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Laying the Tracks: The Political Economy of Railway Development in Ethiopia's Railway Sector and Implications for Technology Transfer

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ABSTRACT

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FOLLOWING THE INTERNATIONAL SURGE OF CHINESE capital and companies in the last decade and the rise of the Belt and Road Initiative, many African countries have sought Chinese financing and technology for significant infrastructure investments. Railway construction is one manifestation of China's economic statecraft in Africa and a sector that African leaders have eagerly leveraged. This paper examines the case of Ethiopia's Chinese-financed railway projects, including the Addis-Djibouti Railway, contrasting it to Ethiopia's experience with subsequent European/Turkish financed projects.

Through the lens of African agency, the case shows the opportunities, missed and taken, by Ethiopian actors in leveraging external partners, focusing on areas of technology and skills transfer. The different financing arrangements entail different relationships—one politicized, one commercial—offering different scopes of bargaining power: while the political relationship offers greater flexibility regarding financing, the commercial project has been more successful for exercising agency in relation to contractors.

INTRODUCTION

The ubiquity of Chinese capital is visible across the Addis Ababa skyline: from skeletal skyscrapers and airport terminals, to the new modern light rail that glides through Meskel Square. Ethiopia has been a major beneficiary of China's "going out" in Africa, which has seen growing flows of trade, investment, as well as aid and development finance between the two regions. After Angola, Ethiopia is the second largest African recipient of Chinese loans, much of which is channeled into supporting the country's infrastructure and industrial development strategy. In turn, Ethiopia has sought to emulate the East Asian development experience.

One sector that has received major attention is transportation, specifically, railways. As well as the Addis Ababa Light Rail Transit project, the new Chinese-built Addis-Djibouti line (or Ethio-Djibouti Railway) opened for commercial operation in 2018. Financed by China's Eximbank, it is the first railway constructed in Ethiopia since the French-built *chemin de fer Djibouto-Ethiopien* (CDE) over a century ago. Ethiopia's government has used rail investment as one part of a wider industrial strategy that seeks to use infrastructure investment to facilitate economic corridors. By lowering the economic and transaction costs of logistics, infrastructure investment can facilitate industrial zone development, boost export sectors, and contribute to the long-term structural transformation of the economy.

Railways have also been one manifestation of China's economic statecraft in Africa, which has used state financing—primarily commercial and concessional loans from China's Eximbank—to support state-owned enterprises (SOEs) in winning overseas contracts. China's technical capacity and expertise in railways has been a comparative advantage abroad. However, in African contexts, railways have also been associated with the colonization of Western powers into African states, reflected in the extractive design of colonial railways that connect inland resources to ports and colonial metropoles.[1]

In the China-Africa relationship the Addis-Djibouti railway (ADR) is symbolic as the first Chinese railway project in Africa since the Tanzania-Zambia (TAZARA) railway, built in the 1970s with Chinese aid. "Belt and Road Initiative" discourse has also enfolded the Horn and East African regions, making them strategically valuable in Chinese foreign and economic policy. In Kenya, China Road and Bridge Construction Company (CRBC), supported by China's Eximbank, has constructed two phases of a standard gauge railway from Mombasa to Nairobi, initially planned to extend to Naivasha and to the Ugandan border.[2]

Unlike Kenya, however, where Chinese companies and capital dominated the entire railway network construction, Ethiopia's network is more fragmented. While Ethiopia turned to China for its first railway projects, for subsequent routes—an extension from Awash into northern Tigray—it chose instead to work with a Turkish contractor, with financing from the Turkish Eximbank and a consortium of European financiers including Credit Suisse, generating a diverse market of actors, firms, and financiers. This paper looks at how Ethiopian railway actors have leveraged different players in the railway market and asks, what have been the impacts of different foreign financiers

and contractors in railway finance, design, implementation, and technology transfer? The paper draws two conclusions: firstly, Ethiopian decision-makers showed decisive agency in some aspects of the railway, including its design and implementation. However, this agency is limited by the nature of the finance-contractor relationship: the Chinese built ADR is premised on a political and strategic relationship, in contrast to the European-Turkish line, which remains commercial in orientation. This has given Ethiopia advantages in leniency and flexibility, as evidenced in negotiations around loan repayment with their Chinese partners. However, relations with Chinese contractors have been more challenging, with implications for technology transfer and the railway's long-term sustainability.

METHODOLOGY & IMPLICATIONS

Fieldwork studies were conducted between May-June 2018 and in January 2019, comprising over 40 primary interviews with Chinese and Turkish contractors, the Ethiopian Railway Corporation, and other relevant government agencies. I adopt a process-tracing approach in analyzing chronology of the projects, the key policy decisions, and also observed cases of skills and technology transfer.

Ethiopia's case highlights the significant role that international contractors play, as political entrepreneurs and actors that initiate, facilitate, and mediate between domestic and international actors. Comparing the two major railway projects shows evidence of the substantial influence financiers exert in project implementation, including in social and environmental areas. The case also highlights the importance of technical capacity on the part of recipient African governments: when negotiating with external partners.[3]

COLOSSAL CAPITAL: INFRASTRUCTURE FINANCE PLAYERS IN AFRICA

CHINA'S RISING STAR IN AFRICA

While much of China's engagement in Africa has been viewed through the lens of resource and commodity trade, Chinese capital has also been flowing into Africa in the form of investment and lending. Chinese state financing after the 2000s has supported large swathes of infrastructure investment across Africa and the developing world and Chinese construction contractors, often winners of World Bank construction projects, have been responsible for many more.[4] This rise in infrastructure lending accelerated after the global financial crisis at a time when major western lenders were unable and/or unwilling to support large infrastructure in Africa despite the "infrastructure gap".[5] In China, industrial overcapacity at home and the lure of untapped markets abroad have also pushed investors and firms overseas.[6] Simultaneously, China's foreign economic policy has encouraged and supported Chinese (usually state-owned) companies in "Going Out" through preferential incentives and benefits, as well as through its policy banks, China's Eximbank and China's Development Bank, which offer favorable and quick loans to governments on conditions of procurement of Chinese goods.

Much of these flows have been channeled through the Forum of China-Africa Cooperation (FOCAC) political initiative, the triannual summit that serves as a platform for bilateral meetings and engagement. The more recent Belt and Road Initiative (BRI), which aims to foster economic connectivity across the Eurasian 'belt' and maritime routes—partly through investments in transportation and communication infrastructure—is the latest emanation of this policy impulse. Though their inception pre-dates the official Belt and Road discourse, both the Light Rail and ADR, the Kenyan SGR, the new Chinese naval and logistics base in Djibouti, and commercial port investments have all been folded into the BRI.

Elsewhere, Chinese companies bringing Chinese high-speed rail technology have competed against European and Japanese firms to construct lines in Southeast Asia and North Africa.[7] Having developed through foreign technology transfer and deliberate government support, Chinese rail technology was designated a key strategic sector, and the 'supply-chain export' of its manufacturing chain that international railway projects now allow a key opportunity to offshore Chinese domestic overcapacity.

