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ABSTRACT

The purpose of the paper is to research fast-growing economies of East Africa regarding conditions and effects of infrastructure investments in various sectors and their influence on socio-economic growth. The paper aims to provide insights, knowledge and a rudimentary blueprint of how Least Developed Countries can take the first step to initiate dynamic economic growth. An important question is which infrastructure project should be financed with the limited available funds of an emerging market. The authors discuss various infrastructure projects, related conflicts, political issues, social impacts and the growing dependence on international influences. The structure of investment in East Africa and its economic playground with different trade agreements, NGOs Aid Programmes and Development Foundations, as well as International Agreements for development aid is often difficult to understand and its outcome is difficult to measure. So, the foundation of this paper will be built on in-depth interviews and statistical research based on the development theories of Emerging Markets. The authors were able to demonstrate an influence of infrastructure investments on economic and human development by a high positive correlation. In addition, 10 out of 13 analysed infrastructure characteristics showed a significantly positive moderate, high or very high correlation with economic growth.

1. Introduction

Africa, in particular East Africa, is making steady progress in developing the key characteristics for sustainable and resilient societies and respectable economic growth, although progress towards the seventeen Sustainable Development Goals (SDG) is slow and varies across the continent (United Nations Economic Commission for

Africa, 2019, p. 44). East Africa has already become the focus of attention within African Continent for global investors and indicators that promise continuous expansion in the future. There are several reasons why such development growth is taking place in certain areas of East Africa. The excellent geographical location on the Arabian Sea, the Gulf of Aden and Indian Ocean to the East, as well as the landmass of the entire continent to the north, west and south, enables East Africa a strategic advantage due to a growing domestic market and the shipping trade channels to Middle East, South East Asia and India. Access to domestic and global markets and efforts to increase exports and imports are a huge obstacle for the majority of the least-developed countries. The foundation of a rudimentary infrastructure is the prerequisite for being able to produce goods and services on one hand and attract foreign investors and capital on the other. However, not all infrastructure projects automatically lead to an improvement in the quality of life or the prerequisite for economic growth. Prioritisation[1] of these projects, the actors involved, society and even culture play a major role in increasing the chances of success of infrastructure projects (Unruh et al., 2019, p. 2). East Africa and national governments are seeking to invest in so-called large-scale infrastructure projects with the support of national and international development programs involving both African Development Bank and commercial banks, as well foreign financial capital (African Development Bank, 2019, p. 12). These foreign capital investments are the basis for effective implementation of Agenda 2063 and 2030, but to do so, African countries must increase their monetary efforts in the field of technology, science and innovation to ensure continuous and inclusive growth (United Nations Economic Commission for Africa, 2019, p. 40).

The recent growth in this sector has two major advantages: First, certain infrastructural measures will lead to a better investment climate, economic growth and thus to regional stability, including a stable source of employment. Second, increasing independence from foreign aid ensures a certain quality and stability of rudimentary infrastructure elements such as water and electricity supply, as well as the possibility of exporting overproduction of these elements to neighbouring countries (Unruh et al., 2019, p. 3). Additionally, also an improvement is needed, since the level of sufficient access to rudimentary infrastructure such as clean water supply, energy and sanitation, and health care is constantly improving, but is still below the global average (United Nations Economic Commission for Africa, 2019, p. 42).

Due to the extremely large geographical area, the authors decided to concentrate on eight core countries to represent the East African area. These countries were selected based on various factors such as economic performance, history, role in the region, geographical location and available data: Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, Tanzania and Uganda.

The fascination and the reason for this research, is the expected slumbering potential of this region in the coming years. East Africa and the Horn of Africa have the chance to unfold its economic potential, although these countries are among the most politically dynamic regions in the world. The combination of enormous geopolitical forces and regional ambitions to achieve such volatile results is almost unique (Inter-Agency Regional Analysts Network, 2017, p. 7).

Each country is faced with a different set of issues, so these investment decisions vary from country to country, but the core concept should be the same. The main questions are: What is the first step (investment) that a country needs to take in order to make the transition to an Emerging Market. This first step usually refers to the development of infrastructure to address infrastructural problems/gaps that block foreign direct investment. Growth theory assumes that changes in real output are result of technological shocks within the economy (Škare & Tomic, 2014, p. 521).

The development and expansion of the infrastructure makes the country more attractive for foreign companies. Countries such as Ethiopia have shown that this movement could begin with certain changes in the infrastructure sector, for example the new 'Grand Ethiopian Renaissance Dam' to be independent of foreign sources of electricity on one hand and to sell electricity to other countries on the other. They are also starting to invest in another problem faced by many developing countries, namely public transport. East African countries, in particular, have had the problem that, after the end of the colonial period, a great deal of know-how about the maintenance of the existing railways has been lost. Until then, governments decided to use only buses for public transport in the cities, with the result that the roads are completely congested as the rural exodus continues to increase, and more and more people move to the cities or near suburbs for better living conditions.

Ethiopia has now completed the first metro in Addis Abeba to combat traffic problems and has been able to reduce commuting time enormously. Following these and a host of other infrastructural and political changes, Ethiopia is now one of the countries in East Africa with the highest economic growth rates. The downside of this success is an increasing dependence on major investors such as China and the short-term national investment freeze on other projects of national interest that would help the country's non-economic sectors, as money is redirected to key investment projects to boost the country's long-term productivity. This is related to immense political disputes and possible protests by society, which cannot be convinced to confirm the long-term strategy due to short-term fears and problems.

The authors intend to focus the research on several points, including an examination of the choice of infrastructure that is likely to have the greatest chance of triggering a particular economic development, together with other factors that favour or block this development, such as political disputes, changes in administration and foreign direct investment. Since the authors will use a qualitative approach in the form of in-depth expert interviews, supported by a quantitative approach, they will address the following questions:

RQ 1: What infrastructural measures and steps are necessary to turn an underdeveloped country into an Emerging Economy during the transition phase?

RQ 2: How can infrastructure development measures lead to positive economic growth?

The research aims to prove whether it is possible to create a general pattern that only needs to be adapted to the individual situation of a particular country facing the problem of lack of development or initial growth start.

First, some preliminary findings can be derived from historically similar events, such as the link between infrastructure development as an initiator of a certain

economic growth and the fact that increasing FDI will lead to a stable source of revenue for the state. However, there is still no careful study of the relationship between the effective chronological order of these projects in East Africa. The literature review will show common theories about the economic development in emerging markets and is conducted to apply this knowledge about the characteristics of the East African situation with its unique features. Different theoretical models will be used to analyse the correlation between the economy and infrastructure, and to analyse the importance of different processes that could influence each other. As qualitative interviews are conducted to fill emerging knowledge gaps in the literature, the guiding methodology and research design of the study will be presented. The study concludes with a final critical discussion and the results of the research as well as the limitations that have arisen.

