Addressing Impact Evaluation Gaps in Belt and Road Initiative Projects in Africa: The Standard Gauge Railway Project in Kenya as a Proof of Concept

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Abstract

The impact of the Belt and Road Initiative (BRI) to global development will be unprecedented and significant, and developmental impact evaluation is therefore central to understanding BRI projects and making informed decisions. Compared with evaluations of individual projects and programs, evaluation of large and mega infrastructure projects under the BRI is particularly challenging and complex in integrating stakeholder objectives, accounting for social benefit and costs, and tracking long-term project impact. In this paper, we summarize the key drawbacks of existing BRI evaluation frameworks, propose a systematic evaluation framework elicitation method based on the inputs from BRI subject matter experts and verified through stakeholder participation, and apply an interim evaluation framework in understanding the Mombasa-Nairobi Standard Gauge Railway project in Kenya, as a proof of concept of a comprehensive evaluation framework. In doing so, we seek to provide a tool for BRI

decision makers and stakeholders to assess these projects holistically at planning, construction and operation stages.

Keywords

Belt and Road Initiative – program evaluation – evaluation framework – Standard Gauge Railway – Kenya

1 Introduction

Infrastructure provides services that enable society to function and to thrive, serves as impetus for economic growth and poverty alleviation, and lies at the heart of efforts to meet every country's developmental goals. Insufficient infrastructure investment may have led to inadequate and uneven socio-economic development across the world. In Africa, huge infrastructure gaps remain an obstacle for growth. The African Development Bank (AfDB) estimates the minimum infrastructure needs for countries to sustain growth of their economies, population, income level and replace ageing infrastructure – at US\$ 130 bn to US\$ 170 bn per annum. More than half of the funding shortage is not met (AfDB, 2011).

In 2013, Chinese President Xi Jinping announced plans for a transcontinental infrastructure initiative. China would work with partner countries under two programs termed the Silk Road Economic Belt and the 21st Century Maritime Silk Road. Together, these have come to be known as the Belt and Road Initiative (BRI). Set to encompass 4.4 billion people with a cumulative GDP of around US\$ 21 trillion, the BRI is being implemented in over 70 developing countries, as exemplified by completed and ongoing projects, such as Mombasa-Nairobi Standard Gauge Railway, power plants from Nigeria to Djibouti, rehabilitation and upgrading project across eight cities in Ethiopia, and Eastern Industrial Park.

The impact of BRI to world development will be unprecedented and significant. According to the World Bank (2019), BRI transport projects could reduce travel times along economic corridors by 12%, increase trade between 2.7% and 9.7%, increase income by up to 3.4% and lift 7.6 million people from extreme poverty. At the same time, BRI projects also presents risks common to many major infrastructure projects: debt risks, corruptions, stranded infrastructure, social and environmental risks. BRI transport projects have the

potential to substantially improve trade, foreign investment, and living conditions for participating countries – but only if BRI project providers from China and the recipient country governments can work together to adopt policy that can increase transparency, improve sustainability, and mitigate environmental, social and corruption risks. The overarching goal of this paper is to assist the BRI projects and their recipient countries to evaluate these projects through a framework at the design, negotiation, and evaluation phases.

Evaluating the impact of infrastructure megaproject as exemplified by BRI projects is methodologically and practically challenging. Methodologically, it is relatively easy to apply traditional impact evaluation methods such as difference-in-difference or instrumental variable methods on smaller infrastructure projects to compare places with and without service (Dinkelman, 2011; Duflo and Pande, 2007). Yet it is almost impossible to identify counterfactuals for mega projects such as a centenary railway, a large power plant or a major port, because of their unique standing in a country or even a region. In addition to difficulties in counterfactual identification, other methodological challenges include working through a long causal chain of spillover effects and identifying a valid and reliable dataset, which explain lack of empirical research on the outcomes and impact of megaprojects. At a practical level, megaproject evaluation is challenging because of exceptionally large budgets, considerable economic and political interests involved, gigantic temporal and spatial scales, and sharp normative disagreements among stakeholders involved (Lehtonen, Joly, and Aparicio, 2017). In contrast to an abundance of literature about megaproject pathologies, there is sparse literature on megaproject evaluation (Lehtonen, 2014).

So far, the methods that have been proposed for evaluating megaproject impact include comparing more and less affected units, constructing counterfactuals based on similar countries and time series data, applying methods from economic history studies to delve into long causal chains, taking a Bayesian approach once these sorts of studies have been done well for a few countries, conceptualizing and mapping megaproject as an evolving network, evaluating program organization using fuzzy synthetic evaluation method (Duflo and Pande, 2007; Estache, 2010; Dinkelman, 2011; McKenzie, 2011; Hansen et al., 2013; McKenzie, 2010; Lehtonen, 2014; Hu et al., 2015). These methods offer helpful insights at an operational level, but do not provide a systematic framework that guides mega infrastructure evaluation design.

