Infrastructure inequities and its effect on poverty reduction across regional states in Ethiopia

Ambaw Desalegn and Negussie Solomon

Center for Federalism and Governance Studies, Addis Ababa University College of Law and Governance, Addis Ababa, Ethiopia

ABSTRACT
Sustainable development aims to enhance the quality of life in an inclusive manner, including economic prosperity, social equity, and environmental protection. Megaprojects are ‘large unique projects’ where public actors play a significant role and are often the conduit of corruption, and eradication of corruption is one of the critical challenges in most parts of the world, particularly the developing countries. Besides, corruption in construction can decrease the efficiency, effectiveness, and equity of infrastructure and services, resulting in the execution of ‘white elephant’ projects that are neither growth-inducing nor relevant to needs. Therefore, lack of access to roads, electricity, mobile phones, and the Internet limits the potential earnings of modern accessibilities and facilities in developing countries, and it also has a negative impact on poverty reduction. Although there are high perceptions about infrastructure inequity in Ethiopia, the difference between relatively developed and underdeveloped regions or states is not clear, especially in the equitable allocation of infrastructure resources. By analysing regional infrastructure, the states are categorised based on the results of the Composite Infrastructure Index, thereby exposing the unequal distribution of infrastructure and services. This paper shows gross inequity of public investments in Ethiopia, hindering the country’s nation-building process. In substantially unequal societies, elite groups are more able to manipulate and influence policymakers to their advantage. Understanding the nature and extent of regional inequities in Ethiopia, as exemplified by regional infrastructure differentials, and finding sustainable solutions is imperative to socioeconomic development and shared prosperity.

ARTICLE HISTORY
Received 30 March 2021
Accepted 30 August 2022

KEYWORDS
Mega infrastructure; infrastructure inequity; poverty alleviation; sustainable development; principal component analysis; composite infrastructure index; regional development; levelling-up; nation building

1. Introduction
There is general acceptance that economic and social expansion needs infrastructure investment, including the delivery of megaprojects, to enable physical mobility, deliver water supply, facilitate sewage disposal and processing, deliver energy to homes and businesses, accommodate social services, and house people in healthy conditions, but all such investment needs to be allocated equitably with projects delivered in a...
sustainable manner (World Development Report (WDR) 2006; Sturup and Low 2019). This paper examines whether infrastructure and spendings decisions are equitable across the nine regional states (Oromia, Amhara, SNNP, Tigray, Somali, Benshangul-Gumuz, Afar, Gambella, and Harari) and two administrative cities (Addis Ababa and Driedawa) in Ethiopia, focusing in the main but not exclusively on road, electricity, and telecommunications. Each locale has an important role in the development of the regional states, and ultimately of the nation, and yet there is currently no verifiable evidence of infrastructure equity across the regions in Ethiopia. This paper therefore seeks to provide empirical evidence that reflects the equity of public infrastructure investments to support the nation-building process. The comparative performance of each of the country’s regional states relative to available infrastructure is pivotal to the study, as is the analysis of prevailing disparities between such states. In highlighting any serious disparities, the study is important if the country is to achieve balanced and sustainable growth since, in most countries, federal governments have considerable policy discretion in the allocation of infrastructure investment across regional states (Castells and Sole-Olle 2005).

Generally, there is a broad consensus that the rapid development in Ethiopia since 2000 has been largely determined by public infrastructure developments (World Bank 2009; Shiferaw 2017). These have included not only the expansion of road networks but also the construction of hydroelectric power plants and transmission lines, airports, telecommunication systems, and education facilities. This is because the primary goal of the Ethiopian government, as a developmental state, is to eradicate poverty by delivering economic growth and transforming the structure of the economy (Deloitte 2014). Public infrastructure development is therefore at the centre of Ethiopia’s economic strategy, and this has made it possible for significant growth in roads, electricity, telecommunications, and other critical infrastructures, which are financed in the main both nationally and internationally by unilateral and multilateral agencies, with foreign direct investments constituting a smaller part (World Bank 2018a).

The literature behind the conceptual comprehensive framework, the methodology used for the study, and the analysis of the indicators from the empirical evidence including the policy implications thereof, are presented below.

2. Literature review

2.1. Mega infrastructure and sustainable development

Sustainable development is a notion that has only relatively recently been applied to the investigation of mega infrastructure projects (World Development Report (WDR) 2003; Sturup and Low 2019). The perspective of sustainability here relates to the impacts of mega infrastructure projects and that action may have an impact on sustainable development (World Development Report (WDR) 2003; Sturup and Low 2019). Today, sustainable development aims to increase the quality of life in an inclusive manner, including economic prosperity, social equity, and environmental protection (WDR 2003). But, getting sustainable development underway is obviously not an easy task. In this context, there is an urgent requirement to invest in enhancing governance
and the institutional environment to deliver the desired level of infrastructural development that will lead to sustainable long-term growth and development (Akanbi 2013). Akanbi (2013) concluded that the stylized facts presented on infrastructure and governance revealed that an improvement in governance will have a direct and positive effect on the countries and regional states’ infrastructure stock (Akanbi 2013). This indicates that good governance remains important to infrastructural development and equity.

Mega infrastructure projects are very large constructions, usually with a price label more than US$1 billion, connecting a variety of stakeholders, attracting a lot of public attention because of substantial effects on communities, environment, and budgets, and businesses with effects on the wider economy of cities, regions, and countries, and even on the worldwide economy (Flyvbjerg 2014). A megaproject is an extremely large-scale investment project (Korytarova and Hromadka 2014; Locatelli et al. 2017; Sturup and Low 2019). The most common megaprojects are in the types of hydroelectric facilities, nuclear power plants, multiplex housing, dams and highways, and large public transportation projects (Korytarova and Hromadka 2014; Sturup and Low 2019). The reason why many of the distinctive megaprojects are constructed is their reach and shared benefits (Sturup and Low 2019). Moreover, megaprojects are ‘large unique projects’ where public actors play an important role but where such intervention can be affected by corruption, the eradication of which is one of the critical challenges the world faces (Locatelli et al. 2017). Corruption in construction can compromise the efficiency, effectiveness, and equity in the distribution of infrastructure facilities, often resulting in the production and delivery of construction projects that are unsuitable, defective, and unnecessary (Sohail and Cavill 2008; Nordin, Takim, and Nawawi 2011).

The authors of this paper focus on roads, electricity, telecommunication, airports, and universities infrastructure in Ethiopia. However, there are infrastructure projects and other initiatives that fit the megaproject categorization such as the Grand Ethiopian Renaissance Dam (a 6,450 MW hydropower project), which is nearing completion. Megaprojects can generate employment and incomes in particular sectors and in specific places over time. They also look to open economic and social opportunities (Korytarova and Hromadka 2014; Sturup and Low 2019). Therefore, megaprojects signify a strategic choice towards attaining sustainable development objectives in developing nations (Othman 2013; Akanbi 2013).