2. Literature review

2.1. Infrastructure and economic development

Last years, the fact of the positive impact of infrastructure on productivity and economic growth is in increased attention. Aschauer (1989) found out that almost simultaneously with a reduction of public investment almost everywhere the productivity growth fell sharply. He was the first who proposed that the reduction of productive public services in the United States may be crucial in explaining the overall reduction in the rate of productivity growth in the country. Mamatzakis' (2008) calculations suggest that the infrastructure is an important component of economic activity in Greece. His estimates show that the public infrastructure reduces costs in the most manufacturing industries, as it strengthens the growth of productivity of resources. The efficient infrastructure supports economic growth and improves quality of life, and it is important for national security (Baldwin & Dixon, 2008). The researchers analyse the impact of infrastructure in various aspects: regional competitiveness, economic growth, income inequality, output, labour productivity, the impact on the environment and well-being (in time and cost savings, increased safety, the development of information networks) (Bristow and Nellthorp (2000)). Public infrastructure provides the geographic concentration of economic resources and wider and deeper markets for output and employment (Gu & Macdonald, 2009). It affects the markets and resources of the finished product, helps to determine the spatial patterns of development and provides an extensive network of individual users at low prices. Public infrastructure is generally seen as a foundation on which to build the economy (Macdonald, 2008). Burinskiene and Rudzkiene (2009) and Grundey (2008) have conducted an analysis of the implementation of sustainable development policies, and they note the development of infrastructure as one of the most important aspects in the field of strategic planning for sustainable spatial and socio-economic development of the country. Aschauer confirms that the public infrastructure is the basis of the quality of life: good roads reduce the number of accidents and increase public safety, water supply system reduces the level of disease and waste management improves the health and aesthetics of the environment. Agenor and Moreno-Dodson (2006) examined the association between the presence of infrastructure and health and education in the community, and proved that

infrastructure services are essential to ensure the quality and availability of health and education, which provide a wealth effect to a large extent.

According to the World Bank (2014, p. 47), infrastructure can have an enormous influence on the growth of an economy and provide substantial support. Infrastructure is one of the main pillars to enable an economy to grow and to give local, national and international actors a long-term perspective. The interrelation between infrastructure and economic prosperity/growth is a complex area of research involving many individual independent standards that interact at different levels. Despite the fact that there is a certain relationship between infrastructure and economic growth, researchers have not been able to agree on a specific ranking of the importance of infrastructure in terms of its impact on economic growth, as a variety of problems arise when investments are pooled at different economic levels, sectors and regions within a country (Estache & Garsous, 2012, p. 3).

The research results of Owusu-Manu et al. (2019, p. 4) have found that infrastructure, and electricity in particular, has some positive impact on economic growth. Studies by Gosh (1998, p. 3040) showed that infrastructure development is a crucial factor in ensuring long-term access to markets and facilitating further economic expansion. This makes it a crucial asset to strengthen local and national enterprises and to serve as the main attraction for international investment and multinational companies. According to Deng (2013, p. 686), an adequate transportation network in the country is a crucial factor, as it enables the fast and effective flow and transport of raw materials, goods and human resources to the market. An effective road infrastructure can have a huge impact on the efficiency of an economy and reduce the production costs of tradable goods.

In addition, a functioning network of roads and public transport enables rapid procurement of human capital. National and international business is able to use the national human resource market more efficiently and achieve an acquisition advantage. Despite the fact of national economic growth, the goods produced are only valuable if access to the world market is possible through a functioning port and airport infrastructure. Infrastructure is therefore crucial at the level of the global competitiveness of an emerging market economy (Mbekeani, 2007, p. 2). These trade relations enable a lucrative export market, but also connect international and national organisations, investors and companies and increase the exchange of knowledge. Multinational economic unions or neighbourhood countries can expand their national economies with infrastructure beyond their own borders. For example, a well-functioning railway network between several countries in a region can promote the exchange of expertise, human resources and know-how. Such projects are planned by Uganda, Kenya and Rwanda with the aim of creating a standard gauge railway network (Anyanzwa, 2019).

Such mega infrastructure projects (MIPs) have an enormous impact on the economic development of a region. In addition, the networking of an area through the technology sector is a central necessity in order to enable rapid information exchange and communication on the one hand, and to ensure the connexion of local, national and individual entities to the world market on the other. This is non-negotiable in order to increase the quality of the environmental infrastructure for the acquisition of international companies (AFDB, 2013, p. 6).

2.2. Human development

The Human Development Index (HDI) as a criterion for the quality of life, education and health of people is the main indicator to measure human development. For academic research, it is necessary to highlight factors in addition to economic growth in order to obtain a holistic view of the research field and its specific characteristics. The HDI is a good indicator to evaluate and compare national policy decisions. Regarding HDI, the United Nations created the following vision: 'The HDI was created to emphasise that people and their skills should be the ultimate criterion for assessing a country's development' (United Nations Development Programme, 2019, p. 2).

The HDI is created through a mix of measures, including the average achievements of certain key areas, these determinants being a long and healthy life, knowledge and a decent standard of living. Each of the three key criteria has subindicators such as life expectancy at birth, expected school years, average school years and gross national income (GNI) per capita PPP $. These indicators are converted into the following three comparable indices: Life expectancy index, education index and GNI index. Overall, the analysis of HDI data suggests that health, education and living standards of a country can be measured. East Africa has however endeavoured to raise the standards measured by the HDI. For example, the East African development model, supported by Ethiopia, Rwanda and, to a lesser extent, Tanzania and Uganda, has sought to reduce poverty and inequality. In particular, to address the situation in rural areas as well as in large urban structures, the trend towards urbanisation has led to growing problems and inequality, as urban areas are much more prosperous than rural and peripheral areas (Inter-Agency Regional Analysts Network, 2017, p. 8). Ethiopia and other countries have launched ambitious health programs to improve the health and well-being of the population and contribute to the onset of fertility decline. One of these programs is the so-called Health Extension Program (HEP) of Ethiopia, which was launched in 2003 to improve the medical infrastructure in rural areas and has even been linked to the national health system. More than 35,000 people are involved in this project to provide special assistance for primary health care and reduce the morbidity and mortality of mothers and children in the country. It is also a pillar of the medical education of citizens, as knowledge of general hygiene and medical risks is limited in certain areas of the country (Banteyerga, 2011; Ethiopian Economics Association, 2015; Witter & Awosusi, 2017).

2.3. Foreign direct investment and infrastructure

The development of the region depends in part on the attractiveness of FDI. FDI is one of the main catalysts that enables an economy to grow rapidly. According to the literature, the variety of intentions of FDI is complex, but almost always aimed at a profitable return on investment (ROI). The return measures the time it takes to reach the break-even point of the investment, and the return exceeds the amount invested (Investopedia, 2019). According to United Nations (UNCTAD, U. N., 2019, p. 212), foreign direct investment in East Africa is constant at around 9 billion US dollars per year. In addition, Ethiopia is the leading FDI region in East Africa with US$3.3

billion in FDI. Kenya shows a rising FDI trend (27%) to US$1.6 billion as investments in various sectors such as manufacturing, hospitality, chemicals and natural resources have increased.