Although evaluation researchers have recognized the importance of a holistic evaluation framework for megaprojects that define success beyond the project close-out stage to account for direct and indirect impacts on organizations,

national budgets, community, society, and environment (Zidane, Johansen, and Ekambaram, 2015; Fahri et al., 2015), a practical and comprehensive evaluation framework has not been generated.

BRI evaluation framework design confronts challenges that are similar to megaproject evaluation design. Many projects are being undertaken at scales that will generate significant public goods. Commonly-used tools, such as financial cost-benefit analysis will not capture the social benefits such as area development, or potential social costs such as environmental degradation. Project impact take effect at different scales, which makes comprehensive capture of various impact particularly challenging. Stakeholders have different needs and prioritizations for what should be included in an evaluation framework, and consensus building thus presents another challenge for conceiving a BRI evaluation framework.

Given the massive scale of BRI projects, establishing a framework for evaluating BRI projects could be challenging. In conceiving the evaluation frameworks for BRI projects, evaluators should consider the policy objectives of the Initiative as well as regional development goals and global acceptable standards and good practices. A second complexity is that many projects are being undertaken at scales that will generate significant public goods. Commonly-used tools, such as financial cost-benefit analysis will not capture the social benefits such as area development, or potential social costs such as environmental degradation. In addition, project impact take effect at different scales, making capturing various impact comprehensively particularly challenging.

The construction of the evaluation framework for BRI projects should take into account both the policy objectives of the Chinese government and international standards. The stated objectives of the Initiative need to be incorporated. The five pillars of the Belt and Road – policy coordination, facilities connectivity, unimpeded trade, financial integration and people-to-people exchanges (NDRC et al., 2015) – guide China's efforts to connect to its neighbors and to promote trade and China's international influence. The United Nations has led the search for a common wider concept of development, captured first in the Millennium Development Goals and most recently in the Sustainable Development Goals, agreed to by 193 countries. China has committed that the BRI will be aligned with the SDGs through its partnership with the United Nations Development Program (NDRC et al., 2017).

The paper proceeds as follows. We first make a case for the centrality of BRI program evaluation and describe the characteristics and drawbacks of

existing BRI evaluation frameworks. Then we describe a new methodology for framework elicitation and propose an interim evaluation framework for the BRI projects. Third, we apply the interim framework to a case study, the Nairobi-Mombasa Standard Gauge Railway. Fourth, we derive learnings about the developmental implications of BRI projects for Africa from the case study and discuss how to improve our current framework of analysis.

2 Centrality and Complexity of BRI Project Evaluation

Program evaluation systematically investigates a program's effectiveness, efficiency and quality, and serves as a timely tool for measuring the success or failure of BRI projects. It helps check on risks and uncertainties in project planning, helps with project implementation, assesses program outcomes and impact and helps avoid resource waste and unintended consequences, to make sure that resources are appropriately used globally.

Evaluation of BRI projects in African faces three major challenges. First, project-level data for BRI projects lacks transparency, while country- and regional-level data collected by national governments have jarring collection cycles and baselines, which makes it extremely difficult to capture data needed for effective evaluation. Second, unprecedented in its scale, BRI projects are more likely to underestimate costs, environmental impacts, and overvalue revenues and economic development, with considerable risks concealed from key stakeholders. This requires evaluation to capture BRI's impact not only at individual project level, but also as a system. Third, there is a tension between the technical rigor required for BRI evaluation and accessibility of the evaluation tools to countries with limited technocratic capacity.

Compared with evaluations of individual projects and programs, evaluation of mega and series of infrastructure projects under the BRI is particularly challenging and complex due to the large number of stakeholders involved, and spillover effects across various impact dimensions, scales and time horizons.

2.1 *Complexity in Integrating Different Stakeholders' Objectives in Evaluation*

Program evaluation is also crucial for a wide range of BRI stakeholders with very different interests, objectives and priorities (Table 1).

TABLE 1 Multiple stakeholders' objectives and the tools available to assess projects against these objectives

Objectives	Lending country	Borrowing country	Project manager	Local community	International development agencies/ local NGOs
Trade and connectivity	Connectivity and trade benefit with the lending country	Cultivating comparative advantage as regional trade and transportation hub	Ease of transportation of raw materials and staff during project implementation	Local trade and transportation route development	Not particularly relevant
Economic development	Macro-economic performance indicators Procurement of goods from lending country	Employment promotion Technological transfer Local business development Local procurement	Not particularly relevant	Employment promotion Technological transfer Local business development Local procurement Transformation of local industries and sectors	Equity of economic development Poverty reduction
Financial	Long-term returns	Debt repayment Financial integration Project revenue Sharing of equity with lender	Project budget and construction cost	Not particularly relevant	Presence of "debt trap diplomacy" and political manipulation via debt

TABLE 1 Multiple stakeholders' objectives and the tools available to assess projects against these objectives (*cont.*)