Compared to traditional infrastructure financing from multilateral development banks (MDB), Chinese loans do not mandate the same kind of open competition as World Bank or other MDB financing and infrastructure finance guarantees are instead tied directly to procurement of Chinese goods and services. Chinese loans are often characterized as "no-strings attached", as they lack the same kind of conditionality over environmental and social protections that MDB or western financing dictates, generating criticism and concern over their environmental impacts in the context of weak governance and institutions.[8] Chinese labor relations have also been a source of controversy, as local employment and treatment of labor has been a source of unrest in Chinese resource and construction sector projects.[9]

Chinese-financed projects and infrastructure also face long-term project sustainability issues. The decline of the Tazara railroad after the departure of Chinese engineers, despite efforts in skills training, was a failure in long-term knowledge transfer and in the self-dependence principles that Chinese aid purported to represent.[10] The current surge of Chinese infrastructure projects presents similar risks, but also opportunities, to correct these earlier failures.

The Young Turk in Africa

Ethiopia's railways offer a singular perspective into the diversity of 'emerging powers' on the African continent, as a contested site of interest for multiple emerging powers. Turkey has emerged as a major player and competitor to China. At the time of its agreement in 2013, Turkish Eximbank's loan to Ethiopia for the Awash-Weldiya railway was the largest loan package issued to date.

Turkey's emerging relationship with the African continent shifted in the 2000s under the Justice and Development Party's leadership, where its foreign policy moved to diversify its global engagement towards the Middle East and Africa.[11] Turkey's engagement with Africa parallels

China's rise as a global development actor. Turkey declared 2005 "The Year of Africa" (ironically, a year before China did the same in 2006) and launched a tri-annual Turkey-Africa Cooperation Summit in 2008 as a platform for bilateral relations between Turkish and African leaders—mimicking China's FOCAC, which has become the most prominent Africa-oriented bilateral forum, among similar summits organised by Japan and the US.[12] As well as building deepening relations with the African Union, Turkey has enhanced its commercial presence in Africa by expanding Turkish airlines throughout the continent and extending security cooperation efforts in Somali and Sudanese conflicts.[13] Though lacking China's financial capacity, the Turkish Eximbank has also been a decisive policy instrument in supporting Turkish companies to win overseas infrastructure contracts.

Although Turkish contractors are privately owned companies, rather than SOEs, they have the advantage of connections to European and Western private capital. In addition, Turkish firms' business associations also have strong links to the government and serve as instruments of the state's overseas interests, which parallels the role of Chinese SOEs abroad.[14]

ETHIOPIA'S RAILWAY AMBITIONS

Like the industrializing Asian economies in the 1980s-90s, Ethiopia's leadership under the Ethiopian People's Revolutionary Democratic Front shared the characteristics of a "developmental state": an assertive central state with a strong orientation towards economic growth and poverty reduction.[15] Under the late prime minister, Meles Zenawi (1995-2012), Ethiopia consciously borrowed the experience of newly industrialized Asian economies, attracting FDI in targeted export-industries, as well as leveraging capital from both traditional aid donors and alternative 'rising powers' like China.[16] China has become a major financier across several economic sectors, including sugar-processing plants, hydropower, and several major industrial zones.[17]

Infrastructure is a crucial component of the government's long-term development strategy, and an integral part of Ethiopia's Growth and Transformation Plans (GTP I and II), which aim to structurally transform the economy from an agrarian base to an industrial and manufacturing powerhouse over five-year intervals. Railways are one part of this industrial strategy. By lowering the economic and transaction costs of logistics, Ethiopia seeks to facilitate industrial zone development and its export and manufacturing sectors, in turn promoting the long-term structural transformation of the economy towards higher technology, value-added sectors. Rail investment is also connected to the concept of "Transit-Oriented Development", where urban and cross-national railways raise land values and stimulate the development of industrial and commercial corridors.[18] In the early 2000s, led by a Technical Advisory Group under the Ministry of Transport and Communications and driven by the office of the Prime Minister, the Ethiopian government laid out a Master Plan for nine railway lines across the country, a total network of 5,060 km.[19] This network served not only economic purposes but also as an instrument for political and social cohesion.[20] In 2007, the Ethiopian Railway Corporation (ERC) emerged and was tasked with managing future railway development.

But Ethiopia was no stranger to railways. Built by the French in 1897, the Addis-Djibouti corridor was originally the site of a narrow-gauge railway, which from 1981 on was run by the CDE company, jointly owned by Ethiopia and Djibouti.[21] While the old railway had been operating for the better part of a century, historically spurring the economic development of Ethiopia's second largest city, Dire Dawa, it suffered major infrastructure maintenance and management problems, falling into disrepair. In the mid-2000s, Ethiopia turned to European partners to rehabilitate the railway. In 2009, the European Commission offered 50 million euros in development aid to finance its refurbishment. However, the French Development Agency (AFD) was unable to extend the sovereign concessional loans to the project that would have helped support a concession.[22] The final sum was considered far too low— "50 million is a peanut" quipped one respondent—and after multiple delays and conflicts with the contractor, the refurbishment was eventually abandoned around 2011. Meanwhile, the old CDE was retrenched, with most of the staff absorbed into the state-owned Metals and Engineering Technology Company (METEC).[23]

In the face of this, Ethiopia began negotiations with new partners for an electrified railway line. While both Brazil and India showed interest—Indian consultants were also involved in initial pre-feasibility studies—it was Chinese contractors and Chinese financing that won the contract. Railway finance was agreed as part of these high-level bilateral talks that strengthened the diplomatic and economic relationship between China and Ethiopia, which also pledged support for a new industrial sugar plant at Kuraz and the Grand Ethiopian Renaissance Dam transmission line.

Railway Projects in Ethiopia

Of the nine originally planned major national routes, this paper focuses on the two completed national lines: the Addis-Djibouti line and the Awash-Weldiya Line (a further extension from Weldiya to Mekele has stalled in construction, see map in Appendix A). An urban light rail project, the Addis Ababa Light Rail, was also built under the ERC's supervision. This section outlines the chronology of the projects, their material and technical differences, as well as challenges they face.

The Addis Ababa Light Rail Transit project (LRT)

The Addis Ababa Light Rail Transit (LRT) project was the first rail sector project to be contracted, constructed, and commissioned while also laying the ground for the Addis-Djibouti project. The LRT project was awarded to China Railway Engineering Company No. 2 Bureau (CREC) in 2009, and the Ethiopian government's representative was Swedish transport consultant SweRoad. Financing came in the form of a US$ 475 million loan from China's Eximbank to the ERC, signed in 2011. The loan was set at a commercial rate (see Appendix B), with a 23-year tenor and three-year grace period. Construction began in early 2012 and was completed in 2015, though as of 2019 some parts of the contract were still unfulfilled according to some ERC employees.[24] Since its completion, a three-year contract for the operations and management (O&M) of the LRT has been awarded to a Chinese consortium between contractor CREC and Shenzhen Metro—the latter's first overseas venture. During this O&M contract, the project was expected to transition to build local

capacity with the goal to be solely under Ethiopian management. As of early 2019, the O&M contract had been extended another year to August 2019.