East Africa has become a target for global investment, and Africa's growing economy in particular has benefitted from the substantial investments of India, which is the second most important trading partner after China (The East African Community, 2017, p. 73). Although Europe and America are still considered important trading partners for the East African region (mainly because of development aid and the provision of non-financial assistance), the emergence of new international players will intensify investment competition (Fisher & Anderson, 2015, p. 132). In particular, the enormous presence of Chinese interaction and influence is viewed critically by many experts due to financial dependence on China, as financial loans and credits in exchange for free trade agreements and easy access to markets and infrastructure can lead to a critical future situation for many East African countries (African Development Bank, 2019, p. 33).

China has stated that its investments are not subject to any political conditions and that loans are only intended to promote development cooperation between the two nations (Asche & Cui, 2018). China's Africa Strategy has thus already established a respectable distance advantage over Europe or the USA. Even though the EU has begun to step up its efforts to build up East African relations, there is no sign of a consensus for a common Africa Strategy as a whole.

Historically, the highest risks for foreign investment have been in developing countries, which are predominantly characterised by an immature or volatile political system. The greatest fear was the 'expropriation risk', that is the likelihood that the political administration of the 'host country' could seize foreign-owned assets. Nowadays, this risk has become increasingly important due to international politics and the symbiotic nature of the development in Emerging Economies. Nevertheless, the growing number of foreign direct investment and the normality of international negotiations have created new risks (Henisz & Zelner, 2010, p. 91). George Chifor at the University of Windsor in Canada found that host countries have adapted their strategy over time. He noted that 'more value can be extracted from foreign companies through the more subtle instrument of regulatory control than through direct seizures' (Henisz & Zelner, 2010, p. 93).

It could be seen that the risk of discriminatory governmental changes in laws and policies, aimed only at foreign investors, could enormously reduce the investor's financial return. This can also happen when officials in host countries are unwilling (or unable) to enforce existing policies that should facilitate the security of foreign investment. This political uncertainty is difficult to measure or is rarely reported for fear of total financial loss. This makes it difficult to compare political risks with normal seizures, as they usually attract more attention in the form of press releases (Henisz & Zelner, 2010, p. 94). This phenomenon may also constrain other traditional financial and contractual mechanisms that organisations use to avoid business risks. The literature of Henisz and Zelner (2010, p. 95) points out that to avoid such situations, it is essential to 'develop political management strategies that favour the incentives of government officials to redirect investors' returns'.

Political risk is only one of many potential risks that arise during operation in Emerging Markets. A comprehensive risk assessment for Emerging Markets, in particular of the unique factors of a country's political and social environment, is necessary to understand the conflict dynamics that can arise between national and international actors. This research can help to predict local or national security problems such as (civil wars, separatist movements, terrorism) that may occur after the investment decision is made (Unruh et al., 2019, p. 3). The current situation of already existing cultural, political or religious conflicts or disputes, which are likely to be exacerbated by foreign investment projects, should be taken into account (Menkhaus, 2015, p. 26). The complex dynamics of Emerging Markets can give rise to a variety of potential risks, which need not necessarily be of a financial nature. Shortages of skilled labour, corruption, trade embargoes, etc., can lead to enormous cuts in the return on investment.

3. Methodology

The authors follow a convergent parallel design approach of the mixed methods strategy. The research designs of the quantitative and the qualitative part follow the same research questions as they investigate several similar hypotheses. The recommendation of Schoonenboom and Johnson (2017, p. 108) is that these hybrid designs can produce a more explicit result, rather than following a single method. In the literature of Morse and Niehaus (2009, p. 27), different hybrid methods are described, where one method always determines the general research method and influences the other(s), since they are only classified as supplements. However, this concept is not always applicable because it has certain limitations regarding the weight and balance of the methods used. To overcome these limitations mentioned by Christensen (2017, p. 83), Johnson and Onwuegbuzie (2004, p. 16) and Johnson et al. (2007, p. 116), a mixed-method design was created with a broader perspective and without the leading method limitation.

The authors use the first approach of equivalence of both works QUAL + QUAN (equal-status concurrent design), even if it is partly necessary to bypass the given path to allow a more equivalent sequential design, in which the qualitative questions follow the deductive design of the statistical approach to allow inductive theory building for the qualitative part. Considering the literature of Schoonenboom and Johnson (2017, p. 109), interviews as a research strategy allow authors to obtain in-depth first-hand information from people with knowledge in specific areas within a given context.

Despite the fact that databases already provide an almost sufficient variety of number-based indicators, interviews are inevitable as the research area is rather unexplored due to the novelty and complexity of the topic. This leads to the problem that the available knowledge and literature on this particular topic is limited. Most of the interviews were conducted in person at a neutral location or via Skype in order to follow an ethnographic approach and to allow researchers to obtain valid, unbiased data. The strategy of the interviews based on a semi-structured questionnaire with the same initial questions enabled the researchers to obtain different views and insights from the individual respondents, while at the same time being flexible in their

responses, in order to explore areas beyond the questions asked in the questionnaire. Several interviews were conducted to compare both similarities and differences between them. As mentioned above, this strategy was chosen because of the novelty of the subject, with the aim of comparing multiple responses from individuals and obtaining first-hand information from people with different academic backgrounds in order to make the findings and results more coherent (Merriam, 1998, p. 25).

The interviews enable the authors to facilitate the results of the empirical approach, since some Hypotheses and Assumptions are shared by both methods to deliver a holistic result respecting the intangible factors. This is particularly the case for Assumption 2 and 3 which build the research core for the prioritisation and the positive effect of infrastructural development projects.

The second strategic approach within the research strategy with mixed methods is the statistical research part. The authors wanted to find evidence for the correlation between two or more attributes. According to Schober et al. (2018, p. 1765), correlation analyses pursue the purpose of measuring the correlation between variables, whereby in correlated data the change in the size of one variable causes a change in the size of the second variable. In accordance with the research objective, the authors chose the Pearson product-moment correlation as the leading aspect of this research, since the variables have the prerequisites for this analysis. In addition, the impact is in the form of directional and undirected variables provided by the surveys conducted.

The following table shows five hypotheses that have been developed to address research questions:

H1: There is a significant impact of infrastructure development on economic growth development in East Africa.

H2: The prioritisation of infrastructure projects in East Africa has a significant impact on economic growth.

H3: All infrastructure projects lead to economic growth in East Africa.

H4: There is an impact of infrastructure growth on human development in East Africa.

H5: There is a significant impact of FDI on infrastructure development in East Africa.

H1 examines the basics of the answer for RQ2: Is there a significant correlation between infrastructure development and economic development in a country? To answer this question, the authors use different areas of infrastructure data from the last 29 years to have a broader empirical data set. These data are compared and correlated with the data on economic growth of the eight countries and the region as a whole.