Objectives	Lending country	Borrowing country	Project manager	Local community	International development agencies/ local NGOs
Governance	Policy reforms Regulatory reforms Planning and project coordination Risk management	Government agency coordination Quality and time to complete	Quality and time to complete Coordination with local government Localization of management Regulatory compliance	Not particularly relevant	Corruption
Social costs and benefits	Trade Connectivity to wider networks	Area development Employment Technology transfer Trade Connectivity to wider networks	Corporate social responsibility Community resistance to project development	Social, environmental, and health impact on local communities	Social, environmental, and health impact on local communities

SOURCE: THE AUTHOR'S SUMMARY BASED ON LITERATURE REVIEW AND PRACTICAL EXPERIENCE

As the table above shows, different key stakeholders have their own objectives. While some convergence of objectives among various stakeholders, there is significant divergence in other areas. How to leverage the convergence of interests and bridge the divergence is central to a balanced and stakeholder-friendly evaluation design.

2.2 *Complexity of Accounting for Multi-Dimensional Impact, Benefit and Cost Cross Scales*

In accounting for social costs and benefits of BRI projects, an evaluation framework needs to comprehensively address economic development impact assessment, as well as political, social, environmental, health considerations.

Based on the challenges that have emerged in BRI projects, it is particularly important to delve into the following domains in assessing project impact.

For example, the dimensions and questions listed in Table 2 need to be carefully assessed to comprehensively understand the impact of BRI projects.

TABLE 2 Evaluation dimensions and checklist

Framework items	Questions and checklist
Trade and connectivity	<ul style="list-style-type: none">– How does the project reduce travel time and transit costs?– How has trade volume increased?– How was foreign direct investment affected?
Security and geopolitical risks	<ul style="list-style-type: none">– Has the project triggered increasing incidence of regional conflicts, wars and terrorism?– Has the project been affiliated with military usage?– Was the sovereignty of the country endangered?
Local economic development	<ul style="list-style-type: none">– Does the project lead to economic development of the city/region?– How does the project change regional economic development dynamics?– Does the project promote balanced and inclusive local economic development? Who wins and who loses?
Project Identity	<ul style="list-style-type: none">– How committed are the local and national governments of the host country to make the project successful?
Local enterprise/ SME engagement	<ul style="list-style-type: none">– To what extent are local enterprises and small and medium enterprises (SMEs) involved in the development of the project?
Local labor inclusion	<ul style="list-style-type: none">– What is the proportion of local labor employed for the project?– What kind of positions do local labors take in these projects?– What are the forms of protests and resistance from local labor and local population?

TABLE 2 Evaluation dimensions and checklist (*cont.*)

Framework items	Questions and checklist
Technological transfer	<ul style="list-style-type: none">– Has the foreign partner transferred the skills and technology needed to the local partners for project operation and maintenance?– How much vocational training and technical skills transfer took place?– Have the local staff acquired skills for the maintenance of the project?
Regulations and compliance	<ul style="list-style-type: none">– How complete and effective are the laws and regulations that govern corruption, project planning, feasibility study, implementation and operation phases?
Financial sustainability	<ul style="list-style-type: none">– How has the financing structure impacted the BRI recipient country’s ability to repay the debt?– Have the partner countries amicably negotiated unexpected financial events, such as cost overruns?
Environmental sustainability	<ul style="list-style-type: none">– How complete and effective are the laws and regulations that have environmental impacts?– How has the project affected the natural and built environment?– What types of the pollution has the project generated?
Social and community sustainability	<ul style="list-style-type: none">– Are there effective mechanisms in place to ensure local stakeholders and community engagement before and after the project?– How has the project affected the life of local residents?
Health and wellbeing	<ul style="list-style-type: none">– Has the project enabled greater investment in the healthcare infrastructure for all?– How has the project design accommodated concerns about general wellbeing?

SOURCE: DOSSANI, BOUEY, AND ZHU (2019)

The effect and impact of BRI projects are at play at various scales. Some outcomes and impact are limited to the district or city of the infrastructure sites, whereas other impacts loom large at provincial, regional, national and even transnational levels. In developing evaluation metrics, it is important to consider the spillover effect of various costs and benefits and set up measurement of impact at multiple scales.

2.3 *Complexity of Time Horizons*

In evaluating BRI projects, time horizon is a particularly challenging, as many dimensions of project impact are long-term and hard to isolate.

3 **Limitations of Current BRI Project Evaluation Frameworks**

We examined the evaluation reports available and summarized the evaluation criteria, data source, and analytic methods used in these studies (see Appendix). Most of the evaluations were released recently in 2018–2019 and provided insights for framework elicitation and evaluation design.

The key characteristics of the existing frameworks is that they tend to single out one impact factor of a project phase at a certain geographic level. In addition, majority of the analysis focuses on the impact of the BRI projects at the country level instead of smaller units of analysis such as states, counties and projects. Project-level analysis is limited due to data transparency issues. Each evaluation focuses on a singular level of analysis (either project, sectoral or national level) and there is no analysis that addresses BRI projects' impact across different levels and scales. In terms of domain or sector of analysis, existing frameworks mainly focus on trade and investment, transit and travel time, emission data, some social welfare indicators. While there are scant discussions of social and environmental impact with specific indicators, there is hardly any in-depth analysis that describes the wide-ranging socio-environmental impact of BRI projects. In terms of time horizon, the majority of the proposed framework focuses on effect and impact of BRI project during and after their construction. Given that the bulk of BRI projects are still in the planning and implementation stage, there seems to be scant analysis on evaluation prior to project implementation process.