Addis-Djibouti Standard Gauge Railway (ADR)

The Addis-Djibouti railway (ADR) is considered a 'lifeline' as the corridor forms a backbone that connects landlocked Ethiopia to the major regional port in Djibouti, and is intended to replace the single, poorly maintained road from Addis-Assab, which previously channeled the majority of Ethiopia's import and exports.[25] The 656 km standard gauge railway is double-track between Addis Ababa and Adama, and single-track until its endpoint in Nagad, Djibouti. Like the Kenyan SGR, Chinese contractors offered a modern railway with a completely new standard-gauge width track, based on Chinese technology and design for Chinese locomotives, and Chinese train control system (CTCS) for signaling and communications.[26] Unlike the Kenyan SGR, the ADR has the added feature of being electrified along the entire route.[27]

Financing for both construction and the power transmission lines were provided by China's Eximbank in two separate packages. Project construction was financed through a US$ 2.49 billion commercial loan. The Ethiopian government, notably, divided the construction contract into two sections, from Addis Ababa to Mieso, and from Mieso to Dewele at the border with Djibouti, in order to foster competition and faster completion. As contractor for the LRT, CREC was a competitive choice for the Addis-Mieso section, with the idea that the railway would eventually be linked to the urban LRT; meanwhile CCECC won the eastern section from Mieso to the Djiboutian border. Contracts were signed at the end of 2011 and construction began in 2012. After winning the Ethiopian contract, CCECC promptly crossed over the border to lobby the government of Djibouti for the Djiboutian segment of the contract as well, and facilitated finance from China's Eximbank.[28] A separate loan package for rolling stock procurement was arranged with the China North Industries Group (Norinco), who later signed a contract with Ethiopia's METEC to assemble wagons domestically.

Ethiopia already had a bilateral commitment with China to finance a railway on the provision that Chinese contractors would be awarded its construction. However, a conflict arose regarding the Ethiopian government's representative. Originally, the ADR project was going to be supervised by SweRoad, the same consultant who supervised the construction of the LRT on behalf of the Ethiopian government. However, under pressure from Chinese financiers, the contract with SweRoad was severed and replaced with a Chinese company, the CIECC, instead.[29]

Implementation of the project was also complicated by inter-governmental negotiations with Djibouti over joint management as well as immigration issues, delaying construction. The two countries created a joint company, the Ethio-Djibouti Railway (EDR) to manage the line but negotiated at length over ownership shares, eventually compromising with a 75:25 split in favor of Ethiopia, compared to the 50:50 of the old CDE line.

Power has been a major obstacle for the project during its construction and operation phases. Electrification was strongly pushed by the Ethiopian government, who intended the ADR project to run on 'clean' energy from Ethiopia's abundant hydropower resources. However, the construction of transmission lines and lack of power delayed the commissioning of the railway for over a year, even when project construction was complete.[30] Since commencing commercial operations in early 2018, power problems have persisted due to overvoltage issues, causing repeated service interruptions.[31]

Awash-Kombolcha-Hara Gebeya (Weldiya) Railway (AKH)

The second line to be tendered and constructed was the Awash-Weldiya line, the first of two sections that would connect the Addis-Djibouti railway at Awash to Mekele in the northern region of Amhara. The economic rationale for the line as a port corridor is weaker. Instead, its' prioritization implicitly reflects the pull of Tigrayan regional politics. The Awash to Weldiya section, commonly referred to as the Awash-Kombolcha-Hara Gebeya line (AKH), was contracted to Turkish construction giant Yapi Merkezi, who had also beaten out Chinese contractors for the SGR project in Tanzania, while the second segment from Weldiya to Mekele was contracted to Chinese Communications Construction Company (CCCC) (See map in Appendix A).[32] The Turkish-built section began construction in 2014 and is close to completion, however, work on the northern section under CCCC has stalled due to lack of financing.[33]

Financing is a major point of contrast between the ADR and AKH projects. After winning the construction contract in 2013, Yapi Merkezi played a significant role in facilitating a US$ 300 million loan from the Turkish Eximbank—at the time, its largest loan package issued to date—as well as subsequent financing from European partners, including Credit Suisse, who supported the project with a total US$ 1.1 billion loan. Export credit agencies from Denmark, France, Italy, Sweden, and Switzerland contributed financing for respective national equipment and components suppliers. Though other Chinese firms competed for the contract, they could not guarantee Chinese Eximbank financing at that time. As the best value and most technologically advanced package offered, Yapi Merkezi was the ERC's first choice.

Notably, the AKH railway follows European technical and social standards. Material differences between projects include preference for composite bridges over concrete, and the use of *long-welded* rail instead of the older *fish-plate* technique.[34] European financiers also exercised much more stringent requirements for social impact management schemes for displaced communities along the route, requiring compensation for land and follow-up to ensure water and sanitation services were provided to relocated communities. However, some railway design aspects have had to accommodate to standards set by the Chinese ADR, like path-dependent systems favoring Chinese firms and technology standards. For example, beyond being standard gauge, specifications for tunnels and curvatures of the route were altered to accommodate larger Chinese locomotives rather than the smaller European trains they were originally designed for.

A key technological divergence between the projects is the signaling systems employed between the two railways: The Awash-Kombolcha-Weldiya/Hara Gebeya uses European technology (ERMTS Level 1) and a more advanced system than the Chinese CTCS. These have been subcontracted to the Canadian-Italian locomotive division of Bombardier transportation, and is also used in the Tanzania railway project contracted to Yapi Merkezi.

The two signaling systems present a logistical challenge for the AKH's integration with the main ADR trunk line. Challenges are twofold, first in terms of the hardware to integrate the sections of rail track and of onboard equipment for the Chinese locomotives, and second the technical and management training for staff to operate between the two lines. Ensuring cross-compatibility between the two systems also requires additional funding, a perennial challenge to Ethiopia's cash-strapped railway corporation. One respondent noted that, "even if we install everything, we cannot test it because there is no power supply", as a major challenge has been the financing and construction of corresponding transmission lines to power trains on the AKH line.[35] As of late 2020, track-laying is complete, but the line is still in testing phase and not operational.

CAPACITY CHALLENGES: TECHNOLOGY TRANSFER AND IMPACT MANAGEMENT

While managed by the same domestic institution, the ERC, the sources of financing, as well as choice of foreign contractor, have distinctly influenced the implementation and operation of the ADR and AKH railway projects. This section comparatively discusses the experiences of the two projects in technology transfer and capacity building, which have been a major challenge for the railway projects, before noting differences in social and environmental management.