An important question is which infrastructure project should be financed with the limited available funds of an emerging market. One aim of this study with H2 is to provide the answer to the above question: Does the economic development rate change in percent if, among other things, a certain infrastructure project is prioritised? Consideration of this question is particularly important for countries stuck in an agrarian state and cannot achieve the initial start of economic growth. They often need help in finding the infrastructure projects that should be prioritised first in order to lay the foundation for a stable infrastructure network. H3 examines whether

Table 1. Sample of countries for empirical approach.

Ethiopia
Somalia
Madagascar
Tanzania
South Sudan
Burundi
Djibouti
Kenya
Rwanda
Uganda
Sudan
Eritrea

The colour of the country means:
Light grey = part of the dataset
Dark grey = part of research but not of empirical analysis
White = Not included in research
Source: Own research.

all infrastructure sectors will lead to some economic success or whether some efforts will not lead to positive growth after all. The individual infrastructure sectors (e.g. transport sector) are grouped together and their investment volume is compared to their share in economic growth in terms of GDP. This hypothesis is particularly important for RQ1 to demonstrate which infrastructure measures and investments actually have a significant impact. In H4, the authors examine the correlation between the level of human development within the area and infrastructure investment. The aim is to find evidence of the relationships between human development and infrastructure in relation to the prosperity and wealth of society. These research steps will be undertaken to demonstrate the side-effects of infrastructure development that can increase human development.

The impact of China's current investments on the East African economy is indirectly examined by H5. It will examine the fact of foreign direct investment in general, but also the specific impact of Chinese investment on the economic transformation of East Africa.

The authors wanted to find evidence of the impact of infrastructure investments on a particular economic development of a region (East Africa) or country. To prove this theory, databases of different infrastructure sectors from eight East African countries are examined and related to their past economic growth. The presented databases or data tables come from different sources such as the World Bank Comparison Database (2019) for rudimentary infrastructure and economic data, and The World Bank Project Database for infrastructure investments. In addition, the study examines the influence of foreign direct investment (FDI) on economic development and the share of infrastructural development. China is highlighted because East Africa is in the unique position to experience enormous FDI from both, China's private investors and the government. This part of infrastructure investment becomes a dependent variable for this purpose. Furthermore, it is part of the research presented to show the inverse relationship between infrastructure and FDI attraction effects.

Despite the fact that the research focuses on eight countries in the Horn of Africa and surrounding area, Djibouti and Somalia are excluded from the empirical analysis

Table 2. Factors of economic development measuring.

	N	Minimum	Maximum	Mean	Standard deviation
GDP p. c. (PPP)	29	803.012	2601.271	1455.088	480.439
GDP p.c. growth (annual %)	29	−4.086	8.960	3.359	2.062

Source: Own research.

due to a lack of information for the dependent variable GDP-PPS p.c. and GDP growth to measure economic development. As shown in Table 1 below, the statistical analysis will be continued with the six East African selected core countries with regard to the availability of data for these countries. As can be seen in Appendix 1, important comparable data on GDP were not available for the two excluded countries. However, some correlations could show the influence between two or more infrastructure variables for all eight countries.

3.1. Quantitative research

Valuable data are collected for 28 years (1990–2018) from available secondary data sources for the respective sectors in order to perform the statistical tests mentioned above. From the available data, the authors have selected GDP-PPS p.c., which is mainly provided by the World Bank Comparison Database (2019). Economic growth is measured by GDP growth per year. As mentioned above, the infrastructure variables come from the same source and cover areas such as transport, energy, water, telecommunications, agriculture and industry.

The statistical approach is generally based on two pillars of data on infrastructure: firstly, indicators of development in various measures (people, containers, energy consumption, etc.) to show the use of infrastructure in the socio-economic environment. Secondly, investment projects over the last 28 years in the same sectors to analyse the flow of funds and the resulting impact on the economy.

In addition to economic and infrastructure data, the authors decided to examine the interrelation between infrastructure, HDI, FDI and the economy. The GDP p. c. (PPP) 1990 − 2018 (US$) and the per capita growth of GDP (annually in %) are presented in Appendix 1.

Table 2 shows two indicators including their sample size (N), their minimum, mean and maximum values and the standard deviation.

In addition, two main aspects of infrastructure development are examined in order to determine the infrastructural efforts of a nation. First, basic data on infrastructure use and development are collected. These data are for example 'container port transport', 'air freight traffic' or 'energy consumption'. The second measurement of infrastructural development approach is monetary investment to support and improve the infrastructure.

Each of the infrastructure sectors mentioned above contains a large number of indicators. These individual indicators vary in quantity from sector to sector, but each of the individual indicators supports the overall importance of the main sector. The following list in Table 3 will illustrate the measured variables in detail.

Table 3. List of researched indicators.

Indicator	Abbreviation
Transportation (T)	
Rail lines (total route − km)	RL
Railways, goods transported (million ton − km	RG
Air transport, registered carrier departures worldwide	ATC
Air transport, freight (million ton − km)	ATF
Container port traffic (TEU 20-foot equivalent units)	CPT
Energy (E)	
Indicator	Abbreviation
Electric power consumption (kWh per capita)	EPC
Investment in energy with private participation (current US$)	IEP
Fossil fuel energy consumption (% of total)	FEC
Water (W)	
Annual freshwater withdrawals, total (billion cubic meters)	AFW
Not measured due to a critical low amount of data	
Telecommunication & Internet (TEL)	
Indicator	Abbreviation
broadband subscriptions (per 100 people)	BS
Mobile phone subscriptions (per 100 people)	MPS
Secure Internet servers	SIS
Infrastructure investments projects (INV)	
Indicator	Abbreviation
Transportation	INVT
Energy and extractives	INVE
Water, sanitation and waste management	INVW
Information and communications technologies	INVTEL
Agriculture, fishing and forestry	INVAGR
Industry, trade and services	INVITS
Total investment on sector per year	TOTAL
Infrastructure indices (INDX)	
Liner shipping connectivity index	LSCI
(maximum value in 2004 = 100)	
Quality of port infrastructure, WEF	QPI
(1 = extremely underdeveloped to	
7 = well developed and efficient by international standards)	

Source: Own research.

These indicators are correlated on a single basis and merged into infrastructural sector accordingly. This makes it possible to find both individual positive or negative correlations of indicators within sectors and the influence of the sector as a whole.

The transport sector is measured by five attributes relating to the rail, ship and air transport of freight (Table 4). Road transport attributes could not be analysed due to the unavailability of data for the temporal and geographical research framework used.

Various attributes of energy databases that are believed to be related to, or to have an impact on economic growth were analysed (Table 5). This variable examines the area of electricity consumption (kWh per capita), investments in energy with private participation (current US$) and fossil fuel consumption (% of total consumption).

Telecommunication factors were selected based on the availability of data for the given time frame. Most attributes reflect the use of the telecommunication infrastructure in East Africa such as mobile phone subscriptions, Internet broadband connections or secure Internet servers (Table 6). Other basic data, such as submarine cables, were not selected because no data is available for observed period.

Investment projects in East Africa were used to reflect the holistic situation of infrastructure efforts in all seven areas (Table 7).