Various methods are applied in assessing BRI's effect or impact including comparison over time, benchmarking, index composition and simulation.

In terms of data source, most analyses rely on country-level data, some use provincial- or state-level data. While such analysis could provide an overview of BRI's impact at an aggregate level, they fail to demonstrate BRI project impact at a smaller scale due to lack of project-level data. Granted that there exist project-level commentary and analysis, these do not have a focus on evaluation, unable to generate a set of criteria based on which objective judgements about projects are derived. In addition, critical stakeholders are not involved. Existing assessments were produced by universities, think tanks and multilateral development agencies. While few frameworks mentioned consultation with government departments (Asia Society Policy Institute, 2019), it seems that most evaluation frameworks did not involve stakeholders central to BRI project decision making such as the Chinese government, project host country government, BRI project managers. Neither has affected communities not been involved in conceptualizing or critiquing these frameworks. Rather detached from project planning and implementation, existing evaluation also lacks measurement of project impact based on primary data collection.

4 What to Include in a BRI Project Evaluation: a Proposed Method

What is an appropriate framework for evaluating mega infrastructure projects such as ones under the Belt and Road Initiative? Given the complexity of stakeholder and domains involved for evaluation, framework elicitation process should address the concerns of multiple stakeholders, domains of impact as well as issues that arise at different project phases. In Table 3 we propose a systematic evaluation framework elicitation method based on the inputs from BRI subject matter experts and verified through stakeholder participation. Stakeholders include decision makers of infrastructure finance lending country government, recipient country government, infrastructure project managers, project staff, local population, local non-governmental organization, multi-lateral development agency representatives, as well as researchers working on BRI and infrastructure finance and program evaluation related research. Sample size for each stakeholder group is of 15 to 20 people.

TABLE 3 Steps for a proposed evaluation framework elicitation method

Steps	Activities
Step 1	Review of different ways to evaluation BRI projects: review evaluation framework on BRI, large infrastructure projects, megaproject evaluation and sustainable development.
Step 2	Criteria elicitation: elicit dimensions these frameworks capture and generate a master list of dimensions, and generate 1) a mutually exclusive and exhaustive list of evaluation dimensions and 2) a list of distinct BRI project categories. Use the evaluation dimensions and project categories to form an evaluation dimension matrix.
Step 3	Criteria application: apply criteria to specific projects to see how they work.
Step 4	Stakeholder opinion elicitation: conduct survey with professional groups of BRI experts, including Chinese experts overseeing BRI projects, local management of BRI projects, international organization staff working on large infrastructure project development. For each project category, three projects representing three types of infrastructure investment will be presented: 1) Chinese funded infrastructure project under the framework of the BRI, 2) projects funded by local government, 3) projects funded by multilateral development agencies, 4) projects funded by a national development agency. In the survey, experts are asked to rank order the importance they attach to each evaluation dimension for each project scenario.
Step 5	Data analysis and framework creation: Then data collected will be analyzed to generate an evaluation framework that captures and convergence and divergence of different stakeholders' objectives. Use the findings from the analysis to inform the design of a new evaluation framework for large infrastructure projects.
Step 6	Verification through case study: conduct three case study by interviewing stakeholders involved in the above mentioned three types of infrastructure projects to verify the feasibility of the frameworks in each case, confirm how evaluation should be scaled for each domain or dimension, and use their feedback to enhance evaluation framework development.
Step 7	Evaluation framework development: adjust the proposed framework based on feedback of stakeholder groups.
Step 8	Specific metrics development: based on the feedback from the projects, generate specific metrics for each impact dimension to be included in the evaluation framework.

SOURCE: THE AUTHOR'S OWN TABULATION

Compared with existing single-scale, single-dimension and single-phased frameworks, our proposed methods will provide a comprehensive and nuanced framework for BRI project evaluation. If used appropriately, it could better reveal benefits or risks of each project and inform more robust decision making for a wide range of stakeholders involved. Lessons learned are not limited to BRI projects and can be transferred to large infrastructure evaluation in other settings.

5 Interim Framework for Project Impact Evaluation

While the proposed a comprehensive evaluation framework elicitation method provides a way to systematically measure the outcomes and impact of BRI projects, given data availability at a preliminary stage of research, we propose a stakeholder-friendly interim evaluation framework that helps reveal the multi-facet developmental impact of BRI projects.