Mega infrastructures are complex, risky, and time-consuming activities that are typically commissioned by governments and provided by national and international participants with a ‘multiplicity of cultural differences, backgrounds, political systems, and languages’ (Othman 2013; Locatelli et al. 2017; Sturup and Low 2019). Megaprojects attract high levels of public consideration and political interest due to the extensive cost, direct and indirect effect on the community, environment, budgets, etc. (Sohail and Cavill 2008; Nordin, Takim, and Nawawi 2011). Moreover, due to their unique nature and characteristics, megaprojects require significant design knowledge and technical skills, competent human resources, specialized managerial capabilities, and large-scale investments (Flyvbjerg 2007; Sturup and Low 2019), all of which support addressing the political and leadership challenges of developing mega infrastructure.
projects in developing nations (Othman 2013; Akanbi 2013). Unfortunately, developing countries suffer from shortages in providing these indispensables, i.e., knowledge, skills, capabilities, and finance, which inevitably challenges the successful development of megaprojects (Locatelli et al. 2017; Sturup and Low 2019).

2.2. Theory of (in) equity

As a background, the intention is to piece together a comprehensive definition of equity that is workable in the Ethiopian context, while also taking into account the complexity and implicit trade-offs in any definition. Stakeholders have conveyed the need to have an acknowledged and accepted definition of equity that can be used when evaluating infrastructure equity across the country’s regional states. The central idea of this paper is thus to deliver important concepts relating to equity to inform the debate, followed by a harmonized definition. The, the dictionary definition of equity is the quality of being fair and impartial or justice according to natural law or right…more precisely: ‘freedom from bias or favoritism’ (Webster’s New Collegiate Dictionary 2006) or the ideal, state, or impartial, quality of being just, and fair; and, ‘Inequity’, then, is the linguistic opposite: the ideal, state, or quality of being unjust, partial, or unfair (American Heritage Dictionary 2004). The dominant feature is not equality of distributions but rather fairness of distributions, which is central to the definition equity (Whitehead 1991; Stevens 1993). Equity is also defined as fairness/justice, or unfair-injustice-inequity (Al-Zawahreh and Al-Madi 2012; Litman 2020).

A theory of inequity exists. To understand an inequity, the theory identifies the conditions under which perceived inequity will arise and the instruments by which it may be reduced (Adams 1963; Al-Zawahreh and Al-Madi 2012; Watkins 2015; Gashgari 2016; Litman 2020). It appeared to everyone highly unlikely that persons who practiced inequity in their dealings with others would only feel and manifest dissatisfaction, whatever its emotional pattern and strength (Adams 1963). Concerning the terminology, no common term has been recognized as fairness, equity, and justice are generally used interchangeably contingent on the context, adding an additional degree of vagueness, including solidarity or (spatial/territorial) cohesion in the infrastructure sector (Thomopoulos, Grant-Muller, and Tight 2009; Litman 2020). Hence, equity and fairness/social justice are interchangeably used in this paper.

In other ways, according to the World Development Report (WDR)) (2006), equity has to be defined based on two basic principles. The first is ‘equal opportunities’, and the second is the ‘avoidance of deprivation in outcomes’. The ‘equal opportunities’ principle is that ‘a person’s life attainments should be determined primarily by his or her “talents and efforts”, rather than by pre-determined circumstances such as social, gender, or family background, race’ (WDR 2006, xi). It is ensuring that efforts and talent determine outcomes. This is achieved through equality before the law, equal enforcement of personal and property rights, non-discriminatory institutions, and equal access to public services and infrastructure (WDR 2006).

The ‘avoidance of deprivation in outcomes’ principle applies particularly in education, health and consumption levels. Here, a key objective is to show how disparities interact, combine, and are replicated through interlinked political, economic, and
sociocultural processes (WDR 2006). According to Jones (2009), although there is growing recognition that equity is important for nation-building, and issues of inequality and inequity have been debated for some time, these are either based on misunderstanding or other features of ideas of equity and are becoming a ‘new equity agenda’ (Anderson and O’Neil 2006). Therefore, ‘Equity is a very important matter for development, but so far has been under-represented in policy and practice’ (Jones 2009, 43). There is a growing recognition of the importance of equity in pursuit of development, and many development authorities accept equity as a key goal for their programming (Jones 2009). Against this backdrop, the starting point in applying a coherent and up-to-date assessment framework that embraces equity is the analysis of the equity procedures presently found in transport infrastructure assessment (Thomopoulos, Grant-Muller, and Tight 2009; Litman 2020), which can also be adapted for other sectors like electricity and telecommunication for equitable distributions across regions.

While high and increasing inequality/inequity is stimulating divided political arguments around the world, a consensus has emerged that all should enjoy equal access to opportunity … that one’s chances to flourish in life ought not to be decided by situations beyond an individual’s control (World Social Report 2020). It is indicated that in national infrastructure policy documents emphasis is given to accessibility, equal rights on access to public infrastructure and basic technologies, and other basic needs (employment, health, and education), the equal allocation of public funds for infrastructure among diverse regional states, i.e., horizontal equity or the prerequisite to maintain a minimum level of infrastructure links within all parts of a region in a country, i.e., vertical equity (Thomopoulos, Grant-Muller, and Tight 2009; Litman 2020; World Social Report 2020). It is also apparent that scholars distinguish their terms according to their emphasis and experience, which might occasionally impede the expansion of mutual and common ground for the argument of thoughts and understandings (Thomopoulos, Grant-Muller, and Tight 2009; Litman 2020; World Social Report 2020).

Based on these scholars and organizations, issues of equity are crucial for development, which also needs to be considered in the infrastructure space in Ethiopia. As mentioned above, two broad redistributive criteria govern the analysis of the effect of government policies. The first is vertical equity (VE), which serves to assess whether the equity of that influence on individuals or communities/regional states with a different initial level of ‘wellbeing’ or VE (also called social justice, environmental justice and social inclusion2) is desirable and may require transfers from regional states that are richer to those that are poorer; the second is horizontal equity (HE) (also referred to fairness and egalitarianism3), which helps estimate the equity of the effect across individuals/regional states who are equal in all ‘relevant respects’ (Duclos 2006; WDR

---

1Litman (2020) Environmental justice is defined as the “equitable distribution of both negative and positive impacts across ethnic, and income groups, with the environment defined to incorporate ecological, economic, and social effects” (Alsnih and Stopher 2003).

2Litman (2020) Social inclusion means everybody can participate adequately in important activities and opportunities, including access to services, education, employment, and decision-making (Litman 2003; Lucas 2004).

3Litman (2020) Egalitarianism means treating everybody equally, regardless of factors such as groups, gender, or income.
These diverse types of equity frequently overlap or conflict. For instance, HE necessitates that users tolerate the costs of their infrastructure facilities and services, but VE frequently necessitates subsidies for disadvantaged/deprived groups or regional states (Frey 2017; Litman 2021). Infrastructure planning invariably encompasses making trade-offs between diverse equity objectives.