Technology and Skills Transfer

New railway technology can foster inter-firm spillovers by encouraging industrial clustering, but also has the potential to generate a broader supply chain in services, retail, and equipment and parts manufacturing. The presence of foreign or transnationals firms can be a source of knowledge spillover essential for this process.[36] Most directly, the operation and maintenance of new imported railway technology also creates demand for skilled labor and necessitates large-scale development of human capital—what is sometimes known as the *skill-enhancing trade hypothesis*.[37] For the operation of new railway projects, a key technology transfer is of the skills and "know-how" needed to operate and maintain assets.[38] Construction contractors may provide technical, but also *managerial* skill transfers.[39] A new railway system requires technical staff, including drivers and engineers, but also entails a parallel "soft" infrastructure in the form of management structures to administrate, regulate, and maintain new assets.

China's own railway history demonstrates these possibilities. Foreign-built railways in the 19th century were driven by Japanese and Russian occupation, but the railway bureaucracy also created a class of Chinese technical staff and professionals that became a powerful political force in government.[40] Chinese railway administrators sent to the US in the 1910s also adopted American models of technical training and infrastructure organization. Nearly a century later, China's

high-speed railway industry strategically leveraged foreign investment from German and Japanese locomotive technology to develop their own indigenous high-speed rail, which it now exports abroad.[41] This is a tertiary form of technology transfer, where knowledge has been sufficiently localized so that "domestic innovation capabilities" are possible.[42]

A major divergence between the Turkish and Chinese projects have been their approach to capacity building and technology transfer. While the Chinese-built project entailed broader educational exchanges and a long-term capacity building program by the contractors themselves, training in the construction phase was comparably weaker, compared to the Turkish contractor. Neither project had enforced local content requirements and linkages with local firms were minimal. Finally, though there have been attempts to localize railway wagon assembly in Ethiopia in cooperation with a Chinese firm, this has not been successful. We detail these initiatives and challenges below.

A. University Exchanges and Formal Training

Compared to Turkish/European partners, training in Chinese projects entails broader cooperation, including formal student exchanges and collaborations with Chinese specialized railway universities, including China Central South University (Changsha, Hunan), Southwest Jiaotong University (Chengdu), and Tianjin Railway Vocational College. Around 200 ERC staff were sent to Tianjin in 2015, with 126 awarded driver training certificates.[43] CCECC also offered scholarships for their various African railway projects, including scholarships for 10 Ethiopian staff and 30 Nigerian students in 2018, to specialize in either engineering, transportation, or construction.

Other formal collaborations have occurred with the Addis Ababa University Institute of Technology (AAIT), which plans to offer a five-year joint degree in conjunction with the Central South University in China. Through World Bank funding, AAIT has also started a domestic training institution for railway specialists, creating an African Railway Centre of Excellence, which plans to train engineers and specialists from Djibouti and Kenya.[44] The first professors were also initially trained at Southwest Jiaotong University in China: nine took a one-month course, while 15 were awarded their Master of Science in China. These higher-education linkages with China extend China-Ethiopian cooperation beyond a single project or sector and serve to institutionalize Chinese railway practices further in Ethiopia's rail sector.

More recently, with the support of Chinese grants and a new concessional loan, Ethiopia has secured the construction of a new Railway Technology Transfer Academy, which will offer vocational training for the entire railway network. While agreed upon bilaterally in 2014, funding for its implementation (an RMB 373 million MOFCOM grant) was only secured in 2018. Design, feasibility studies, and clearing of the site in Bishoftu were still underway at the time of this research.[45]

B. On-site training and skills-transfer

Despite the strong emphasis on training initiatives through university exchanges, ERC respondents lamented the lack of capacity building and technology transfer from the Chinese contractors. While stipulated in the construction contract, training ultimately "fell short of expectations".[46] In contrast, with Yapi Merkezi, the ERC agreed on a training schedule as part of the construction contract which involved "aggressively training" around 40 of ERC's own engineers on site under the supervision of the Turkish firm.[47] Part of this agreement was a push within the ERC to develop capacity for their own in-house subcontractor, an initiative of the previous director. After six months, trainees were hired by the project, and some have been promoted in Phase II of construction.[48] Yapi Merkezi's project director also noted they had 100 mechanical engineering interns on site and 500 local personnel who were promoted to professional positions in design, finance, signaling, and electrification.[49]

Part of this discrepancy lies in the approach the ERC has taken with the two sets of project contractors. One respondent conceded that during construction of the ADR, priority was put on speed and project completion, to the detriment of capacity building goals. Indeed, the very fact that the Chinese construction contractors now taking on O&M have no operations experience signals a failure in adequate capacity-building and forward planning during construction.[50] Some respondents implied that the contractors were pressured to take on and bid for the O&M contractors by Ethiopian partners, who refused to accept project handover unless contractors continued their involvement in the O&M phase.[51]

Capacity building is now built into the O&M contract.[52] The Chinese CREC/CCECC consortium has established a capacity building center based at Labu station in Addis and at the Indode locomotive depot, as well in Dire Dawa and Djibouti.[53] Local staff are trained in five main technical areas, including locomotives, maintenance, driving, signaling, and electrical engineering. In 2018, CCECC staff and visiting lecturers from Tianjin Railway University trained a new cohort of around 30 students on-site, representing a shift in training from exchanges to localized centers. The process will be a lengthy one. During on-site training for local drivers, staff commented that even in the Chinese context, training would often require a minimum of 18 months. In Ethiopia it would likely take far longer, particularly for drivers and maintenance engineers, given students' lower standards of education and lack of hands-on experience.[54]

The language barrier is a major difference between the Turkish and Chinese projects for training. Yapi Merkezi has a built-in advantage given their working language is English; documents and technical blueprints are also translated to English for ERC staff. The language barrier was a tougher situation for Chinese contractors to overcome, and, and hampered direct training. In the LRT, technician training sessions sometimes required a translator plus instructor, an expensive and awkward format where information was lost in translation. In the ADR, training sessions for aspiring train drivers relied on CCECC technical staff to teach themselves the necessary English terms and then go on to train the Ethiopian students, which was effective but slow.[55] Lack of English was also a barrier for ERC staff to communicate their demands with Chinese partners.

Additionally, and compared to the relative transparency they experienced with Yapi Merkezi, accessing Chinese technical documents was more difficult—often documents would be untranslated, or inaccessible to the ERC without authorization from headquarters in Beijing.[56]

Even between Chinese companies however, company culture seems to play a role. One interviewee noted that the various Chinese contractors "are not equivalent".[57] Comparing the Chinese-built LRT project and the ADR, the latter seemed to be behind in terms of capacity building. After three years, driving and daily operation of the LRT had been completely handed over to Ethiopian staff, with a skeletal Chinese staff for "backroom" support and "project sustainability".[58] Driver training began before the project had been completed via student exchanges to Tianjin Railway University, and the project director commented on the smooth transition from Chinese drivers to domestic trainees over the course of the three-year O&M contract with CREC and Shenzhen Metro (SZMC). The presence of SZMC, a company with experience in rail operations, appears to have made a difference in terms of capacity building in the LRT project. In contrast, with the ADR, most of the driver training courses took place only after the railway commenced operation and construction of the Indode maintenance and capacity building training center was completed.

c. Subcontractors and local content

Neither railway project enforced local content requirements and there is little comprehensive information on subcontracting. In all cases, major subcontractors for signaling and electrical systems were awarded to foreign companies.