Based on existing challenges of BRI projects, BRI policy objectives and sustainable development framework, we propose an impact evaluation framework to assess sustainable development, presented in Table 4 below. Framework

TABLE 4 Project risk management and sustainability framework

Framework items	Sustainable development goal addressed
Trade and connectivity	Industry, innovation and infrastructure
Local economic development	Economic growth
Security and geopolitical risks	Peace, justice and strong institutions
Project identity	Partnerships for the goals
Local enterprise/SME engagement	Industry, innovation and infrastructure
Local labor inclusion	Decent work
Technological transfer	Innovation
Regulations and compliance	Peace, justice and strong institutions
Financial sustainability	Economic growth
Environmental sustainability	Climate action, cean water and sanitation, affordable and clean energy
Social and community sustainability	Sustainable cities and communities Gender equality
Health and wellbeing	Good health and hell-being

SOURCE: DOSSANI, BOUEY, AND ZHU (2019)

items are elicited based on existing BRI evaluation framework and the areas of challenges common to BRI projects across the world, and the Sustainable Development Goals provide a convenient tool for categorizing project impact. Compared with existing evaluation framework, it includes multiple domains of project impact, targets project impact at multiple scales, and seeks to combine data from multiple project phases.

6 Case Study: Mombasa-Nairobi Standard Gauge Railway¹

Following the steps proposed in Table 3 for evaluation framework elicitation, and using the proposed interim evaluation framework in Table 4, we conducted a preliminary assessment of the Mombasa-Nairobi Standard Gauge Railway (SGR) in Kenya as a preliminary proof of concept that demonstrates the utility of a holistic megaproject evaluation framework. Compared with existing studies of the SGR that focus on singular aspects such as political dynamics (Wang 2019; Wissenbach and Wang, 2017), national development (Irandu, 2017), technological transfer (Chenge et al., 2019), and environmental footprints (Jiang, 2020; Ambani, 2017), our approach comprehensively assesses of early-stage outcomes of the SGR, and provides a structured approach to analyzing longer term impact of the project.

6.1 *Connectivity and Trade*

At a cost of US\$3.8 billion (Railway Technology, 2016), the SGR is Kenya's most expensive infrastructure project since independence, the first railway built in Kenya in the past century, and a flagship project in China-Africa cooperation. Construction started in 2014 and was completed in 2017, when the railway was inaugurated. It runs parallel to the now-closed narrow-gauge Uganda Railway that was completed in 1901 under British colonial rule and has shortened the Nairobi-Mombasa travel time from over 10 hours to 4.5 hours. The railway carries both passengers (at 120 km/h) and freight (at 80 km/h). The development of the SGR offsets burden on roads saves potential cost incurred by road maintenance and enhances freight security in transit. It also helps promote a better mix of rail and road transportation to formulate a well-balanced multi-modal transportation system.

¹ This case study builds on my earlier co-authored work Dossani, Bouey, and Zhu (2019).

TABLE 5 Facts on the Standard Gauge Railway project, Kenya

Contract Amount	US\$ 3.804 billion
Funding agency	The government of the Republic of Kenya (15%) and the Export-Import Bank of China (85%)
Client	Kenya Railway Corporation (KRC)
EPC contractor	China Road and Bridges Corporation (CRBC)
Date of Commencement	12 December 2014
Duration of Construction	60 months
Operator	China Road and Bridge Corporation (CRBC)
Characteristics	Single-track non-electric SGR from Mombasa to Nairobi (phase 1) and Naivasha (phase 2A); freight trains of up to 80 kilometers per hour and passenger trains at up to 120 km/hr.

SOURCE: CHINA ROAD AND BRIDGE CORPORATION SOCIAL RESPONSIBILITY REPORT ON MOMBASA NAIROBI SGR PROJECT

Before the construction of the SGR, key regional corridors in Kenya were performing poorly, partly due to poor connectivity and weak transportation capacity (Adero and Aligula, 2012). The aged and dilapidated Meter Gauge Railway could handle 5.5% of the total traffic in Kenya’s North Corridor and 6.2 of the total traffic of the Central Corridor, and road transportation used to handle the bulk of traffic along both Corridors (Irandu, 2017). The SGR increases cargo throughput by rail and lower transport costs and time by as much as 60% (Wissenbach and Wang, 2017). Once the railway is connected with other parts of Kenya and its neighboring country to form a regional railway network, the SGR will significantly promote efficient and effective movement of goods and services, increases productivity of regional transportation system, and lowers cost of doing business in the region. Better connectivity powered by SGR development can break down the transportation bottleneck of the East African Community and serves as asset for the region’s future growth.

