. There is considerable scholarship on the theory and historical analysis of developing

technological capabilities in firms and national systems.⁷ There is work on technological change models, as they relate to dynamics of markets, resources and stimulation of industrial innovation.⁸ Further, there are established fields that relate to technological change and overlap with it, such as diffusion of innovations⁹ and institutional economics of technology affairs.¹⁰ There is also an influential literature on understanding the phenomenon of technology as it pertains to both developed and developing societies.¹¹ As for developing societies there is extant literature on the dichotomies between traditional and modern technologies¹² as well as the role of national and international dynamics in technology transfer and technological development as it relates to various factors, such as development policies and international relations.¹³

Few works, however, connect the multitude of themes mentioned above through conceptual frameworks that integrate and map big pictures. One such framework is the National Innovation System (NIS) framework, which aims to organize productive forces and structures, and the flow of information and skills in a country, in order to increase the output of innovative solutions to development constraints (Maharajh, Scerri and Sibanda 2013). In that framework, science, technology and innovation (STI) play a central role, and thus require strategic investment. At the policy level the NIS will include careful investments in education systems, enterprise support and labour markets (Lundvall 1992). Many countries are careful to devise and improve their own NISs as part of their national development plans. This framework operates only at the national policy level by default and thus contributes to the design of macroeconomic policies. It is, however, vague on key technological activities that are not considered ‘innovative’, but customary or traditional, even if they are recognised as important for the particular context. There are also a few other frameworks with limited use and scope (for example, see Aubert 2005).

The framework of technological autonomy, presented in this book, builds on the literature discussed above and ameliorates some of the

7 Lall 1992; Wolff 1999; Kim and Nelson 2000; Oyelaran-Oyeyinka & McCormick 2007; Mazzucato 2013.

8 Dosi 1982; Arthur 1989; Ruttan 1997.

9 Wejnert 2002; Rogers 2003; Huh and Kim 2008; Haider & Kreps 2010; Zanello et al. 2015.

10 Polanyi 1944; Rosenberg 1982; Binswanger 1986; Kroszner 1987; Haug 1992; Page 2016.

11 Mumford 1967 and 1970; Galtung 1979; Franklin 1989; Aunger 2010; Franssen et al. 2013.

12 Hyman 1987; Gamsler 1988; Scott 1999; Roy 2002; Adeel, Schuster and Bigas 2008.

13 Morehouse 1979; Nyerere 1998; UNDP 2001; Shaw 2002; Diyamett & Risha 2015.

mentioned shortcomings of other conceptual frameworks. It describes processes of technological change in developing societies. If developing societies seek to improve levels of human and economic development it will be necessary for them to develop an endogenous capacity to oversee technological affairs. It is this capacity that we can term “technological autonomy”. Such autonomy includes a “strengthened autonomous capacity for creating, acquiring, adapting and using technology” (Morehouse 1979, 387) and an autonomous decision-making capacity to plan and manage the local affairs of industrial and infrastructural development. Further, this framework presents two main variables that lead to technological autonomy: technology localization and technological capabilities. Technology localization consists of three activities: diffusion, institutional support, and technical adaptation. Technological capabilities, on the other hand, consist of: production activities, investment activities and networking of actors who generate technological innovations and knowledge. Together, advances in technology localization and technological capabilities advance a society along the path towards technological autonomy.

The groups, bodies and individuals who actualize and set in motion the process of technological change, undergirding technological autonomy, are called agents of technological change – such as the state, private industries, and non-governmental organizations. They activate and support – i.e. operationalize – the mechanisms of the technological autonomy framework. This proposed framework identifies the main elements of technological change and helps to visualize and connect its goals and objectives in developing societies.

Liberation Technology

This study has a particular approach to the concept of liberation which sees the concepts of decolonization and autonomy as related and related in turn to technological change in contemporary developing societies.

Decolonization is the process of recuperating from the experience of being colonized. Perceiving decolonization as a process is vital because decolonization thought of as an ‘event’ then most will associate it with the declaration of political independence and the transfer of political power from a foreign administration to a government of native faces (i.e. different faces in high places). This event is not decolonization, but at most one milestone in the process. Decolonization is bigger, deeper, and more complex, and that is most evident in that, often enough, foreign colonizers get replaced by native oppressors in the

experience of the masses. One can say that a genuine decolonization process is complete when genuine autonomy is attained, and vice versa. In its relation to technological development, decolonization would mean breaking away from the colonial relationships of one-directional technology transfer, as well as trade of raw materials exports vs. finished products import, etc. It would also mean a more comprehensive fostering of the work of harnessing native technological capabilities to the point where the local industrial relations and innovations begin to express themselves without being helplessly tied to the politics, markets and technological institutions of former colonizers. It would mean reaching technological autonomy.