Table 4. Calculations on transportation.

Transportation	N	Minimum	Maximum	Mean	Standard deviation
T − RL	13	754	8488	6222.307	2690.340
T − RG	11	118	3983	2777.090	1097.851
T − ATC	29	45800	324438.178	110940.476	82343.448
T − ATF	29	118.100	2384.635	625.465	635.654
T − CPT	12	1231260	3337000	2383403.808	711176.151

Source: Own research.

Table 5. Calculations on energy.

Energy	N	Minimum	Maximum	Mean	Standard deviation
E − EPC	25	63.596	112.402	79.051	13.7446
E − IEP	19	6000000	908100000	302818421.1	252582794.5
E − FEC	25	3.373	8.001	6.670	1.095

Source: Own research.

Table 6. Calculations on telecommunication.

Telecommunication & Internet	N	Minimum	Maximum	Mean	Standard deviation
TEL − BS	15	0.001	0.689	0.282	0.253
TEL − MPS	27	0.004	64.514	18.067	21.533
TEL − SIS	9	1.189	49.225	10.561	14.842

Source: Own research.

Table 7. Calculations on investment projects.

Investment projects	N	Minimum	Maximum	Mean	Standard deviation
INV − INVT	28	66.58	1605	520.055	424.390
INV − INVE	27	1.5	840.14	318.459	234.031
INV − INVW	25	20	1100	376.390	327.334
INV − INVTEL	16	1.15	286.8	88.488	79.186
INV − INVAGR	29	1.5	1659.73	498.231	389.319
INV − INVITS	29	17.5	847	331.040	214.744
INV − TOTAL	29	285.6	4489.17	2001.187	1309.485

Source: Own research.

Indices form the basis for decisions and take into account a large amount of data that is examined to create an index ranking (Table 8). Therefore, two main index numbers are used to analyse the development caused by infrastructural efforts over years.

One purpose of the study is to demonstrate the impact of infrastructure on human development (Table 9). This variable compares the rank of the HDI over years with the total of infrastructure investment projects in order to examine the correlation between the two variables.

Foreign direct investment in terms of net inflows (balance of payments, current US$) represents the foreign influence and impact on the region (Table 10). This variable is compared with the development of infrastructure over years.

3.2. Qualitative research

Interview partners in Table 11 were selected according to their respective professional field, origin and area of expertise, involving people with different professional and

Table 8. Calculations indices.

Indices	N	Minimum	Maximum	Mean	Standard deviation
INDX – LSCI	15	3.5025	10.611	6.127	1.948
INDX – QPI	11	3.22	3.693	3.445	0.136

Source: Own research.

Table 9. Calculations on human development.

Human development index	N	Minimum	Maximum	Mean	Standard deviation
Human development – HDI	24	0.043	0.466	0.134	0.085

Source: Own research.

Table 10. Calculations on FDI.

Investment projects	N	Minimum	Maximum	Mean	Standard deviation
Total foreign direct investments – FDI	29	26561083.24	8419996022	2578011292	2549059017

Source: Own research.

Table 11. List of interview partners.

Interview partners
Musa A Ahmed (Somalia); Sociologist & President of AIESEC
Girum Kinfemichael, (Ethiopia) Senior Lecturer Politics & Ph.D. Political Science
Dr. Eng. Manal El-Shahat, Scientific Researcher of EZBET Development Project
Hemal Bharadva (Kenya); Aviation Management

hierarchical backgrounds. Attention was paid to the homogeneity of the participants in order to obtain a stable data quality.

The design of the questionnaire was divided into four parts:

- General questions: The respondent was introduced in a softer approach to create a pleasant environment. The interview started with a short presentation of the interviewer and basic information about the respondent (current position, academic background, projects he/she works in, etc.). In addition, the first section contains a variety of questions about the culture, demography and human development of the research area. This allows to create a basis for deeper development and infrastructure questions in the second part.
- Development and infrastructure: The questions of the second part examined the current infrastructure, problems, urban and suburban areas, socio-economic status, infrastructure needs and the successful implementation of new infrastructure. Building on this last part, the interviewer asked questions about the certain influence or participation of foreign powers, especially China. Surveys in the form of questions on the first infrastructure projects in the past were asked in order to find answers as to which effective infrastructure projects should be prioritised.
- Foreign influence: The last section focussed on area-related political and economic issues to examine the relationship and cooperation between countries and their societies and the response to specific infrastructure projects or individual actions by countries.

- Area-related issues.

With the consent of the interviewees, the interviews were recorded and transcribed to enable phrases or answers to be assigned to code keywords. The interviews were conducted in one-on-one physical interviews or, due to geographical restrictions, via Skype or 'Google meet'.

In order to enable the data to be categorised, the researchers created a category system that generates category codes according to the frequency of the answers and their significance for the research result. The transcribed sections of each interview are carefully sifted, extracted, assigned the category code and assigned to their group. Using the coding to filter the data allows the researcher to extract meaningful blocks from the vast amount of data and to effectively categorise the topic. After the extraction and sorting process, the data is prepared and assigned to the defined matrix. The most important findings and results are summarised and interpreted, including the source. Finally, the statements are cross-analysed and compared to enable the creation of recommendations and conclusions for each category.

4. Results and discussion

4.1. Infrastructure investments

The following results present the total investment of each infrastructure sector from 1990 to 2018, as well as the cumulative total investment from all infrastructure sectors and the correlated impact on the development of GDP PPP p.c. Table 12 shows all correlations between the variables used in this section. Correlations of GDP growth in % are not shown in point clouds, but are shown in the correlation matrix and briefly described below the table.

With regard to the impact of infrastructure investments on GDP growth, it can be determined whether the following sections had a positive or negative effect:

- Transportation investments ($r = 0.4287363$) indicate a low positive correlation.
- Energy investments ($r = 0.4772055$) indicate a low positive correlation.
- Water investments ($r = 0.3291364$) indicate a low positive correlation.
- Telecommunication investments ($r = -0.314523$) indicate a negligible correlation.
- Agriculture investments ($r = 0.3249674$) indicate a low positive correlation.
- Industry & trade investments ($r = 0.1909818$) indicate a negligible correlation.
- Total investments in infrastructure ($r = 0.3552475$) indicate a low positive correlation.

4.2. Infrastructure attributes

This section presents the results of the infrastructure characteristics of the selected countries and the correlation/impact on GDP development PPP p.c. (fewer points indicate a smaller time frame). Table 13 shows all correlations between the variables used in this section. Fourteen different attributes have been examined for their correlation with the GDP PPP p.c. presented in Appendix 2.

Table 12. Correlation matrix – infrastructure investments.