Therefore, the study has mainly focused on the equal shares policy principle which allocates an equal share of all infrastructure project benefits to all-regions impacted, and on horizontal equity (equal treatment) among the respective regional states. Meanwhile, the study understands that both the Jones’ (2009), Policy Link (2013, unpublished), Rubin (2006), (Thomopoulos, Grant-Muller, and Tight 2009; Thomopoulos and Grant-Muller 2013; Wismadi et al. 2015; Litman 2020) and other principles are crucial for the planning and implementation of infrastructure equity, as well as equal opportunity, social justice, national competitiveness, spatial intervention, and citizen satisfaction across the regional states in Ethiopia. Apart from the political-cultural aspect, there are also practical requirements for this as the nation-building process needs a ‘national’ infrastructure (Hippler 2004–2005; Bel 2011). Above all, these principles of infrastructure equity are also crucial for economic growth and the state-and nation-building processes. Lack of access to road, electricity, mobile phones, and the internet limits the potential earnings of modern accessibilities and facilities in developing countries (World Social Report 2020). In seriously unequal societies, elite groups are more adept at manipulating policymakers, generating a situation that favours their interests (World Social Report 2020). It could be required to explain diverse criteria to reveal the diverse principles and purposes underlying each type. Thus, the task can in principle be attained using principal component analysis techniques, with potentially divergent weights of significance assigned to each (Thomopoulos, Grant-Muller, and Tight 2009).

### 2.3. Status of road, electricity, and telecommunication in Ethiopia

There is an enormous literature pertaining to disparities in terms of road, electricity, and telecommunication (Frey 2017). By referring to known scholars (for instance, Estache and Fay 2007), Sawada (2015) explained that the theories of macro-economics and associated empirical studies clearly justify the aggregate effects of infrastructure investment in an economy. In other ways, the macro-econometric studies indicate the role of infrastructure in enhancing productivity and decreasing poverty. Moreover, two points need to be assessed: 1) the proper identification of the causal effect of infrastructure in reducing poverty; 2) the broader framework to evaluate the role of infrastructure in reducing poverty because, obviously, infrastructure cannot exist in isolation (Sawada 2015; Ashenafi 2017). However, there is no agreement on the ‘channels’ through which infrastructure development decreases poverty. Though infrastructure encourages growth, and economic growth brings about changes in infrastructure (Patra and Acharya 2011). Access to infrastructure not only increases household income directly by improving production; it also has indirect effects, such
as changing consumption, saving, and investment decisions as well as creating shared knowledge, mutual trust, social norms, and unwritten rules (Sawada 2015).

There have been studies in the literature emphasising that infrastructure is a key catalyst for economic growth and development (Rammelt 2018). From WDR (1994), what is evident is that a strong association exists between the data availability of some infrastructures, i.e., telecommunications, power, paved roads, and per capita GDP. For example, data for 1990 indicate that while total infrastructure stocks increase by 1% with each 1% increment in per capita GDP, paved roads increase by 0.8%, power by 1.5%, and telecommunications by 1.7% (WDR, 1994). Put another way, a one point increase in infrastructure stocks would lead to an approximately 0.06 point growth rate in GDP per capita (Yilmaz and Cetin 2018). In view of the large theoretical literature supporting the view that investments in infrastructure are key to ensure high levels of standards of living and economic growth, large-scale plans to enhance infrastructure should be given high priority (Calderon and Serven 2014; Hooper, Peters, and Pintus 2017), as a result of a long term policy that has used infrastructure for nation-building (Bel 2011). By studying the disparities between the Ethiopian regional states in the aforementioned main sectors, it is possible to make some key findings. Thus, infrastructure-driven development is of course not a new occurrence. It has always been a debatable issue about its allocation in Ethiopia (Rammelt 2018). Overall, the literature found positive effects of infrastructure investment on income growth and, more cautiously, on distributive equity (Calderon and Serven 2014). At this point, the question is to what extent that infrastructure is allocated/distributed equitably across regions in Ethiopia to build the nation?

The relationship between economic growth and infrastructure is various and complex, because not only does infrastructure investment affect production and consumption directly, but it also generates many direct and indirect externalities, and includes large flows of expenditure thereby creating additional employment. In this conceptual framework, infrastructure affects outputs in two ways: 1) the direct ‘channel’ where infrastructure improves output by decreasing the cost of intermediate goods; 2) The other ‘channel’ is through the externality effect (Seid, Taffesse, and Ali 2016; Ashenafi 2017). By citing Kucheva (2012), Schultz (2017) stated that classical economic theory indicates that three factors, natural amenities, infrastructure, and remoteness all affect economic development. The second factor affecting uneven development is infrastructure, which is the focus area of this study. More importantly, the goal of infrastructure investment is to offset both natural amenities and remoteness as variables affecting ‘uneven investment’ or ‘development’ (Schultz 2017). Thus, ‘Infrastructure Equity’, which is about equitable public infrastructure investments that can generate enormous national and regional benefits, is used as a theoretical framework in this study (Rubin 2006; PolicyLink). To the end, the paper describes the status and trends of road, electricity, telecom including other infrastructures, and regional poverty in relation to infrastructure.

With respect to roads, only 70% of the population in less developed countries (and 33% in Africa) have access to an all-weather road (Dethier and Moore 2012). According to the Growth and Transformation Plan I and II (GTP)4, the Ethiopian

---

4The Growth and Transformation Plan I (GTP) is a national five-year development plan created by the Government of Ethiopia.
Government considers transport infrastructure to be the crucial catalyst for sustainable development and broad and inclusive growth. This clearly signifies a high level of government commitment to road infrastructure development, which has been a priority for many years (Harris, Tekleselassie, and Lawson 2019). It is assumed that more physical infrastructure investment such as roads will lead a country closer to the world markets and reduce regional disparities (Fan and Zhang 2002). Investment in road infrastructure looks to be the main driver of economic growth in Ethiopia given the current economic structure and level of development (Harris, Tekleselassie, and Lawson 2019).

In addition, the Ethiopian Road Authority (Ethiopian Roads Authority) has stated that road infrastructure supports and catalyzes the achievement of economic growth and the objectives of poverty reduction in the country. The rural population of Ethiopia has also proclaimed that the ‘the road is our bloodline!’ (Rammelt 2018, 15). Moreover, improved road access is pivotal in the country’s poverty reduction strategy. According to World Bank Group (2017), poverty rates increase by 7% for every 10 kilometres’ distance from a market town. Meanwhile, poverty reduction from agricultural growth displays similar patterns, as poverty reduction is higher for people close to urban centres (26%) than those who are living in rural areas (4%). This further illustrates the role of spatial connectivity in poverty reduction: travel times to urban centres are an important variable in reducing poverty (World Bank Group 2017).

Regarding electricity, in less developed countries, more than 25% of households have no access to electricity, with 70% of the African population unconnected (Dethier and Moore 2012). Similarly, about 60% of Ethiopia’s population has no access to electricity, and where there is grid coverage, only 60% of households are connected. About 85% of the urban population has access to electricity while only 29% of the rural population has access (Deloitte 2019). Using cross-sectional and panel regressions with national-level decadal data, Best and Burke (2018) also found some evidence that electricity availability has a significant effect on successive economic growth. Limited access to reliable energy hinders firm performance and growth as well (World Bank Group 2017).