Liberation, as a concept used in this book, takes the whole process of decolonization a step further. We can say that decolonization is one phase, or part, of a society's liberation process. While the goal of decolonization is breaking away from the remnants of colonization, the goal of liberation is breaking away from all material conditions that limit and inhibit the population. Liberation is thus the successful effort to minimize (or, preferably, eliminate) dependency and exploitation. The act and process of liberation is transformative and comprehensive, and takes place over time (i.e., is not incidental or momentary). In the context of technological development in developing societies, liberation amounts to harnessing technological capabilities and advances to the point where good and sustained measures of human development are achieved, and where there is freedom from substantial barriers to living a flourishing life; a freedom attained and maintained using an autonomous process of building, learning, growing and choosing.

Liberation in the context of technological development is relatively, reminiscent of Amartya Sen's approach of 'development as freedom' (1999). Sen argues that, in contrast to the narrower views of development (e.g., dry and broad econometrics with generalized 'averages'), development can be seen as the expansion of "substantive human freedoms" to lead the kind of life we value (as human individuals and as human communities). Pursuing such development amounts to eliminating those things that limit political freedom, economic facilities, social opportunities, transparency guarantees, and protective security. Rearticulated: development is the process of creating conditions whereby obstacles are eliminated or minimized, and opportunities are enhanced, for all individuals and groups as they seek to realize their full potentials and aspirations. Liberation is understood along similar

lines. So, for this book, while technological change is the main topic, it is perceived as a mean to an end, and that end is liberation.¹⁴

Yet liberation implies a proactive process rather than a status to be achieved (that is freedom). So here we are concerned with the liberating process of technological change—i.e. a technological change that has liberation as its focus. This approach to “liberation technology”, was chosen before the author later on came across a group that used the same term in a legitimate, but more limited, context. The Center for Democracy, Development and Rule of Law at Stanford University uses the term to refer to how information technology can be used to “improve governance, empower the poor, defend human rights, promote economic development, and pursue a variety of other social goods.”¹⁵ Here liberation, and the role of technology in it, is conceived in ways that can include all the above and more; but importantly more. Essentially, all technologies can be, as some already are, used to further goals of human development, prosperity and dignity. Technologies of agriculture, energy harvesting and distribution, water and sanitation, healthcare, local value chain development, transportation, communication, etc., all can be engaged as liberation technologies, as described in this book. If they are integrated and utilized to serve the elimination of dependency and exploitation, they are liberation technologies.

The approach of this book to liberation is influenced by two movements: the liberation theology movement and the legacy of the anti-colonial liberation movements worldwide.

The movement of liberation theology took shape in the late 20th century in Latin America, led by proponents of Christian Catholicism. It sought to engage religious and moral discourse into siding with the poor and the oppressed and taking a stand against ‘sinful’ socioeconomic practices that dispossess and exploit the vulnerable folk in society. It was essentially a sociopolitical movement that was guided by a theological worldview that, as part of its framework, perceived social justice as a moral stance with the goal being to mobilize for alleviation of conditions inimical to the realisation of social justice. “When I give food to the poor,

14 It is understood, however, that conventional indicators of development are not totally irrelevant. There is justification for using them when deemed suitable within the larger scope of liberation. Measurement like rise in incomes and purchasing power, industrialization, technological advances and social modernization can have their proper place in the larger picture if used appropriately.

15 Center for Democracy, Development and the Rule of Law, Program on Liberation Technology website page: <http://cddrl.fsi.stanford.edu/libtech/> (visited December 16, 2015).