6.2 *Local Economic Development*

A flagship project under Kenya’s Vision 2030, which aims at transforming Kenya into a middle-income industrialized economy by 2030 (CRBC, 2016). During construction, the railway reportedly increased Kenyan annual GDP by 1.5%, and reduced logistics cost by 40%. When completed, the railway will span the

Kenya's Railway to Nowhere

Construction of a Chinese-built line across East Africa has halted

Note: Map shows only selected stops
Source: Kenyan and Ugandan government documents

FIGURE 1 Illustration of the railway network plan and the Nairobi-Mombasa Standard Gauge Railway
SOURCE: KENYAN AND UGANDAN GOVERNMENT DOCUMENTS AND OPENSTREETMAP
(<http://www.openstreetmap.org>)

country and open corridors to Uganda, South Sudan and Rwanda. North of Kenya is the Lamu-Port-South Sudan-Ethiopia Transportation Corridor, a network of ports, highways, railway, oil refineries and a coal plant. The SGR will thus accelerate economic integration and regional economic cooperation. The project also strengthens Kenya's infrastructure and connectivity compared with its regional competitors such as Tanzania, and help the country develop long-term comparative advantage.

6.3 *Security and Geopolitics*

To date, there is no reported military involvement of China in the SGR. What should be noted is the changing economic dynamics that gives rise to geopolitical risks. Under the SGR development agreement, part of the goods that used to go through customs clearance in Mombasa are now transferred to Nairobi for the process, which increases the revenue for Nairobi and in turn weakens the economic capacity of Mombasa, where the opposition party dominates. Thus, change of economic dynamics shifts geopolitical dynamics within the country, which has become a key reason for the political resistance against the project.

6.4 *Project Identity*

China-Exim Bank provided 85% of the financing for the SGR (with a combination of commercial loan and concessional loan), and the Kenyan Government contributed 15%. The Kenyan Government is highly supportive of the development of the SGR. It regards the railway as a key step for Kenya towards becoming an industrialized middle-income country, as detailed in Kenya's Vision 2030. Note that the government is operating the projects after completion. In summary, there is high sense of partnership and commitment of the state. Based on over 100 interviews, Wang and Wissenbach (2019) observed that both Kenyan and Chinese sides repeatedly emphasized that the SGR is a 'Kenyan railway', with technical and financial support from China. China Road and Bridges Corporation leaves ethnic conflicts, land distributes, or politics of business in Kenya to the relevant bodies of the Kenyan government and limit its role to technical aspects of railway construction. The Government of Kenya is thus able to exercise its agency in the process and drive results desirable for the Kenyan government and enterprises.

6.5 *Local Enterprise*

As a result of the Kenyan government's significant agency ability to negotiate with the China Road and Bridges Corporation, President Kenyatta pushed for

and publicly announced that the SGR would locally source 40% materials, services, and employment, which is 10% higher than EXIM Bank's requirement of 70% of Chinese products in overseas infrastructure projects (Wang and Wissenbach, 2019). This provides local businesses with significant opportunities in providing raw materials and services. The SGR, by increasing passenger transit speed and volume, also provide local businesses with more tourists to cater. For example, two years into the operation of the Mombasa-Nairobi SGR, hotel occupancy rate in Mombasa turned from 50% to 90%. Between January 2017 and May 2018, SGR has generated 26,706 jobs and involved 378 local enterprises in sub-contract work (CRBC, 2018).

6.6 *Local Labor Inclusion*

According to Social Corporate Responsibility Report of CRBC (2018), the SGR provided 46,000 jobs and trained 5000 local staff during construction. Local staff constitute 76% of the workforce (CRBC, 2017). The objective is to systematically reduce the percentage of Chinese staff and achieve 90% local staff rate by 2027.

6.7 *Technological Transfer*

CITIC responded to Kenya's needs for technological transfer by providing different types of training including apprenticeships, off-the-job training and on-the-job training to promote management skills and technological standards. As of June 2019, most basic service and integrated management positions have been localized. According to official reports, four Kenyan staff support the core function of command and dispatch; 11 Kenyans have obtained licenses to independently operate the trains; in 25 out of 33 stations, the entire management has been transferred to Kenyan staff, and the customer service, train service and passenger transfer management have been transferred with a staff localization rate of over 90% in 9 of the stations (FOCAC, 2019). The operating company of the SGR has hired and employed over 1,000 local staff and developed specialized on-the-job training in collaboration between Kenyan and Chinese universities and occupational training programs. By 2017, it has trained 858 local staff in five categories of jobs including freight service, passenger service, mechanical engineering, electronic engineering and railway transportation control (Embassy of China in Kenya, 2019).

Meanwhile, there are still criticisms on the short-term nature of training and lack of comprehensive and systematic workforce training on railway

technology development. To address the long-term technological transfer needs of the railway industry in Kenya, CRBC started collaboration with Southwest University in China and Kenya Railway Training Institute (RTI) to operate training program. Together with Kenya Railway Corporation, it has established the East Africa Railway Technology Training Center (CRBC, 2017). In the past three years, CRBC has sent a total of 100 Kenyan high-school graduates to pursue Bachelor's degree in railway construction and operation in Beijing Jiaotong University for comprehensive knowledge and skills development (CRBC, 2018).