International Telecommunication Union (ITU) has recorded the universality of ICTs and the extent of digital gaps between countries and regions through its annual ICT Development Index (IDI), which aggregates quantitative indicators for ICT access, use, and skills in most of the world economies (International Telecommunication Union (ITU) 2016). ITU also stated that there is a strong association between ICT and economic development, with developing countries at a particular disadvantage. The average IDI value for advanced countries (7.40) is 3.33 points higher than that for less developed countries (4.07), although less developed countries improved their IDI value more than advanced countries. In suggesting a country’s telecom infrastructure has strong effects on economic growth, it has been argued that telecommunication investments have significant spillovers and create externalities (Roller and Waverman 2001). According to International Telecommunication Union (ITU) (2016), Ethiopia has 0.9 in fixed-telephone subscriptions per100 inhabitants, 42.8 in mobile-cellular subscriptions per 100 inhabitants, 3.5 in %age of households with a computer, and 9.8 in %age of households with internet in 2015. Regarding infrastructure equity issues, access to
essential telecom services is one of the important factors in telecom geographic expansion, while economic considerations largely drive network capacity (Harris, Tekleselassie, and Lawson 2019).

This study has evaluated that, in mobile-cellular telephone subscriptions/100 pop, Ethiopia has got 59.7 value, 49.7 scores (scores are on a 0 to 100 scale, where 100 represents the optimal situation or ‘frontier’), and 130 ranks out of 140 countries in the world. In fixed-broadband internet subscriptions/100 pop, Ethiopia has got 0.6 value, 1.1 scores, and ranks 115 out of 140 countries in the world. In internet users’ % pop, Ethiopia has got 15.4 value, 15.4 scores, and ranks 127 out of 140 countries in the world (Schwab 2017–2018). Hence, Ethiopia is relatively better in mobile-cellular subscriptions/100 inhabitants than other measurements.

### 2.4. Other infrastructures (airport and university) in Ethiopia

Airport investments are essential to meeting the growing passenger and cargo demand in Ethiopia as the country is landlocked. But, if somebody asked what are the principles, policies, standards, and guidelines to establish an airport in a region in Ethiopia they would be disappointed? There are no clear policies, standards, and guidelines on how to establish a new airport and to ensure the equitability of its location and funding vis-à-vis the other regions across the country (Ethiopian Airport Enterprise 2018, unpublished). In relation to this issue, population demography is one of the criteria for the establishment of a new regional airport (Federal Aviation Administration 2018). Regarding universities, there has been a huge higher education expansion in Ethiopia for the last 27 years (Semela 2011; Bishaw and Melesse 2017). While there are no clear policy guidelines and standards to establish a university in a region in Ethiopia, population/demography could and should be one of the key criteria for the establishment of new Higher Education Institutions (HEIs).

Generally, infrastructure capacity nurtures step-for-step with economic output… a 1% increase in the infrastructure stocks is associated with a 1% increase in GDP across all countries (World Development Report (WDR) 1994)). The share of the population living below the national poverty line halved between 1995/96 and 2015/16, from 45.5 percent to 23.5 percent (Central Statistical Agency 2018; UNDP Ethiopia 2018). Despite its large population (of above 100 million), Ethiopia also has one of the world’s lowest rates of inequality, with a Gini coefficient of 0.33. However, rapid growth has not reduced inequality for the very poorest (Kanth and Geiger 2017).

### 2.5. Inequalities across regional states in Ethiopia

The spatial disparities in many indicators of well-being demonstrate that development has not been fully inclusive in Ethiopia (World Bank Group 2017). Based on inequality estimates, for example in the year 2010/11, one can categorize the regions into two: (1) regions with Gini-coefficients below 0.3 are Oromia, Amhara, Somali, Gambela, Harari, and Dire Dawa with Harari region having the lowest; and (2) Regions with Gini-coefficients above 0.3 are Tigray, Benshangul-Gumuz, SNNP, and Addis Ababa with inequality the highest in Tigray region. If one compares by rural-urban residence, one can find
inequality is higher in urban areas for all regions. Among the regional urban areas, the highest inequality is observed in Amhara followed by Benshangul-Gumuz and Tigray. Whereas, in 2015/16, (1) regions with Gini-coefficients below 0.3 are only the Somali region having the lowest; and (2) Regions with Gini-coefficients above 0.3 are Tigray, Oromia, Amhara, Gambela, Afar, Harari, Benshangul-Gumuz, SNNP, Dire Dawa and Addis Ababa. Tigray has the highest inequality in the country. The Somali region has the lowest inequality in the country. Therefore, trends in inequality as measured by the Gini Coefficient of consumption are increasing in all regions except the Somali region (National Planning Commission (2018). Hence, empirical evidence indicates that public infrastructure investment results in greater economic output, higher employment, and better quality of life (Seid, Taffesse, and Ali 2016; Chotia and Rao 2015). Although poverty rates have converged over time across regions, thereby reducing inter-regional disparities, there are also significant intra-regional and inter-woreda/district disparities (World Bank Group 2017; National Planning Commission 2018).

Various development policies, such as allocation of infrastructure that are ‘place-based’ are being pursued. These policies are a basic part of development policy, determined by both equity and efficiency. There is inequity because the procedure of economic growth is spatially uneven. There is also inefficiency because spatial development procedures result in market failures due to coordination failures, and government and political failures which need more considered government intervention, deep vs. shallow (Hoff 2001; Duranton and Venables 2019). Some places are relatively well-served with roads, power, telecommunications, and other public facilities, while others fall short of such provision. These regional inequities/disparities are expected to show up, maybe harmfully and alarmingly, in regional states and national politics (World Bank 2009); Duranton and Venables 2019). Notwithstanding prevailing perceptions about infrastructure inequity, the differences between relatively successful and lagging regional states is not clear, especially in the equitable allocation of infrastructure resources, which therefore needs to be scrutinised more scientifically.

Finally, the equitable infrastructure development framework combines people and places to build robust communities, as well as great places/regional states with equitable access. The framework, with its equity drivers and equity outcomes, uses as an analytical instrument to guide this study to identify infrastructure inequities and to attain equitable outcomes in the long-run for disadvantaged communities and regional states (Rubin 2006; Jones 2009; PolicyLink); Thomopoulos, Grant-Muller, and Tight 2009; Thomopoulos and Grant-Muller 2013). Therefore, the theoretical framework has been established by mixing the theories of coordination failures for resource allocations, equity in development, and infrastructure equity for the state- and nation-building processes (using democratic federalism as a device) through government deep interventions across Ethiopia.