they call me a saint. When I ask why the poor have no food, they call me a communist,” said Dom Hélder Pessoa Câmara, one of the prominent figures associated with the liberation theology movement. Another known figure of that movement is South African Archbishop Desmond Tutu, whose record of anti-apartheid struggle was consistent with his words that, “to be neutral in a situation of injustice is to have chosen sides already. It is to support the status quo.” An intellectual representative of the liberation theology movement was Paulo Freire, the educator and philosopher who wrote *Pedagogy of the Oppressed* (1984). In his seeking to merge adult/literacy education with sociopolitical critical awareness, Freire introduced to the global critical literature the concept of ‘conscientization’ which is defined as the process of becoming critically conscious of structural sources of oppression in society as obstacles to genuine development. The process of education, to Freire, is a process of engagement with the masses. “Human existence cannot be silent, nor can it be nourished by false words, but only by true words, with which man transforms the world. To exist, humanly, is to name the world, to change it.” (Freire 1984, 77). Freire’s work is mainly about promoting education—not any education, but one engaged in critically addressing social reality—as a conscientization and emancipation process. Critical education is thus one field where theory and practice come together (praxis). Similarly, technological development is another field in which the call to praxis – conscious, strategic planning and implementation – is made.

The main lesson taken from liberation theology is that theology by itself can support one position or another in social dynamics. Theology can be, and had been, used to further interests of elites and exploitative trends in history. Yet it can also be used to further progressive notions of liberation, social justice, empathy and mindful action for desired change. Indeed it has been used in that manner multiple times in history as well. The same, in that particular quality, can be said of technology. By itself, technology takes no particular sides in social dynamics. The gears will turn—if assembled correctly—regardless of who is turning them. An automotive vehicle will obey the laws of physics and move from point A to point B if all the conditions for its movement are satisfied. Yet technology can also be deliberately employed and integrated in a process of liberation; as described above and as will be discussed in the book.

Book outline

Following this introduction, chapter one presents a theoretical elaboration for understanding and perceiving technology, institutional dynamics, and technological change. It explores and builds a definition of technology from a historical and developmental perspective. This exercise in defining technology seeks to clarify technology's function in human existence, particularly the socio-ecological existence. The chapter then discusses the three main conditions that influence technological change processes in developing societies: technology-institutional dynamics, the dichotomy between traditional and modern technology in key sectors, and development priorities of societies. The chapter also demonstrates some models of technological change, and examples of different manifestations.

Chapter two contains the main proposal of this book, which is that in addressing technological change processes in developing societies technological autonomy is paramount. The chapter begins with proposing and explaining the framework and fleshing-out its variables (purpose, tools, and elements). The discussion of technological autonomy shows this to be the attainment of a sufficient level of self-determination in planning and managing technological matters for a society.

Chapter three sheds light on the agents of technological change—the bodies, groups and organizations that initiate and operationalize technological change processes in contemporary societies. The chapter identifies which the chief agents (the state and a few others) are, in addition to their characteristics, what roles they often play and under which circumstances.

Chapter four discusses important sources of influence on technological affairs of societies, such as the political atmospheres, ecological systems and cultures (or cultural institutions). Within each of these influences, and in their interfaces, technology permeates complex institutions and navigates through tough balances. This chapter touches on broad, and seemingly sporadic, subjects, but the general point is that technology interacts extensively with each of the grand influencing phenomena shaping our contemporary lives and we cannot afford reductionism when engaging technological change processes. We live within states, exist under complex ecosystems, and interact through very diverse and persisting cultural and social systems – such as educational systems, languages, division of labour, communication networks, etc. This chapter explores how to navigate through this myriad of elements and connections with technological change in mind.

Chapter five is dedicated to one specific point within the main topic of liberation technology: technology and justice. The choice to dedicate a chapter to the topic of justice is because justice is central to development and to liberation, and this book is about technological development as a vehicle for human development and freedom. Sustainable development seeks that people attain better lives because they are worthy of it by virtue of being human. That is a value judgement on human life—it is the worthiness of humans that entails they should have their needs satisfied, live in reasonable comfort and that there be room for expressing aspirations. Because of that value judgement we find that measures of pure material progress do not suffice in expressing matters of technological development from this perspective. The topics the chapter addresses include issues of modernization vs. westernization, as well as brain drain migration from the economic south to the north (as a problematic phenomenon for developing societies and beneficial for industrialized ones). Issues of gender and technology in developing societies are also addressed. A discussion of alienation and dispossession as they relate to the challenges of technological change is also included. The chapter also talks about ICTs as a double-edged sword that could work either for supporting and enhancing justice or for subverting it (depending on how it is used). The chapter also talks about justice in the factory, which is the temple of modern technology and where it is both optimally utilized and gives birth to the products that shape contemporary lives. Finally, a chapter on technology and justice would not be complete without addressing the issue of poverty in the presence of globally capable technology.