In the AKH railway, the project manager noted that local earthworks and civil construction contracts were awarded to domestic contractors, including 255 subcontractors. This accounted for the15 percent of the project cost paid in Birr. There were no comparative figures for the Chinese project. Commenters noted the ERC "encouraged" them to use local contractors and promote technology transfer but did not enforce this.[59] This hands-off approach meant there was little pressure on Chinese contractors to localize.

A further political economy factor is the 'export-supply chain' philosophy that Chinese railway construction firms promote. By design, the project involves Chinese standards and specifications, entailing wholesale export of other Chinese firms and products in the construction, operations and maintenance, and the supply chain—what one respondent described as a "*zhongguohua*" or Sinicization of the railway. The industrial promotion policy is potentially at odds with the goals of Ethiopian actors to foster technological transfers and ownership, and fuels distrust of Chinese firms' motivations.

d. Supply Chains and Partnerships

In China, foreign firms and investors in railways and other sectors were legally obliged to partner or form joint ventures with local firms, who then benefit from exposure to foreign technology and management. Overseas, the opposite occurs. Though there have been joint ventures between

Chinese companies, there are few formalized linkages with domestic Ethiopian firms. One prominent exception was in rolling stock procurement. For example, Chinese SOE, Norinco, was contracted to procure locomotives and wagons for the new ADR line. For flat wagons, Norinco formed an agreement with Ethiopian SOE METEC's locomotive division to assemble 550 basic flat wagons to be used for container freight.[60]

While this was a positive example of localizing assembly and manufacturing processes, the initiative has been plagued by financial and political scandal. Only 330 of the original 550 wagons have been fully assembled. According to representatives at METEC, the collapse of the exchange rate around 2013 left them unable to purchase further inputs, putting their plans for a new assembly and manufacturing plant in Dire Dawa on hold.[61] More recently, METEC senior officials have been implicated in a series of corruption scandals, suggesting wider factors in the disappearance of funds. The ongoing corruption investigation into METEC offers a pessimistic prospect for the continuation of these partnerships.

Social and Environmental Impact

Compared to the Chinese LRT and ADR, the management of social and environmental impacts in the Turkish AKH was held to much more stringent standards, due to the participation of European creditors. As one respondent noted, "European loans have a lot of requirements".[62] Although Turkish Eximbank played a critical role initially crowding in finance for the AKH, European financiers, particularly Credit Suisse, had a bigger presence during construction. In contrast to China's Eximbank's hands-off approach, European lenders sent 12 supervisors to the AKH project site for quarterly visits to monitor the implementation of environmental and social management plans. Resettled populations were required to have water and electricity and ERC was forced to budget for these expenditures when the local government in Kombolcha was unable to do so.[63] Credit Suisse employed London-based consultancy Arup, to conduct biannual visits on the lender's behalf, creating a further channel of accountability to pressure both ERC and Yapi Merkezi. For instance, in late 2018, Arup flagged a major issue with land compensation, which led Credit Suisse to threaten to cut funding and curtail ERC's ability to pay contractors. While the situation appears to have been addressed, the case demonstrates the power and willingness of European lenders to use financial tools to pressure recipients to honor social impact plans.

Although ERC respondents expressed some frustration with the stringency of "European" norms in African contexts, both the ERC and Systra MD, the employers' representative, reported being largely satisfied with the Turkish contractor Yapi Merkezi, who performed according to international standards. In contrast, the Chinese contractors had a less stellar record. Claiming they may have "taken the companies' side", several respondents expressed distrust in CIECC, the employers' representative, who was responsible for monitoring environmental impact management.[64] In comparison, in the LRT project the employer's representative, Sweroad, was more proactive with the Chinese contractors, in one case, forcing CREC to reinstall a section of rail considered problematic in quality, at the company's expense, after failing to follow the consultant's initial advice.[65]

Although the ADR's rural setting meant land compensation and displacement was less of an issue, the railway has still had significant local impacts. Animal crossings and animal collisions have been a frequent issue along the largely unfenced route. This has generated issues around compensation for ERC and has constrained the railway's operation, forcing a reduced speed of 50 kph to minimize incidents. The collisions have also contributed to wider local grievances against the federal government, in a country increasingly divided by fractious ethnic conflict. Beginning in late 2018, the railway was targeted in a series of security incidents, including blockades and hostage-taking, which led to a suspension of operation, and further dampened its ridership.[66]

DEALING WITH LARGE DRAGONS

African Agency and its Challenges

At various stages of the railway's design and construction, Ethiopian decision-makers exercised agency in pushing domestic interests, sometimes involving conscious trade-offs, and at times pushing against Chinese contractors and state-actors. However, while they exercised agency in areas like design, the ability of the ERC to monitor and pressure contractors was conditioned by factors related to project financing. Agency was also curtailed by capacity and technical expertise limitations.

Political considerations drove the construction of the ADR. Meeting the timeframe of the GTP Phase I was a "pressure point" for the ERC.[67] The prioritization of speed above all motivated decisions that were strategic and effective, such as the division of the Addis-Djibouti and Awash-Mekele lines into dual segments. This decision introduced competition between the contractors, and incentivized lower-cost bids from the firm during the tender process. This has been cited as one factor that contributed to the ADR's substantially lower total project cost compared to the Kenyan SGR.[68]

However, prioritizing speed led to neglect of other goals. While the main trunk line was operational by 2018, the final sea and dry-port connections took another year, and uptake of the railway by industrial exporters remains weak. Technology transfer and training during the construction were also under-prioritized, which has lengthened the capacity-building process for eventual handover and local ownership. Lack of institutional and technical capacity in the young ERC was a disadvantage in negotiating with external partners, but there has been a learning process: ERC respondents noted the stronger emphasis on skill training with the Turkish project, showing they had learned from their previous experiences with Chinese contractors.

The absence of fencing for large sections of the Addis to Djibouti route, despite it being standard design in Chinese railways, has also had perverse consequences. Motivated in part by cost-savings and considerations for local communities, this choice has generated operational problems with livestock collisions, adding to local grievances.[69] The choice of electrified railway itself was a point of contention. For the Addis-Djibouti line, Chinese contractors as well as American bidders initially submitted tenders for diesel-fueled railway systems, as in Kenya's SGR, which are more

efficient and reliable. This, however, was a point of no-compromise for Ethiopian decision-makers, who saw electrified rail as cleaner, and wanted to utilize the country's hydropower resources; contractors eventually conceded to Ethiopian pressure. However, the added complication of the power transmission system's construction and integration delayed the projects commission by a year. While the environmental rationale for electrification holds, the economic and financial costs incurred have been substantial.