6.8 *Regulations, Compliance and Corruption*

Governance remains a prominent problem in the region and corruption remain a central concern in media coverage of the SGR, which fuels a growing distrust of the government. Criticism of corruption centers around cost of the railway (Kacungira, 2017), pricing mechanism and lack of transparency with SGR construction and operation agreements. Kenyan authorities arrested the head of the agency that managed public land and the head of the state railway on suspicion of corruption over land allocation for the SGR (Reuters, 8.1.2018) and arrested seven officials with the CRBC for bribing investigators looking into corruption tied to the SGR (*Daily Nations*, 2018).

6.9 *Financial Sustainability*

This is an area attracting most of the criticism and query about the project. The SGR was financed by Chinese Exim Bank loans of US\$ 3.2 bn (BBC, 2017). The repayment period for the loan is 20 years, with an annual interest of 2% (FOCAC, 2017). With the unprecedented investment came the concern that Kenya risked losing the port of Mombasa to China Exim Bank should the government default (*Daily Nations*, 2019, November 6 and 2019, May 29). The President of Kenya denied the accusation and acknowledged China as a strong development partner similar to the World Bank, Japan, France and Germany (FOCAC, 2019). Kenya's net borrowing has also shrunk to 5.2% of GDP from 6.7% according to IMF data. As of March 2018, China accounts for 72% of bilateral debt (*Business Daily*, 2018), with a 15-percentage increase from the 2016 data. Overall, China accounts for over 21% of Kenya's external debt (*Quarts Africa*, 2018). Debt to GDP significantly increased, from 38.2% in 2012 to 55.5% by April 2019 (*The Star*, 2019), but is still under the generally accepted sustainable threshold of 60% for a developing economy.

6.10 *Environmental Sustainability*

The railway goes from southeast to northwest, moving along the largest national wildlife park in the country, with an overlap of 120 km. Environmental and ecological concerns were expressed during the construction of the railway. At the design phase, the railway established green standards in route selection and construction. It introduced environmental conservation good practices from A50 Highway in the Netherlands, B38 Highway in Germany, and Qinghai-Tibet Railway in China. Over 20 rounds of consultations were conducted, from the Kenyan government, wildlife protection organizations and local residents. By building a railroad parallel to the existing railway and highway and establishing wildlife passages in the middle of the railroad, the railway was able to reduce the biodiversity and ecological impact of the railway. Research was conducted in collaboration with the Bureau for Wildlife Protection in Kenya, on wild animals' living habits and migration patterns, and established bridges as passage for animals, and built drinking stations for smaller animals. 61 bridges, 14 animal passages, 600 anti-flood and fly-over culverts were built during construction. Based on observation, the animal passages are being used by wild animals. CRBC has contracted the Africa Waste and Environment Management Center to conduct Environmental and Social Impact Assessment Study for the proposed Mombasa-Nairobi RGR (2012). Ministry of Transport, Infrastructure, Housing and Urban Development also conducted environmental and social assessments (2017).

Despite these efforts, there were environmentalist protests, according to media reports. There are reported damage (*Ndiho Media*, 2018) of fence set up by wildlife. Humans are drawn to the overpasses because they create park access for livestock and scavenging. Because of these human settlements, wildlife holds back, rendering the wildlife underpass useless. There was also reportage from the Chinese media on the death of elephants caused by railway operations.

6.11 *Social and Community*

The SGR is expected to promote regional integration. The East African Railway Master Plan provides for the Mombasa-Nairobi SGR to link with other SGRs being built in the East Africa Community. The ultimate vision is to build a railroad of 2,700 km connecting Kenya, Tanzania, Uganda, Rwanda Burundi and South Sudan. The development of the railway also triggered travelling pattern and lifestyle change within Kenya, as exemplified the change of hotel occupancy rate from 50% to 90% in Mombasa due to increase of domestic travel (FOCAC, 2019). There is potential for the railway to transform the migration

pattern, shatter the foundations for tribe-based society and fundamentally transform the social, economic and political structure of the country, although longitudinal tracking and data gathering is missing at this stage.

CRBC has invested US\$ 27.6 million in corporate social responsibility related activities. Over 260 community engagement activities have been conducted, including the building of 3 schools, digging wells for local community water access, donation to children, road building and transport of disaster relief grain (CRBC, 2015, 2017, 2018).

6.12 *Health and Wellbeing*

Reduced use of road transportation reduces road accidents and helps prevent road-related injuries and mortality. Long-distance truck drivers are at a higher risk of exposure to HIV/AIDS and are more likely to spread it along truck routes. With SGR's development, the number of trucks driver on the road will likely decline and could thus reduce the HIV/AIDS transmission rate through this transmission route. Increasing use of railway instead of highway could also reduce the number of road accidents and may increase the healthcare access for people in remote areas by providing an additional transportation option. Yet the spillover effect could work in an opposite direction due change in mobility. Kenyan government agency attributed high HIV/AIDS rate to ongoing road and railroad construction (Business and Human Rights Center, 2016). News report points out that HIV infection doubling in counties along the SGR (*The Star*, 2019), which could have been attributed to increasing mobility and lifestyle change. The long-term impact of the SGR on health and wellbeing remains to be closely tracked.