3. Data and methodology

3.1. Methodology

Time-series data availability and country coverage across the different indicators of the performance of infrastructure is heterogeneous (Calderon, Cantu, and Chuhan-Pole
Principal component analysis (PCA) is a multivariate numerical technique used to decrease the number of variables in a data set into a smaller number of ‘dimensions’. PCA works best when asset variables are interrelated, but also when the distribution of variable indicators varies across cases. It is the assets that are more inequitably distributed between regions that are given more weight in PCA. Indicator variables with low standard deviations would carry a low weight from the PCA (Vyas and Kumaranayake 2006; Patra and Acharya 2011; Chotia and Rao 2015). Practically, Patra and Acharya (2011) computed the Infrastructure Development Index for 16 major Indian states through PCA. Moreover, Chotia and Rao (2015) also examined the inter-linkages between economic growth, poverty, and regional infrastructure disparities in the 21 major Indian states. By analyzing the regional disparities between states in terms of infrastructure, the states were ranked based on the considered CII. Their empirical analysis also proved that economic growth and composite infrastructure growth go together.

In SPSS/STATA, when specifying PCA, the user is given the choice of deriving eigenvectors (weights) from either the correlation matrix or the covariance matrix of the data. If the raw data has been standardised, then PCA should use the covariance matrix (Vyas and Kumaranayake 2006). However, by referring to McKenzie (2003), Vyas and Kumaranayake (2006) stated that there are several theoretical questions of interest in which inequality of wealth is more important than consumption or income inequality, so inequality of asset-based measures may be preferred in empirical tests. Although, it is up to the user to bear in mind that PCA is best considered as a summary empirical method (Vyas and Kumaranayake 2006)). PCA is used to aggregate infrastructure components such as electricity, roads, telecommunication, and other infrastructures (Patra and Acharya 2011; Chotia and Rao 2015; Calderon and Serven 2014)). Hence, based on the above descriptions, to comprehend and gauge the trend and pattern of regional disparities between Ethiopian regional states in terms of infrastructure, the indicators (for the latest time period available) have been selected and are discussed as follows.

### 3.2. Data

#### 3.2.1. Data for road network

In 2017, the data indicated that Direawa, Harari, South, Oromia, and Amhara regions are under the national average in road density per 1000 population. Whereas, Gambela, Afar, Benshangul-Gumuz, Tigray, and Somali regions are above the national average in road density per 1000 pop. From a density per 1000 sq.km point of view, Harari, South, Amhara, Direawa, Tigray, Afar, Oromia, and Gambela are above the national average in road density per 1000 sq.km. Whereas, Somali and Benshangul-Gumuz are below the national average. This practically shows that there is infrastructure inequity across regions in Ethiopia. In other assessments, it is also indicated that this has significantly contributed to perceived disparity in the allocation process (Harris, Tekleselassie, and Lawson 2019).
3.2.2. Data for electricity

The paper identified the Substation Coverage based on the Number of Population and Capacity usage per MW per Region and per 1 million population in Ethiopia. In Substation Coverage based on the Number of Population, Addis Ababa, Driedawa, Harari, Gambela, Afar, Oromia, and Tigray have currently extra substation coverage. However, Benshangul-Gumuz, Amhara, SNNP, and Somali need additional substations to ensure infrastructure equity. Thus, the distribution of electricity per substation coverage is varied across the regions. Although regional household consumption is only inaccurately related to regional production as (a) some substations serve multiple regions and (b) some electricity is distributed to commercial use and not households. In other words, the existence of additional substations in a region does not infer better household electricity consumption in that region. Similarly, in Capacity usage per MW per Region and per 1 million population, Addis Ababa, Driedawa, Gambela, Tigray, and Afar are more than the national average. However, Benshangul-Gumuz, Amhara, Oromia, SNNP, Harari, and Somali are less than the national average. Hence, the distribution of electricity per MW is varied across the regions. Generally, there are no formal written policies and guidelines used by Ethiopian Electric Power, or Utility in their allocation decisions, though both institutions were able to verbally explain processes. The absence of documented policy and guidelines significantly contributes to perceptions of unfairness (Harris, Tekleselassie, and Lawson 2019).

3.2.3. Data for telecommunication

When the study considers Telecommunication distribution in Ethiopia, there is a lack of data availability in the country, especially across regional states. However, total capacity and telecom density per 100 population has been used as a measurement across regional states. As the study considers telecom density per 100 population, Addis Ababa, Harari, Driedawa, Tigray, Gambela, and Benshanul-Gumuz have telecom density more than the national average. While, Somali, Afar, Amhara, Oromia, and SNNP have less than the national average. Similarly, there are disparities in regional telecommunication distributions regarding mobile networks and fixed-line voice and data service network capacity. Other infrastructures such as airports and universities per 1 million populations have also been considered.

3.2.4. Data for regional poverty and unemployment rate

Some regions are above the national average in the poverty line. These are Tigray, Amhara, Benshngul-Gumuz, Oromia, and Afar. The remaining regions are below the national average. There are also differences in the percentage decrease in poverty in 2015/16 from 1999/00. Tigray, Afar, SNNP, Benshanul-Gumuz, and Gambela have decreased poverty above the national average. Amhara, Somali, Oromia, Addis Ababa, Harari, and Driedawa have decreased poverty below the national average. Regarding the unemployment rate by region in 2012, the highest rate was observed in Addis Ababa City Administration (23.0 percent) followed by the Dire Dawa Administration (22.7 percent), while the lowest unemployment rate was recorded in Gambella Region (7.8 percent) and Benishangul-Gumuz Region (7.1 percent) (Central Statistical Agency (CSA), 2012, unpublished). Whereas, in 2017/18, in terms of the unemployment rate by
region that relied on the growth of employment opportunities, in Dire Dawa 25.3 percent, Tigray 21.5 percent, Addis Ababa 20.2 percent, and Amhara 19.7 percent in that order reported above the national average. Benishangul-Gumuz at 7.2 percent is the lowest unemployment rate. The rest of the urban areas in other regions fall between 10 and 19 percent of the unemployment rate in June 2018. The unemployment rate among females is also higher than males in all regions (CSA 2017/18, unpublished).

The study used all the above-mentioned indicators in order to construct a CII. Before constructing the index, all the indicators have to be normalized, the PCA was applied to decide the factor loadings and their respective weights (Patra and Acharya 2011; Chotia and Rao 2015). All the results were found with PCA. The calculation was done by using STATA software (V = 14), specifically by adopting the Chotia and Rao (2015) formula:

For normalization, the following formula was employed:

\[
NV_{ij} = \frac{1 - (BestX_i - ObservedX_{ij})}{(BestX_i - WorstX_i)}
\]

Where: \(NV_{ij}\) = Normalized value corresponding to the Xth indicator, \(i=\)corresponding state, and \(j=\)corresponding indicator; \(Best X_i =\) Best/Maximum value of Xth indicator, where \(l=\)number corresponding to the state (in this case values of 9 regions and 1 administrative city under the Xth indicator will become the i series); \(Observed X_{ij} =\) Observed/current value of Xth indicator where \(i=\)corresponding state and \(j=\)corresponding indicator; and \(Worst X_i =\) Worst/Lowest value of Xth indicator.