Choosing China

A common refrain around the rise of China and 'non-traditional' donors concerns the positive impacts for agency and bargaining power for recipient countries, who have traditionally acted as 'rule-takers' from multilateral agencies.[70] The availability of alternative options for aid and finance ostensibly affords greater freedom of choice to developing countries. Ethiopia's case illustrates the limits of this portrayal. The period between 2005 and 2015 saw engagement from both 'traditional' and non-traditional lenders. Beyond China and Turkey, the European Commission and AFD were also active in supporting the rehabilitation of the old CDE. However, the larger cast of players did not correspond to greater choice. Respondents from ERC repeatedly highlighted that in the case of the ADR, China was the only *viable* option for financing. Particularly in the immediate wake of the global financial crisis, French and European offers could not compete with Chinese finance.

Financing is a persistent challenge. For the AKH line, Yapi Merkezi was awarded the contract because they said they could deliver the fastest possible construction timeline. Ultimately it was the company's capacity to facilitate financing for the project that guaranteed them the project, in a similar manner to Chinese SOEs. Bringing an "EPC Plus" model, Yapi Merkezi's package guaranteed Turkish Eximbank financing, as well as assistance in mobilizing other European lenders and Credit Suisse to secure total funding for the project. In the meantime, China Eximbank appears to have retreated from financing future railway projects within Ethiopia due to the ADR's lackluster performance. If there indeed was a 'marketplace' for infrastructure financing in Ethiopia, it was short-lived.

One consequence of Ethiopia's choice of Turkish/European partners for the AKH line project is that it has served to diversify Ethiopia's railway sector from sole dependence on Chinese technology. That said, Chinese railway and locomotives have enjoyed a first-mover advantage in the future development of Ethiopia's railway lines. Despite pushing European technological and environmental standards, the AKH still had built to Chinese locomotives' specifications. Furthermore, the coordinated package that China offered, through its SOE firms, sponsored training programs, facilities and exchanges, all serve to embed Chinese managerial practices and operating procedures into the future development of Ethiopia's railway network, potentially creating a technological path-dependence and advantage.

Political vs. Commercial Financing

Finally, the projects' financing has entailed divergent creditor-debtor relationships. In terms of social and environmental impacts, Chinese financing has afforded more flexibility. In contrast, European lenders closely monitor progress and have threatened to cut funding when their standards for social or environmental safeguards are not met. On the other hand, the ERC has been less able to pressures Chinese contractors, compared to the European-financed AKH project, partly due to the conditions of financing that tied them to a Chinese employer's representative.

The Chinese rail projects were a result of high-level strategic bilateral relationships, driven by political considerations as well as the optics of the Belt and Road. The projects, to paraphrase one ERC representative, were a "showcase for China-Ethiopia cooperation".[71] Despite the instrumental involvement of the Turkish Eximbank, the Turkish railway project, on the other hand, has been guided instead by the commercial orientation of major lender Credit Suisse and other European banks as a result of the blended financing options used.

Compared to private sector commercial loans, the major advantage to Chinese loans has been financial flexibility in the post-construction phase. One ERC respondent noted the Chinese were more "flexible" and "willing to support you".[72] In Ethiopia's case, the government has struggled to repay external debts due to the ongoing shortage of foreign reserves. Poor export performance and years of internal instability left the country with dollar reserves shortages. The shortage has also constrained railway-related expenditures on spare parts, locomotives, and management fees for the railway's O&M.[73] On the Eximbank loans itself, after the expiration of the grace period, Ethiopia has reportedly struggled to repay the interest, let alone principal, on the commercial loans. On this, China appears to have been remarkably lenient. Ethiopia was able to default on its loan repayments to China for one year, mutually agreed to and with no penalty. Additionally, in late 2018 after high-level bilateral talks and via the FOCAC platform, the original SGR loan terms were renegotiated from a 10 to 20-year tenor, or repayment period.[74] On the part of the contractors, the SOEs have had to swallow their costs: the optics of the Belt and Road demand that the projects continue to run, even if the Ethiopian state cannot pay for them.

In contrast, the creditor-borrower relationship with commercial European lenders has been more transactional and more stringent. Respondents from ERC claimed that they had never missed a loan payment, although the contractor noted they often had to pressure the ERC to do so. The fact that loan payments were owed to a consortium rather than a single creditor increased the pressure for timely repayment and complicated any renegotiation; the penalties of defaulting on private creditor loans—potentially losing access to future credit—are far greater.[75]

With Turkish contractors, Ethiopian representatives praised the company's willingness to engage in training and technology transfer; the company itself was also considered far more transparent with information. Meanwhile, processes of engagement with Chinese firms were described as "frustrating", and some were skeptical of the Chinese firms deliberately not wanting to share knowledge.[76] Under Chinese pressure, ERC lost its original employers representative, Sweroad,

replacing them with the Chinese CIECC, covering both the Ethiopia and Djibouti segments of the railway, but at a substantially higher cost.[77] Some Ethiopian respondents expressed reservations over CIECC's interests being aligned with the Chinese contractors rather than with the Ethiopian government, resulting in lower trust and transparency between the Chinese contractors and Ethiopian project owner.[78]

The political *advantages* that Chinese financing entails have been a boon for cash-strapped Ethiopia, but it has perverse implications for the balance of power between the ERC and its Chinese contractors. While the ERC finds itself dissatisfied with aspects of the railway's quality and management, it has limited bargaining power *vis-à-vis* the companies. Due also to delayed O&M contract payments, ERC staff found themselves regularly surrounded by CREC and CCECC staff pressuring them for payment and made concessions to assuage contractors, such as loosening the premiums on the performance guarantees.[79] The manager of the light rail notes that it took two years to pressure the contractor to provide resources for a new maintenance workshop, and even then it was only made possible by pulling political strings, involving the Chinese economic counselor's office in negotiations. Without the political channels it is difficult to make demands of those to whom you owe money.

CONCLUSION

For capital-scarce African economies, the rise of alternative financiers—predominantly China—have been welcomed, driving an expansion of construction that caters to African policymakers' long-drawn infrastructure plans. The case of Ethiopia's railways highlights both the benefits and costs that Chinese financing entails, as well as illustrating the opportunities and failures of domestic decision-makers in negotiating project implementation.

While the availability of Chinese and other alternative financing did not necessarily imply greater *choice* in project financing, we see examples of strategic and pragmatic decisions on the part of Ethiopian policymakers. However, some decisions regarding railway design and technology have had perverse consequences, in part due to lack of experience and technical capacity on the part of Ethiopia's government and young railway institutions. Going forward, building technical and managerial capacity is both a challenge and necessity for the long-term sustainability of the railway networks' future development.