Correlations matrix – infrastructure investments

	GDP PPP p.c.	GDP % gr.	HDI	INV – .INW	INV – INVE	INV – INVW	INV – INVTEL	INV – INVAGR	INV – UNITS	INV – TOTAL
GDP PPP p.c.	1									
GDP % gr.	0.3971536	1								
HDI	0.9421081	0.2527775	1							
INV - INVT	0.590602	0.4287363	0.6074311	1						
INV - INVE	0.6824395	0.4772055	0.6169773	0.3573767	1					
INV - INVW	0.7701746	0.3291364	0.7686173	0.492224	0.329642	1				
INV - INVTEL	0.153596	-0.314523	0.5480614	-0.01037	0.0019329	0.0755845	1			
INV – INVAGR	0.6651041	0.3249674	0.6701623	0.4892588	0.6035333	0.6782401	-0.048696	1		
INV – INVIIS	0.6386561	0.1909818	0.6218946	0.3939637	0.3660842	0.5389497	0.7598775	0.462466	1	
INV-TOTAL	0.8534147	0.3552475	0.8717948	0.7683619	0.6668207	0.82434	0.2383966	0.8541506	0.7136514	1

Source: Own research.

Table 13. Infrastructure attributes and their correlation with the GDP PPP p.c. development.

Correlation Matrix – Infrastructure Attributes

	GDP PPP p. c	GDP % gr.	T – RL	T – RG	T – ATC	T – ATF	T – CPT	E – EPC	E – IEP	E – FEC	TEL – BS	TEL – MPS	TEL – SIS	INDX – LSCI	INDX – QPI
GDP PPP p	1														
GDP % gr.	0.397153573	1													
T – RL	−0.835743537	−0.022563	1												
T – RG	−0.666672677	0.2547711	0.7375678	1											
T – ATC	0.943188598	0.3097253	−0.771022	−0.559579	1										
T – ATF	0.934616927	0.2879122	−0.715201	−0.784121	0.957551	1									
T – CPT	0.966376259	0.235951	−0.132217	n/a	0.9621082	0.8930937	1								
E – EPC	0.963036641	0.3946422	−0.838358	−0.67639	0.9346594	0.9735205	0.9480398	1							
E – IEP	0.315865183	0.2477221	−0.284036	−0.032955	0.2387102	0.1719858	−0.226035	0.6517219	1						
E – FEC	0.629289754	0.5338834	−0.507105	−0.574585	0.4236029	0.4942915	0.8182224	0.5407097	0.4669164	1					
TEL – BS	0.971884683	−0.004265	−0.610102	n/a	0.942244	0.9422951	0.9744359	0.9816538	−0.047629	0.2609652	1				
TEL – MPS	0.96790211	0.2778763	−0.812173	−0.7585	0.9829773	0.9478683	0.9897437	0.9566299	0.2504898	0.4835139	0.96543673	1			
TEL – SIS	0.810552033	−0.275832	0.4607801	n/a	0.9197482	0.8260026	0.6974974	0.923362	−0.003212	0.8375336	0.5827423	0.75963104	1		
INDX – LSO	0.949233021	−0.044588	−0.723512	1	0.9379937	0.930061	0.850103	0.8384111	−0.064508	−0.124384	0.88795418	0.93298315	0.90627353	1	
INDX – QPI	−0.772459481	0.2196151	−0.020322	n/a	−0.619439	−0.813396	−0.691623	−0.384679	0.3040778	−0.019024	−0.7711648	−0.72744837	−0.78627691	0.71768221	1

Source: Own research..

The interpretation of the statistical data from the infrastructure attributes and investments produced a mixture of positive and negative results. Based on the correlations between investment and GDP PPP p.c., the investment projects in all six sectors show a positive correlation with economic development. The Water indicator shows a high correlation, the Transport, Energy, Agriculture and Industry indicator a moderate correlation, and the Technology indicator a negligible correlation. The results for investment effects in the water and energy sectors are surprising, as the qualitative results differ according to the effects caused. This can be interpreted that water and energy have a beneficial effect on the economy and favour almost all industrial sectors and small- and medium-sized enterprises, which benefit from better and more stable supply. Moreover, water and energy are elementary factors for the later stage of development, when FDI reaches the country in the form of physical subsidiaries or factories that will generate a boost in GDP. This interpretation is also supported by the survey results, where more developed areas such as the south of East Africa attract foreign companies to outsource entire production lines or parts of organisations. As far as infrastructure characteristics are concerned, it can be generally acknowledged that all sectors have had a positive impact on economic growth.

Altogether, seven out of 13 infrastructure characteristics examined have a very high positive impact, one has a high positive impact and another two have a low or moderate impact on economic development. Therefore 10 out of 13 sections can be considered as supporting factors for the economic growth of the region. Especially the transport sector of air and sea freight shows an enormously high correlation to economic growth. It can be interpreted that GDP is highly dependent on tradable goods.

On the other hand, the railway characteristics point to a negative ratio to GDP growth. This could be interpreted as a consequence of the unavailability of data due to an underdeveloped train network. Most goods are transported by ship and truck, while trains are mainly used for passenger transport. This fact may explain the limited impact of rail transport on economic development.

4.3. Qualitative results

In the following section, the authors present the most important cumulative results of the qualitative interviews conducted as a summary of the results for each category.

Current state of development: The opinion of the respondents on the current state of development was clear. The South East Africa has a clear advantage, as the countries like Kenya, Uganda, Tanzania and Rwanda are closely linked by culture and language. The participants interviewed all said that the situation in the northern part and the southern part of East Africa is hardly comparable, as the southern part already had a well-functioning infrastructure in almost all areas (such as water, energy supply and roads), while the northern part was still in a very early stage of development. In particular Somalia, Djibouti and Eritrea seem to have just started, while Ethiopia is already in an advanced position. As far as the respondents are concerned, the Internet and telecommunications are functional and available in all regions of all countries and are not related to the other categories of infrastructure

development. It must be pointed out that Somalia is currently experiencing the least development, which is also borne out by statistical data. Ethiopia appears to be culturally and historically isolated, but is very well financed by foreign powers. Somalia and Djibouti, due to their geographical location, are strongly influenced by foreign powers such as the Middle East Region, United Arab Emirates, Turkey, Europe, the USA and China.

Political influence: Political influence on society, but also its relationship to one another, varies greatly in the countries studied. While the governmental structure in the northern part seems to be very differentiated, it can be observed that the institutions and administration function well in the countries of southern East Africa and Ethiopia. According to the interviewees, the Ethiopian government is seen as anxious to establish international relations, but does not perform well in terms of national policy and development. All respondents indicated that corruption and accountability of civil servants and people working in administrative offices is a major problem in all East African countries. It could be seen that society experiences frustration and a feeling of helplessness in the face of government. In particular, it was pointed out that the short-term focus was on a lack of a sense of identifying and addressing problems within the country. While the situation in the South East Africa is generally better, the governments of Ethiopia, Somalia, Djibouti and Eritrea face major problems in terms of corruption, strategic planning and empathy with society. According to the respondents, the political situation in all countries can be described as 'self-sustaining' by ignoring all the side effects it will cause. Political stability was described as positive overall, where the southeast with a more or less stable administration, while the northern part and especially Somalia has internal stability problems.