The Factor Loading and Weights of these indicators using the following formula:

\[
I = \frac{\sum_{i=1}^{n} x_i \left( \sum_{j=1}^{m} |L_{ij}| \ast E_j \right)}{\sum_{i=1}^{n} \left( \sum_{j=1}^{m} |L_{ij}| \ast E_j \right)}
\]

Where: \(I\) is the index for a particular category (region) \(x_i\) is the ith indicator under a particular category. \(L_{ij}\) is the factor loading value of the ith variable on the jth factor. \(E_j\) is the eigenvalue of the jth factor.

4. Results and discussion

4.1. Composite infrastructure index

Ethiopian regional states are classified based on their CII levels. The study has excluded Addis Ababa city administration as it has extreme values in infrastructure stocks, being the capital city (Table 1).

The regional states are relatively divided into infrastructural equipped and infrastructure lagging regions. The infrastructural relatively sound regions have a value higher than the average value (0.6187) of the CII, and the infrastructural lagging states have a lower than the average value (0.6187).

- infrastructure equipped states: Gambela, Dire Dawa, Afar, and Oromia;
- infrastructure lagging states: Tigray, Harari, Amhara, Benishangul, SNNP, and Somali
In analyzing the states using the CII results, one can observe huge variations. Gambela has the distinction of being at the top of the list with an overall index score of 1.2418. It is 6.4880 times the value of the region with the lowest value of the overall development index, Somali, which has an index score of 0.1914. The difference between these two extreme overall index scores is 1.0504. The mean CII value for all regions is 0.6187 and the standard deviation is 0.3050. This is clear evidence of dispersion or infrastructure inequities/disparities between regions. It is not only a perception but also a reality. This is due to the lack of integrated frameworks as there are coordination failures because of the lack of proper government interventions, including lack of proper understanding and implementation of the constitution and the federal system in Ethiopia. The literature says that there is a high correlation between disparity in infrastructure assets and the infrastructure index, and since the infrastructure index measures infrastructure, it can be argued that that improving infrastructure leads to more inclusive growth (African Development Bank (AfDB) 2018). The low and unevenly distributed infrastructure stock in Ethiopia is reflected in the low development of the regions (AfDB 2018), and lagging regions need place-based and people-centred interventions (Wismadi et al. 2015). It is clear that regional states that suffer infrastructure deficits need to be compensated (Thomopoulos, Grant-Muller, and Tight 2009).

5. Conclusions and recommendations

This paper has examined the relationship between growth and infrastructure equity in Ethiopia since the 1990s. The CII result above showed that infrastructure equity cannot be taken for granted in the country and prevailing disparities are manifesting in unbalanced growth. This is due to policy failures on the part of the government. This fact has been obscured by the phenomenal national growth experienced by Ethiopia in the past two and half decades, growth that has been imbalanced and has only occurred in regional states with growth inducing infrastructure and services. This flow in economic infrastructure growth has brought about significant change and improvement for some states while the absence of appropriate infrastructure(s) in other states has left them relatively underdeveloped. This paper suggests that improving infrastructure equity would lead to more inclusive growth (AfDB 2018). Therefore, policymakers

| No | Region            | CII  | Rank |
|----|-------------------|------|------|
| 1  | Afar              | 0.6373 | 4    |
| 2  | Amhara            | 0.4968 | 7    |
| 3  | Benishangul-Gumuz | 0.4176 | 8    |
| 4  | Dire Dawa         | 1.0015 | 2    |
| 5  | Gambela           | 1.2418 | 1    |
| 6  | Harari            | 0.5830 | 5    |
| 7  | Oromia            | 0.7010 | 3    |
| 8  | SNNP              | 0.4109 | 9    |
| 9  | Somali            | 0.1914 | 10   |
| 10 | Tigray            | 0.5057 | 6    |
|    | Country level-mean value | 0.6187 |

Source: Based on Chotia and Rao (2015).
need to sustain efforts aimed at eradicating infrastructure inequity by adopting a growth-oriented strategy (Chotia and Rao 2015; Simon and Natarajan 2017). It can also be concluded that policymakers need to ensure and sustain the momentum to reduce infrastructure disparity across all the regional states of Ethiopia. They should also formalise comprehensive programmes for the development of infrastructure deficient regions. As several commentators have observed, eradication of disparities lies at the heart of an efficient development process (Chotia and Rao 2015; Simon and Natarajan 2017).

This study provides a good beginning for generalising the application of CII for ‘equity-based resource distribution for infrastructure. The CII also contributes to the debate on ‘people-centred’ (e.g., Workers, Leadership, etc.) versus ‘place-based’ (e.g., Infrastructure, Housing, etc.) development (Wismadi et al. 2015). Whereas more traditional place-based policies (PBP) comprise infrastructure investments dealing with special zones, lagging regions, and local growth policies, (Duranton and Venables 2019), the approach should place people at the centre, including deep interventions in skills and training in the sector (Hoff 2001). Policies and strategies are known as progressive if they favour deprived/disadvantaged groups and regressive if they hurt such groups (Litman 2020).

All the above require international and national practices that target inequity/disparities-reduction (e.g., Infrastructure Composite Index (CII), Decentralising the Infrastructure Sector, Spatial Preference Modelling to Distribute Resources, Place-based policies as well as Deep vs. Shallow intervention, establishing a Ministry of Infrastructure by upgrading the infrastructure coordinating agency to coordinate infrastructure sectors in Ethiopia, and establishing a National Development Council). Moreover, development policy and strategy grounded on ‘leave no one behind’, ‘pro-poor growth’ or ‘shared prosperity’ principles need to be considered. But converting these equity principles into practice is very challenging due to the lack of a roadmap for converting the principles into a measurable target as the ‘leave no one behind’ agenda can do for equity in SDGs what the millennium development goals did for poverty reduction (Watkins 2015; World Social Report 2020). To prepare an appropriate roadmap and promote equitable infrastructure development in Ethiopia, the government should assign qualified and well-skilled professionals in each infrastructure sector rather than assigning political apparatchiks. Meanwhile, there are two core processes to reduce infrastructure inequity a citizen or regional state could use to re-establish equity: altering a citizen’s or regional states’ input or outcomes; and, developing explanations for the inequity to make it equitable, fixing perceptions of inputs and outcomes, altering the comparative other, or any other way that endeavours to frame the perception of the circumstances by ensuring both distributive justice (allocation of resources which is distributed across groups or regional states) and procedural justice (the fairness of the procedure which is considered as separate social justice care). Hence, there is an urgent requirement to invest in enhancing governance and the institutional environment in order to deliver the desired level of infrastructural development that will lead to sustainable long-term growth and development.
Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Ambaw Desalegn http://orcid.org/0000-0003-2152-0366

References

Adams, J. S. 1963. “Toward an Understanding of Inequity.” Journal of Abnormal and Social Psychology 67 (5): 422–436.