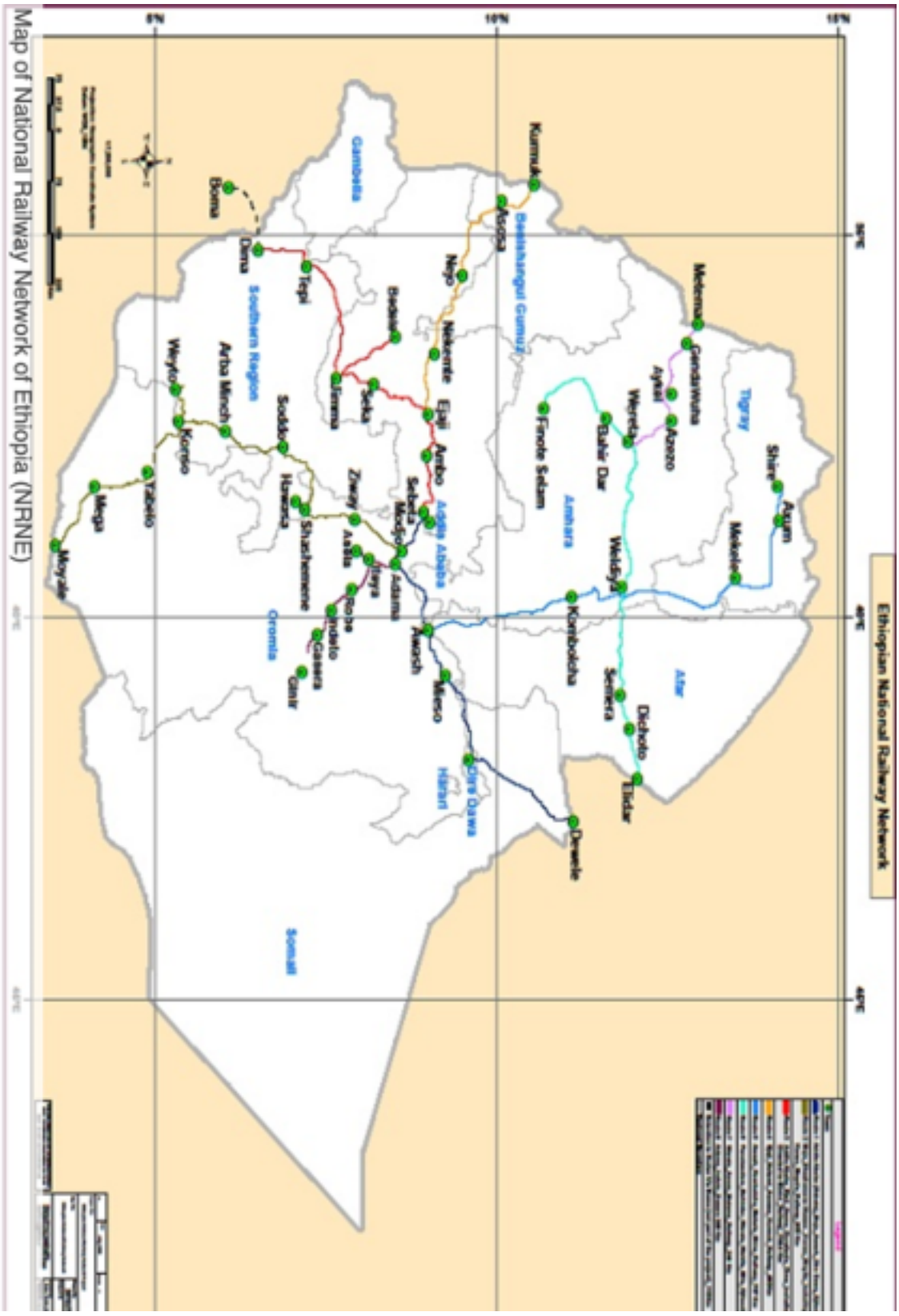
A meta-challenge for Ethiopia's railway institutions is also the development of a managerial infrastructure to accommodate the different technologies that it has absorbed, and then integrating those technologies. Long-run operation requires the parallel development of regulations, protocols, and operating procedures. By selecting multiple partners Ethiopia is better positioned to be less dependent on China's material technology. However, Ethiopia now faces the challenge of integrating two foreign systems while developing its own indigenous standards.

Together with its creditors, Ethiopia has prioritized repayments to its European creditors while taking advantage of Chinese debt repayment leniency, capitalizing on the strategic nature of

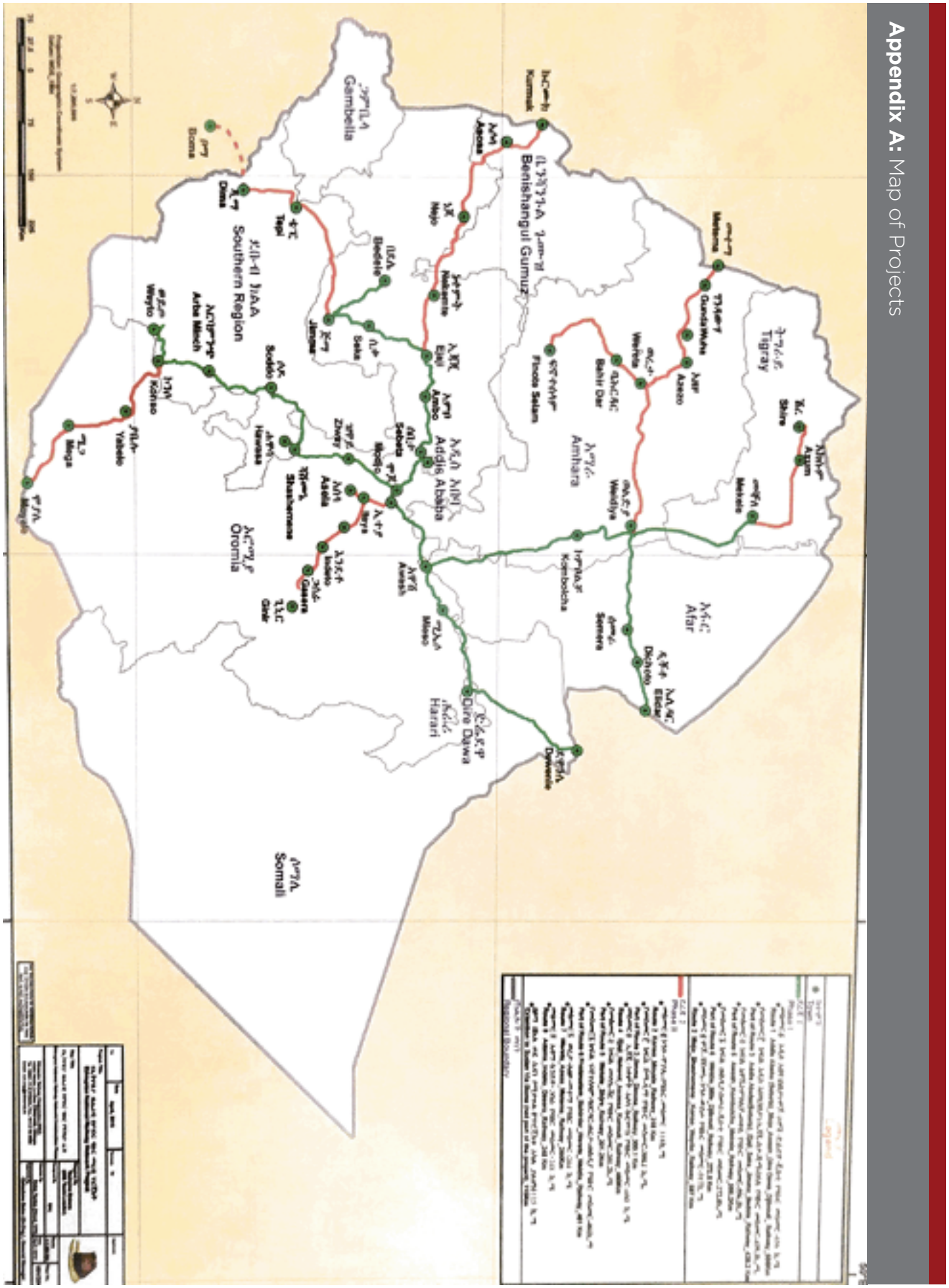
Chinese engagement in these projects. As debt sustainability becomes increasingly salient, the Ethiopian government has sought other options. Under Prime Minister Abiy Ahmed, there has also been an effort to diversify away from Chinese debt financing, towards public private partnerships, encouraging private sector involvement in railways.