Chapter six, being the last, is relegated to further discussions – or selected stories – that generally take the form of case studies. These discussions and stories are meant to bring together the various issues mentioned in the former chapters and examine them in real historical cases. It first discusses the phenomenon of appropriate technology – what it means, what are its goals and how it came about – followed by a critique of theory and practice relevant to today’s international development circles. The second discussion is a look at dams and development, as mega technological projects (large dams) in contexts of active pursuit of energy (hydropower) and agricultural growth (irrigation). Stories of dams and development from two different developing regions of the world, the Nile basin and India, provide substance for a discussion of large dams in developing countries: how much they cost in economic, social and ecological costs and how do

these costs measure compared to the alleged benefits. Finally, the chapter discusses a particular story of a countrywide rural development scheme in as far as it has a theoretical affinity to technological self-reliance and localizing development visions—the story of Ujamaa rural development scheme in Tanzania, in the third quarter of the twentieth century. Was the practice, or implementation, of Ujamaa consistent with its original vision? And what can we learn from that unique experience?

A short section of last remarks concludes the book. Those remarks are neither a summary nor a conclusion of the whole book. The way the chapters are structured does not require either for the readers. Final remarks are meant to stress and emphasize a few notes the author would like to leave readers with.

Guiding notes for the readers

One thing that was considered in this book, but then dismissed, was unifying some terminologies that are widely used in the relevant literature. For example, in the development literature there are many names for developing countries: sometimes they are called the third world, sometimes low-income countries (or low and middle-income countries), sometimes less (or least) developed countries (LDCs), post-colonial societies, and sometimes the economic South.¹⁶ The same for developed/industrialized societies: sometimes called the economic North, sometimes industrialized countries, developed countries, and other names.

This plurality of terminology applies to other phenomena in the field of development, itself a wide field that envelops aspects of many other fields of inquiry. While some may argue that each term within a category does not mean exactly the same thing as another, and while I can in principle agree with that, that level of specificity does not often apply to universal phenomena and arguments within the field. I opted for keeping this diversity of terminology in the text and using terms deemed suitable in different contexts. I did not see a major point in choosing and

16 The term “economic South” was coined by the Non-Aligned Movement countries to describe the bloc of countries who share the common experience of development challenges, a history of colonization and an economic dependency relation with the ‘first world’ countries (or economic North). The term encompasses countries that belong to this category but are located in the northern hemisphere, and vice versa, by distinguishing ‘Southernness’ here as an economic-historical identity, not necessarily geographic, yet it is also the case that the majority of these countries are actually located within the southern hemisphere. For the record, I think this term is probably the most relevant for the themes of this book, but nonetheless I prefer to be able to use the other terms where I see suitable.

committing to limited terminology for the entire manuscript. On the contrary the allowable freedom to use a variety of terms was felt to be to my advantage and not deemed to negatively affect the flow of main points and arguments.

A big part of this work is an amalgamation of many writings of the recent past. Particularly, the technological autonomy conceptual framework and the core literature review about technological change and development draw on the author's doctoral thesis and research. Other parts of this book consult, and draw from, scholarly papers and opinion essays by the author, some published before, in various media, and some yet unpublished. All sources, however, were modified to various degrees to comprise a single manuscript format. That being the case, the book's language and arguments will reflect this. Clear and accessible language, however, were a main goal and I hope this was achieved sufficiently.

The book also tried to strike a balance between generalizations and details. It would not have been sensible to produce a detailed and jargon-filled treatise to share ideas on a topic that should be as public as possible. Similarly, it would not have made sense to generalise, without evidence and rigour, about a topic that requires both, and thrives on both, at its core. I hope I have succeeded in this aspiration.

Additionally, while the book addresses a problem relevant to all developing societies, readers will notice a tendency to address the multiple aspects of this problem through a lens and using examples mainly associated with, but not limited to, Africa. There is no oddity in this, for it is common that writers who address global problems – such as in the development literature – communicate on global platforms but draw mainly on experiences that are associated with regions of the world they are more familiar with, be they South Asia, Latin America, the Caribbean region, or the Middle East. The main issues are common; the details vary but are not totally alien to other contexts.

A last note: occasionally it is important to state the obvious. In that spirit I assert that this book could not have addressed all the aspects of technology, development and liberation, neither in breadth (i.e. the broadness of topics that belong to the spectrum of technological development) nor in depth (i.e. the layers in each topic). Yet the book sought to deliver a comprehensive argument for a keen approach to technology—a liberation technology.