African Development Bank (AfDB). 2018. Macroeconomic Developments and Structural Change, Infrastructure and Its Financing. African Economic Outlook 2018, ISBN 978-9938-882-46-9.

Akanbi, O. A. 2013. “Does Governance Matter in Infrastructure: Evidence from Sub-Saharan Africa?” International Business & Economics Research Journal 12 (1): 113–126.

Alsnih, R., and P. R. Stopher. 2003. “Environmental Justice Applications in Transport: The International Perspective.” In Handbook of Transport and the Environment. Vol. 4, 565–584. Emerald Group Publishing Limited.

Al-Zawahreh, A, and F. Al-Madi. 2012. “The Utility of Equity Theory in Enhancing Organizational Effectiveness.” European Journal of Economics. Finance and Administrative Sciences (46): 159–169.

American Heritage Dictionary. 2004. “The Meaning of Infrastructure.” www.ahdictionary.com. Accessed 23 December 2018.

Anderson, E, and T. O’Neil. 2006. “A New Equity Agenda? Reflections on the 2006 World Development Report.” The 2005 Human Development Report and the 2005 Report on the World Social Situation, Overseas Development Institute, London, UK.

Ashenafi, B. B. 2017. “Infrastructure Development and Economic Growth in Ethiopia.” Journal of Economics and Sustainable Development, Walkite University 8 (13): 1–14.

Bel, G. 2011. “Infrastructure and Nation Building: The Regulation and Financing of Network Transportation Infrastructures in Spain (1720-2010).” Business History 53 (5): 688–705. DOI: 10.1080/00076791.2011.599591.

Best, R, and P. J. Burke. 2018. “Electricity Availability: A Precondition for Faster Economic Growth?” Eneco. 74: 321–329.

Bishaw, A, and S. Melesse. 2017. “Historical Analysis of the Challenges and Opportunities of Higher Education in Ethiopia.” Higher Education for the Future 4 (1): 31–43.

Calderon, C, and L. Serven. 2014. Infrastructure, Growth, and Inequality: An Overview. Washington, DC: The World Bank.

Calderon, C., C. Cantu, and P. Chuhan-Pole. 2018. “Infrastructure Development in Sub-Saharan Africa.” Policy Research Working Paper WPS8425, Africa Region Office of the Chief Economist, The World Bank.

Castells, A, and A. Sole-Olle. 2005. “The Regional Allocation of Infrastructure Investment: The Role of Equity, Efficiency and Political Factors.” European Economic Review 49 (5): 1165–1205. https://doi.org/10.1016/0018-2727(83)90094-5.

Central Statistical Agency. 2018. “The 2015/16 Ethiopian Household Consumption and Expenditure (HCE) Survey.” Statistical Bulletin 585-3, Addis Ababa, Ethiopia.

Chotia, V, and N. V. M. Rao. 2015. “Examining the Interlinkages between Regional Infrastructure Disparities, Economic Growth, and Poverty: A Case of Indian States.” Economic Annals 60 (205): 53–71.

Deloitte. 2014, “Ethiopia’s Growth Miracle, UK.” www.deloitte.com.

Deloitte. 2019. “Invest in Ethiopia: Structural Reforms Set to Unlock East Africa’s LARGEST ECONOMY.” www2.deloitte.com.
Dethier, J.-J, and A. Moore. 2012. “Infrastructure in Developing Countries: An Overview of Some Economic Issues.” ZEF-Discussion Papers on Development Policy No. 165, Center for Development Research, Bonn, 51.

Duclos, J.-Y. 2006. “Equity and Equality, Institute for the Study of Labor.” Discussion Paper No. 2284.

Duranton, G, and A. J. Venables. 2019. “Place-Based Policies: principles and Developing Country Applications Department of Economics.” Discussion Paper Series, University of Oxford.

Estache, A., and M. Fay. 2007. Current Debates on Infrastructure Policy. Policy Research Working Paper, 1–40. Washington DC: The World Bank.

Fan, S, and X. Zhang. 2002. “Infrastructure, Openness and Regional Inequality in India.” The American Agricultural Economics Association Annual Meeting at Long Beach, CA, July 28–31, 2002.

Federal Aviation Administration. 2018. “Airport planning, United States of America.” https://www.faa.gov.

Flyvbjerg, B. 2007. “Policy and Planning for Large Infrastructure Projects: Problems, Causes, Cures.” Aalborg University, Department of Development and Planning, Fibigerstraede 13, 9220 Aalborg, Denmark.

Flyvbjerg, B. 2014. “What You Should Know about Megaprojects and Why: An Overview.” Project Management Journal 45 (2): 6–19.

Frey, N. 2017. “Equity in the Distribution of Urban Environmental Amenities: The Case of Washington, DC.” Urban Geography 38 (10): 1534–1549.

Gashgari, S. 2016. “Equity Theory and Its Effect on Performance Outcome.” International Journal of Scientific & Engineering Research 7 (4): 517. ISSN 2229-5518 IJSER,

Harris, J., T. Tekleselassie, and A. Lawson. 2019. “Ethiopia Fiscal Equity Study: Assessing the Equity of Fiscal Policy, Federal-State Transfers and Federal Investment in Ethiopia, an Independent Study.” Final Report, Submitted by FISCUS Public Finance Consultants, UK for consideration by the Ministry of Finance, Ethiopia (unpublished).

Hippler, J. (Ed.), 2004–2005. Nation-Building: A Key Concept for Peaceful Conflict Transformation? Development and Peace Foundation 2004, 2005. London: Pluto Press.

Hoff, K. 2001. Beyond Rosenstein-Rodan: The Modern Theory of Coordination Problems in Development. Washington DC: The International Bank for Reconstruction and Development/ The World Bank, 145–176.

Hooper, E., S. Peters, and P. A. Pintus. 2017. “To What Extent Can Long-Term Investments in Infrastructure Reduce Inequality?.”

International Telecommunication Union (ITU). 2016. “Measuring the Information Society Report.” 978-92-61-21431-9 (electronic version), Geneva, Switzerland.

Jones, H. 2009. "Why It Is Important and How to Achieve It," Overseas Development Institute, London. www.odi.org.uk. Accessed 3 August 2018.

Kanth, P, and M. Geiger. 2017. “What Studies in Spatial Development Show in Ethiopia Part II. https://blogs.worldbank.org/africacan/what-studies-in-spatial-development-show-in-ethiopia-part-ii.

Korytarova, J, and V. Hromadka. 2014. “The Economic Evaluation of Megaprojects-Social and Economic Impacts.” 27th IPMA World Congress, Elsevier Ltd.

Kucheva, Y. A. 2012. The Dynamics of Participation in Subsidized Housing Programs in the US. 1–176. Los Angeles, CA: University of California.

Litman, T. 2020. “Evaluating Transportation Equity Guidance for Incorporating Distributional Impacts in Transportation Planning, Victoria Transport Policy Institute,” www.vtpi.org. Accessed 5 September 2020.