For Chinese contractors, it is very likely they will have a longer-term presence beyond their original management contracts. The coordinated web of finance that Chinese loans, contractors and technological transfer packages bring have been a competitive advantage, but China's rapid expansion of overseas development finance in Africa and elsewhere to large risky railway projects does not seem to have paid off. China's export credit and lending institutions have also shown greater risk-aversion to further railway lending, given the huge losses that have resulted from lending to the Addis-Djibouti railway project.[80] In the wake of the economic and health impacts of COVID-19, the challenge of making railway infrastructure and industrialization strategies pay off in the wake of collapsing global trade have become even more fraught and has placed issues of debt sustainability and debt relief in the foreground, raising questions over how China's approach and flexibility to debt issues will evolve in the emerging debt crisis. For railways, sit seems, the light at the end of the tunnel remains dim. ★

Appendix A: Map of Railway Network of Ethiopia



Appendix A: Map of Projects



Appendix B: Project Summary Table

Project	Addis Ababa Light Rail Transit (LRT)	Addis-Djibouti/Ethio-Djibouti Railway (EDR)	Awash-Kombombla-Hara Gebeya/Weldiya Railway (AKH)
Specifications	Two electrified lines: • North-South connecting Menelik Square to Kality **16.9 km** • East-West line from Ayat to Torhailoch **17.35 km**	• **656 km** total length electrified standard gauge railway. • Double track **107 km**; single track **549 km** • Chinese Class 2 standard • CTCS Signalling systems	• **392 km** total length electrified standard gauge railway, single track • European Class 1 • ERMTS Level 2 Signalling system.
Contractor	• China Railway Engineering Company (CREC) No. 2 bureau • China Railway Eryuan Engineering (*design*) • **Employers Representative:** Sweroad • **O&M:** CREC & Shenzhen Metro Company	• China Railway Engineering Company (CREC) No. 2 bureau • China Civil Engineering Construction Company (CCECC) • Norinco (*locomotive supplier*) • **Employers Representative:** CIECC • **O&M:** CREC & CCECC	• Yapi Merkezi & Yapiray Bombardier • Molinari (*equiment suppliers*) • **Employers Representative:** Systra MD • **O&M:** N/A
Financing	• **US$ 475 million** • 85% China Eximbank	• Total cost: **US$ 4.5 billion** • China Eximbank loan: **US$ 2.49 billion** in 3 tranches, signed 2013 (libor 6m + 3), 15 year tenor, 6 year grace period. • Tenor renegotiated in 2018 to 30 years.	• Total cost: **US$ 1.7 billion** • Turkish Eximbank loan: **US$ 300 million** • Estimated rates between 7-12%, 15 year tenor. • Credit Suisse Loan: **US$ 1.1 billion** in 2 tranches: **US$ 700 million** and **US$ 400 million**. Terms unverified. • Other financiers include Swedish Exportkreditdamnden, Danish Eksport Kredit Fonden, Swiss Export Risk Insurance.
Status	• Commercial operation since **2015** • Daily capacity: **120,000 passengers**	• Construction completed **2016** • Commerical operation: **Jan 2018** • 1 passenger train every other day (*Addis/Djibouti*) • 2 Freight trains every day	• Phase I: **95% completion** • Phase II: Initiating • Reading for testing/operation in **2020/2021**

Source: Author's research.

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32. The railway starts at Awash, passes through the major construction hub at Kombolcha and terminates at Hara Gebeya, also known as Weldiya or Woldia, leading to the abbreviation of AKH.

33. China Eximbank has yet to disburse funds for the CCCC project, despite the project being tendered on the basis of the loan, and construction to-date has proceeded using Ethiopian Birr (ETB). ERC representatives state that the Eximbank refused to disburse finance for a second railway until the first Chinese railway (ADR) was shown to be successful. This paper does not delve into the northern project, but the case does illustrate the wider financial constraints the Ethiopian government faces in its infrastructure ambitions.

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60. The locomotive division was formed in 2010 after the absorption of the chemin de fer. METEC would purchase parts from Norinco, assemble them in Dire Dawa, then send back to the ERC via Norinco.
61. Interview 02-Jun-1818, Addis Ababa, La Gare.
62. Interview, 19-May-18, Addis Ababa, Yapi Merkezi.
63. Interview 2424-Jan-19a, Kombolcha.
64. Interview 29-JanJan-19, Addis Ababa, Lafto.
65. Fasika Tadesse, "Ethiopia: City Mega Project Off Track with Replacement Rail Required," *Addis Fortune* (Addis Ababa), June 17, 2014, https://allafrica.com/stories/201406170239.html.
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67. Interview 22-May-2018, Addis Ababa, ERC.
68. Interview 15-Jan-19a, CCECC.
69. The Economist (2018) reports on the perverse incentives for camel owners generated by the policy of compensating livestock killed in collisions on the ADR, as the compensation price is set too high above market value. This has led to incidents involving droves of camels killed on the tracks,
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76. Interview 0101-Jun-18, Addis Ababa, LaLa Gare.
77. Interview 29-JanJan-19, Addis Ababa, Lafto.
78. Interview 29-Jan-19, Addis Ababa, Lafto.
79. This allows contractors to pay a lower premium on the performance guarantees taken out for a project. This refers to the performance bonds taken out by the contractor (usually with a private bank) as security for completing the job according to contract.

80. Eric Ng, "Botched Railway in Africa a Warning to Belt and Road Investors," *South China Morning Post*, October 29, 2018, https://www.scmp.com/business/banking-finance/article/2170549/botched-chinese-railway-project-africa-warning-belt-and.

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