Infrastructural problems: Infrastructural problems were mentioned in all the interviews conducted, with certain differences in terms of the level of development. The respondents mentioned that the countries in East Africa could be connected better, especially in the northern part of the region. Due to an almost non-existent road network, the quality of the connexion between urban and rural areas is crucial. Small urban areas and certain parts countries were described as separated from the rest of territories. The proportion of paved roads in rural areas is low, especially in the northern part, and mobility between cities is described as difficult. All four respondents stated that the urban living situation is very critical, which is due to a movement from rural to urban areas. This situation causes numerous infrastructure problems, which are almost always related to housing issues, the creation of slums, water supply or electrical stability. Respondents mentioned the unbalanced growth of population and infrastructure, which causes enormous problems in the supply chain of daily needs. Population growth in urban areas worsens living conditions, caused by the slow development of infrastructure in terms of water, electricity, transport and housing. Everyone agreed that the government often does not have a comprehensive urban development plan on how to solve these problems. Especially the creation of slum-like areas in the suburban regions overtaxes most governments. These areas suffer from poor conditions of water supply and sanitation. Urban transport was mentioned as almost non-existent in Somalia and partly in Ethiopia. In southern parts of

East Africa like Kenya, urban transport was described as well functioning but in need of improvement. In Ethiopia, where the fertile land is not being used efficiently despite an adequate water supply, many investments in agricultural infrastructure are still needed, partly because of a lack of export opportunities due to the poor road infrastructure. In Somalia, agriculture is almost non-existent and has been described as a marginal sector.

Strategic Approaches: According to the interviews, governments have different approaches and strategies to solve the current problems in infrastructure development. In the southern part of East Africa, governments seem to be more cooperative on social problems and solve most of the economic infrastructure problems. Governments invest in rural infrastructure and connect it better with larger cities to make rural areas more attractive. This strategy follows the approach of breaking up demographic accumulation within cities and redistributing it across the country. The northern parts of East Africa, on the other hand, have enormous problems with the emergence of slums in the suburbs and the depopulation of rural areas. Most governments do not have a strategy to address this trend, and dealing with these unregistered residential areas in particular is crucial, as most cities do not improve or solve the existing problems. Functioning communities in these slums are being dismantled and destroyed by the government without creating new prospects for the people. According to the respondents, some cities are trying to build new extremely large residential areas far outside the city in barren areas or deserts in order to redistribute people, but without creating employment opportunities, transport to the cities, health infrastructure, etc. This has led to most of them becoming ghost towns to this day. Another problem mentioned is that the less developed cities in particular are dependent on the help of official organisations, but at the same time, they do not want to cooperate with urban NGOs that are trying to solve this situation. As far as infrastructure development in most countries is concerned, they concentrate on the construction and development of the basic road network, on seaports and on facilitating international trade with policies and regulations.

Prioritisation: According to the interviewees and their backgrounds from different countries, which are at different stages of development, it was found that they all have the same recommendation regarding the prioritisation of infrastructure projects. The interview partners from Kenya and Ethiopia answered this question with a description of past developments in these countries, while the interviewee from Somalia was able to describe current developments. All agreed that the development of their countries began with enormous investments in the areas of seaport and road construction. These two areas were given priority before focussing on other infrastructure sections. Ethiopia's electricity and water supply is still underdeveloped and in a very poor state, but access to the ports via roads and motorways has been massively improved. They also contributed to the renovation and expansion of the ports of Djibouti and Somaliland, which are of enormous importance for Ethiopian imports and exports, as Ethiopia is a landlocked country with no direct connection to world trade via sea access. The Kenyan interviewee noted that his home country is focussed on its ports such as Mombasa, and on the main highways and roads to Uganda and central Kenya. Furthermore, it was evident that the supply of electricity and water

was a priority right after the basic transport infrastructure and that the construction of railroad tracks was not a priority. This method of transport seems to be implemented when the basic connection via roads is already in place to facilitate road traffic and reduce the amount of cars and trucks on the roads.

Culture: According to the interviews with participants from Ethiopia and Somalia, the cultural differences are particularly pronounced in the northern part, as the countries have historically been confronted with many disputes and clashes during the last century. The colonial period in particular has left its mark, which is reflected in the identity of the individual countries. This colonial period and the ongoing proxy wars determined the ideas that were applied to culture. This is particularly evident in Somalia and Ethiopia during the Cold War period, and the result can be seen in each other's perception today. Current problems are often still rooted in that period. The southern countries of East Africa share a common culture and language linked to the British colonial period, which is perceived as an economic and social advantage.

Foreign Influence: All respondents described foreign countries as an important part of the region's development plan. While the countries experience a different intensity of international influence, all East African countries have identified points of contact. Especially in the northern part of the region, the USA and China are striving to increase their influence in the region. While the US is mainly interested in the strategic location, China is investing heavily in almost all countries. Ethiopia and Djibouti in the northern part are experiencing massive interest from the Chinese side in particular, while Turkey, the USA and the Middle East concentrate more on countries such as Somalia or Eritrea. All East African respondents mentioned the increasing influence of China on the entire region of East Africa caused by their investment strategy. Participants noted that China is the source of easily accessible funds, unconditional credit, labour, knowledge and materials. They all pointed out that East Africa is highly dependent on Chinese support as the Chinese have built almost all new infrastructures in the region and continue to provide funding. They all pointed out the long-term risks associated with the increasing involvement, as China finances, plans, implements and operates most projects, subject to temporary control over certain infrastructure facilities. The relationship with China is perceived by all respondents as both positive and negative, as China has improved infrastructure and economic situation in the region at the expense of long-term risk. Furthermore, three respondents mentioned the lack of transfer of knowledge and skills from the Chinese workforce to the local workforce. European and, more generally, Western countries are perceived as positive, but not as significant as China, as Western countries tend to have complex agreements and conditions when granting loans. It can therefore be assumed that government officials are not aware of the need for this complex protection process, which aims to avoid future risks for both sides.

4.4. Comparison and confrontation of quantitative and qualitative approach

Both research methods came to almost similar results, although some of the variables analysed differed greatly in terms of their importance for economic growth. While respondents indicated that water and electricity are underdeveloped in most areas,

but are not a priority project of the government, it was possible to conclude that these factors are not necessary for the initial phase of economic growth, but for the subsequent long-term sustainability of the economic environment, as we saw in Kenya, Uganda, Rwanda or Tanzania. On the other hand, the statistical data indicate that investment in both sectors is highly correlated with economic development.

Although they have a very limited impact on economic development, technology investments, and the technological characteristics such as mobile phone subscriptions and broadband connections are almost identical to GDP growth. This could be caused by the almost complete coverage of the network and Internet connections throughout the region. Technology is not developing very much, but the population is growing. Transport investments show a positive moderate influence on economic growth, which is consistent with the results of the infrastructure attributes in relation to container port and air traffic as well as the results of the qualitative interviews. In both methodological approaches, the transport sector was described as having a very strong influence on GDP growth. Agricultural Investments show a high correlation, which is reflected also in the results of the interview, which identifies a very positive correlation between investments in rural areas in the form of agricultural subsidies, demographic development and the resulting economic growth. The statistical data support the statements of the interviews that the efforts in the economic environment will attract FDI within the region.