Litman, T. 2021. “Evaluating Transportation Equity: Guidance for Incorporating Distributional Impacts in Transport Planning.” Victoria Transport Policy Institute.

Litman, T, 2003, “Social Inclusion as a Transport Planning Issue in Canada, Contribution to the FIA Foundation G7 Comparison.” Paper presented at the European Transport Conference held in Strasbourg in June, 2003, 1–30.
Locatelli, G., G. Mariani, T. Sainati, and M. Greco. 2017. “Corruption in Public Projects and Megaprojects: There is an Elephant in the Room.” International Journal of Project Management 35 (3): 252–268.

Lucas, K. (Ed.). 2004. Running on Empty: Transport, Social Exclusion and Environmental Justice. 1–106. UK: Policy Press.

McKenzie, P. J. 2003. “A Model of Information Practices in Accounts of Everyday-life Information Seeking.” Journal of Documentation 59: 19–40.

National Planning Commission. 2018. “An Interim Report on 2015/16 Poverty Analysis Study.” Addis Ababa, Ethiopia.

Nordin, R. M., R. Takim, and A. H. Nawawi. 2011. “Critical Factors Contributing to Corruption in Construction Industry.” 2011 IEEE Symposium on Business, Engineering and Industrial Applications (ISBEIA), Langkawi, Malaysia.

Othman, A. A. E. 2013. “Challenges of Mega Construction Projects in Developing Countries,” DOI 10.5592/omtcj.2013.1.10, https://www.researchgate.net/publication/243457533.

Patra, A. K, and A. Acharya. 2011. “Regional Disparity, Infrastructure Development and Economic Growth: An Inter-State Analysis.” Research and Practice in Social Sciences 6 (2): 17–30. https://www.researchgate.net/publication/236149543.

Rammelt, C. 2018. “Infrastructures as Catalysts: Precipitating Uneven Patterns of Development from Large-Scale Infrastructure Investments.” Sustainability 10 (4): 1286.

Roller, L.-H, and L. Waverman. 2001. “Telecommunications Infrastructure and Economic Development: A Simultaneous Approach.” American Economic Review 91 (4): 909–923.

Rubin, V. 2006. “Safety, Growth, and Equity: Infrastructure Policies That Promote Opportunity and Inclusion.” www.policylink.org.

Sawada, Y. 2015. “The Impacts of Infrastructure in Development: A Selective Survey.” ADBI Working Paper 511. Tokyo, Asian Development Bank Institute. http://www.adbi.org/working-paper/2015/01/20/6526.impacts.infrastructure.in.dev/.

Schultz, D. 2017. “Regional Disparities in Economic Development: Lessons Learned from the USA.” RUDN Journal of Public Administration 4 (2): 180–201.

Schwab, K. 2017–2018. “The Global Competitiveness Report 2017–2018,” World Economic Forum.

Seid, Y., A. S. Taffesse, and S. N. Ali. 2016. Wider Working Paper 2015/154. Ethiopia—An Agrarian Economy in Transition. 1–29. United Nations University World Institute for Development Economics Research.

Semela, T. 2011. “Breakneck Expansion and Quality Assurance in Ethiopian Higher Education: Ideological Rationales and Economic Impediments.” Higher Education Policy 24: 399–425.

Shiferaw, A. 2017. “Productive Capacity and Economic Growth in Ethiopia, Department of Economic & Social Affairs.” CDP Background Paper No. 34. http://www.un.org/en/development/desa/papers/.

Simon, N. S., and P. Natarajan. 2017. “Nonlinearity between Infrastructure Inequality and Growth: Evidence from India. Review of Market Integration 9 (1–2): 66–82.

Soilhail, M. and S. Cavill. 2008. “Accountability to Prevent Corruption in Construction Projects, Loughborough University.” Journal of Construction Engineering and Management 134 (9): 729–738.

Stevens, C. A. 1993. “Equity and Social Justice Issues Associated with Financing Infrastructure in New Urban Development.” Urban Policy and Research 11 (4): 198–207.

Sturup, S. and N. Low. 2019. “Sustainable Development and Mega Infrastructure: An Overview of the Issues.” Journal of Mega Infrastructure and Sustainable Development 1: 8–26.

Thomopoulos, N., and S. Grant-Muller. 2013. Incorporating Equity as Part of the Wider Impacts in Transport Infrastructure Assessment: An Application of the SUMINI Approach. Berlin: Springer.

Thomopoulos, N., S. Grant-Muller, and M. R. Tight. 2009. “Incorporating Equity Considerations in Transport Infrastructure Evaluation: Current Practice and a Proposed Methodology.” Evaluation and Program Planning 32 (4): 351–359.
UNDP Ethiopia. 2018. “National Human Development Report 2018 Industrialization with a Human Face.” UNDP.

Vyas, S, and L. Kumaranayake. 2006. “Constructing Socio-Economic Status Indices: How to Use Principal Components Analysis.” *Health Policy and Planning* 21 (6): 459–468. [https://www.researchgate.net/publication/6763769](https://www.researchgate.net/publication/6763769).

Watkins, K. 2015. “Leaving No-One Behind: An Equity Agenda for the Post-2015 Goals,” Overseas Development Institute. [www.odi.org](http://www.odi.org). Accessed 7 August 2019.

Webster’s New Collegiate Dictionary. 2006. “The Meaning of Equity,” [www.mariam.webster.com](http://www.mariam.webster.com). Accessed 11 January 2019.

Whitehead, M. 1991. “The Concepts and Principles of Equity and Health,” WHO, EURO Report.

Wismadi, A., M. Brussel, M. Zuidgeest, and M. van Maarseveen. 2015. “Equitable Distribution of Growth for Utilitarian and Non-Utilitarian Infrastructure Planning.” *Infrastructure Complexity* 2: 8.

World Bank. 2009. “Scaling-up Social Accountability in World Bank Operations.” World Bank.

World Bank. 2018a. “Ethiopia Resilient Landscapes and Livelihoods Project (P163383), Combined Project Information Documents.” [http://www.worldbank.org/projects](http://www.worldbank.org/projects).

World Bank Group. 2017. “Unlocking Firm Level Productivity and Promoting More Inclusive Growth: The Role of Innovation in Ethiopia.” Trade and Competitiveness, 102913.

World Development Report (WDR). 1994. *Infrastructure for Development*. New York, Oxford University Press.

World Development Report (WDR). 2003. *Sustainable Development in a Dynamic World Transforming Institutions, Growth, and Quality of Life*. Washington DC: Oxford University Press, The World Bank.

World Development Report (WDR). 2006. *Equity and Development*. New York: Oxford University Press for the World Bank.

World Social Report. 2020. “Inequality in a Rapidly Changing World, Department of Economic and Social Affairs.” United Nations, ISBN 978-92-1-130392-6.

Yilmaz, D, and I. Cetin. 2018. “The Impact of Infrastructure on Growth in Developing Countries: Dynamic Panel Data Analysis,” Uludag University, Turkey. [https://www.researchgate.net/publication/322569814](https://www.researchgate.net/publication/322569814).