4.5. Discussion of infrastructure development and economic growth

Most infrastructure investments and attribute indicators have demonstrated a positive relationship with GDP. In fact, a large part of them had a very strong correlation with economic growth. The authors assumed that infrastructure was related to economic growth, but it was not clear to what extent. It turned out that infrastructure is the physical basis for sustainable economic growth. Without these projects, it is hard to imagine a country leaving the state of agricultural development and becoming an emerging market. Therefore, the enormous importance of infrastructure for countries that want to become emerging could be underlined. To a certain extent, both attributes are mutually beneficial, infrastructure will trigger economic growth and vice versa.

Even if the points mentioned above, which will trigger economic growth, appear to be detached from the situation of quality of life in these countries, the results favour focal points of infrastructure attributes that have no direct short-term benefit for the people. But they will trigger sustainable economic growth that will benefit majority in the country through increasing prosperity within the country. Employment rates will rise, as will access to tradable goods, services, food, etc., which will help people not only to survive the next day but also to maintain a good quality of life.

4.6. Discussion of the effectiveness level of infrastructural development projects

Hypothesis 3 questions the effectiveness of infrastructure development projects and their impact on economic growth. As explained in the previous chapter, not all infrastructure projects automatically lead to economic development. This is due to the

simple fact that not all infrastructure investments are closely linked to the economy itself. These may be road projects in rural areas that are not directly related to heavy industrial areas or transport hubs, but are still considered infrastructure investments. Furthermore, some investments are only made to replace older or damaged infrastructure, such as renewable energy replacing fossil fuels, etc. This is unlikely to increase GDP like the previous source. Another example is investment in agricultural or industrial components that contribute to reducing emissions and are environmentally sound.

It can therefore be concluded that not all infrastructure development projects will have a direct impact on GDP, but rather an impact on social life, quality of life and the environment.

4.7. Discussion of prioritisation and economic growth

If a country finds itself in a situation where it is unable to trigger the initial start of economic growth, it is important to understand in which infrastructure project it should invest initially. This is due to the fact that most countries in this situation do not have sufficient funds to invest in several projects simultaneously. According to the statistical results, investments in the water ($r = 0.78$) and agriculture ($r = 0.73$) sectors have shown a high impact on economic development, but this is not a response to the initial investment. The interviews revealed that countries that have already took off in terms of growth, like Kenya or Ethiopia, have invested heavily in port infrastructure and major 'key roads' connecting these seaports with urban areas and industry. Even without a perfect energy or water supply, a port and roads can open the country to the global market, bringing new opportunities and monetary values. Therefore, it seems that the first step should be to strive for better export and import links, facilitated by a policy that stimulates foreign trade. Landlocked countries in particular seem to focus on creating channels of access to the sea. Many FDI models have no physical connection to the country itself and do not require first-hand water or energy supplies, but rely on the distribution system in the destination country. This may not be beneficial to citizens in the initial phase, but it will have a positive long-term impact on the economic system and therefore on the people. Transport investment in trains is not beneficial for the initial start of a country's economic development, as the statistical results show that both indicators for rail transport have had a negative relationship with economic growth. This negative relationship could be due to missing or undocumented data. It is also supported by the opinions of the respondents and by literature research. More developed countries such as Kenya, Uganda, Rwanda and Tanzania started to develop a common rail network after having achieved some economic growth through road freight transport and seaports. Investment in rail is a plus to shift freight from road to rail to improve road quality, but it is not a necessary factor in initial economic growth.

4.8. Discussion of FDI & economic growth

During the literature review, it was already clear that an increasing inflow of FDI will also boost economic development, but the correlation of $r = 0.980501862$ between net

FDI inflows and GDP development showed that the health of the economy is extremely closely related to or dependent on the foreign capital received. Therefore, it can be said that as infrastructure and government policies improve, the FDI rate will increase, leading to further economic growth in the region. A large part of the money invested by FDI will be used for the above-mentioned infrastructure projects, which will be carried out by foreign and local companies and will partly contribute to economic prosperity.

5. Conclusion

East Africa is an extremely complex area, with its population of nearly 300 million people in eight countries analysed, rapidly changing political structures, competing governments, different economic approaches and models, and developmental differences in all areas. Thus, the entire region eludes easy categorisation and analysis in general.

The impact of infrastructure projects and investments can be described as significant for the increasing socio-economic development of the whole region, despite some small deviations like a negative r in the technology sector, which is probably related to the lack of recorded data over the years. All infrastructure projects, investments and traffic data of the infrastructure indicate a positive correlation with the economic growth and prosperity of the region and the individual member countries. The economic differences between the individual countries continue to affect the overall regional economic growth. These are clearly visible in Kenya, Tanzania, Rwanda and Uganda, countries that are experiencing enormous growth, economic stability and the availability of recorded data. Infrastructure investments and the number of projects in these countries exceed by far those of the other countries. There is also a visible link between the sheer number of projects and the well-being of the socio-economic structure and development. It should be noted that also Ethiopia has achieved enormous annual GDP growth and is making extreme efforts in the field of infrastructure, as evidenced by the correlation between the number of infrastructure investments and economic empowerment.

Based on the data conducted, analysed and discussed above, the following conclusion can be drawn to confirm or reject hypotheses:

H1: There is a significant impact of infrastructure development on economic growth development in East Africa: *Confirmed.*

H2: The prioritisation of infrastructure projects in East Africa has a significant impact on economic growth: *Confirmed.*

H3: All infrastructure projects lead to economic growth in East Africa: *Rejected.*

H4: There is an impact of infrastructure growth on human development in East Africa: *Confirmed.*

H5: There is a significant impact of FDIs on infrastructure development in East Africa: *Confirmed.*

This research of East Africa has shown that there is an enormous potential for future growth beyond national borders. East Africa already attracts economists and

many investors from around the world. The region, it seems, has begun to run, and tougher competition for real estate in urban areas is expected.

Nevertheless, further research beyond the scope of this research is needed, including all possibilities of what can or could happen in the future, to provide a clear prediction of economic success in this area. Nevertheless, the authors wish to point out that China's infrastructure investment intentions have not yet been fully explored. Further research will need to show what repercussions or side effects China's foreign direct investment will have on the area, as an apparent risk could be long-term financial dependence on the country's immense debt. National governments seem to be taking money, despite the fact that there are associated risks. At the same time, administrations need to strike a balance between infrastructure development and the growing influence of foreign powers that finance it, knowing that infrastructure investment is necessary to lay the foundation for economic growth, even if this is done for the sake of long-term financial dependence.

Note

1. Benefit measurement methods include comparative methods, scoring models and cash flow analysis. They are used as project selection tools to determine which project to proceed with or to determine which project among a list of projects should be undertaken.

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