In the recent pandemic in Kenya in 2020, SGR was also suggested to have contributed to mitigating the spread of Covid-19 through effective containment measures (*Xinhua*, 2020, July 7), as well as transportation of medical supplies for epidemic control (*Xinhua*, 2020, November 5).

7 Conclusion

We summarize the results of our assessments using the framework below.

We use color green to indicate areas where positive outcomes and satisfactory performance have been observed. From the perspectives of trade and connectivity, impact on local economy, project ownership and identity, benefits to local enterprises and business development, local labor inclusion, technological and skills transfer, engagements with local community, and effect on

TABLE 6 Project assessment summary (green: satisfactory, yellow: with minor threats, red: not meeting requirements)

Project	Trade, con-nectiv-ity	Local econo-my	Securi-ty and geo-poli-tics	Iden-tity	Local enter-prise	Labor inclu-sion	Tech-no-logical trans-fer	Regu-lation & com-pliance	Finan-cial sus-tain-ability	Envi-ron-ment sus-tain-ability	Social & com-mu-nity	Health & well-being
Mom-basa-Nairobi SGR	Green	Green	Yellow	Green	Green	Green	Green	Red	Yellow	Red	Green	Green

SOURCE: DOSSANI (2018), DOSSANI, BOUEY, AND ZHU (2019)

health and wellbeing, the SGR has produced generally positive outcomes and benefited local community and the country at large in the first two years of its operation. We use color yellow to indicate areas where we think that the SGR pose minor threats that may affect future success of the project and may generate negative outcomes and impacts if not managed properly. Based on our analysis, the SGR is likely to face increasing tensions in security- and geopolitics-related issues due to domestic politics and international competition, and may also encounter financial sustainability issues if debt level becomes increasingly unmanageable. We use color red to indicate areas where negative procedures and outcomes have been observed, and where negative outcomes have generated major controversies in Kenya. Corruption and environmental sustainability are two of the biggest concern at this stage of development, and have triggered fervent debates and discussions that may fuel major disputes in future. Policymakers need to carefully consider the areas of assessment discussed above, and pay special attentions to areas with negative outcomes and potentially dire consequence, and design policy measures that strengthen these areas of development to lower the risks and minimize the negative impacts.

The case study of the SGR, a flagship BRI project in Africa, demonstrates the importance of local identity and ownership, local business participation, local labor inclusion, technological transfer and localization, regulation compliance, as well as the significance of environmental, social and health related measures and considerations in BRI project planning, design, construction

and operations. Other areas including local engagement, socio-environmental impacts and community health and wellbeing implications have not received sufficient consideration in our case study, nor have they been sufficiently incorporated in analysis of other BRI projects. A holistic project assessment framework can help promote a balanced approach to project implementation, and generate sustainable development for different stakeholders involved in the BRI.

Our proposed framework is rather preliminary at this stage, and more in-depth research is required to identify best practices in program evaluation framework design and implementation. The case study demonstrates the use of an evaluative perspective in understanding project outcomes. Longitudinal tracking of the SGR project is needed to understand new developments and challenges in project operation, so as to incorporate emerging project needs and concerns into the design of BRI project evaluation. Future research should also seek to identify ways to bridge BRI project evaluation and other international large and mega infrastructure project evaluation schemes, which will allow comparison of project processes, outcomes and impacts, and inform more objective assessment of BRI projects and megaprojects at large.

Appendix: Existing Evaluation Framework of BRI or BRI Projects

Title	Time released	What is the evaluation about?	Who are the evaluators?	What's the level of analysis?	What evaluation tools are proposed?	What is the source of data?	What analytical methods were applied?
Grading China's Belt and Road	2019	BRI project challenges including <ul style="list-style-type: none">– Sovereignty– Transparency– Financial sustainability– Local engagement– Geopolitical risks– Environmental sustainability– Corruption	Center for New American Security (think tank)	Project	Checklist	BRI project information from reports and media accounts	Case study

(cont.)

Title	Time released	What is the evaluation about?	Who are the evaluators?	What's the level of analysis?	What evaluation tools are proposed?	What is the source of data?	What analytical methods were applied?
Navigating the Belt and Road Initiative	2019	<ul style="list-style-type: none"> – Respecting sovereignty – Project preparation assessment and analysis – Environmental and social impact assessment – Project financing and debt – Local stakeholder engagement – Incorporating local labor, businesses, and training – Competition and transparency – Corruption – Project oversight and coordination 	Asia Society Policy Institute (think tank)	Project	Checklist	BRI project information from reports and media accounts	Case study

(cont.)

Title	Time released	What is the evaluation about?	Who are the evaluators?	What's the level of analysis?	What evaluation tools are proposed?	What is the source of data?	What analytical methods were applied?
A Framework to assess debt sustainability and fiscal risks under the Belt and Road Initiative ^a	2019	<ul style="list-style-type: none"> – Debt vulnerability – Fiscal risks 	World Bank (international organization)	Country	Economic modeling using existing data Checklist of sources of debt vulnerabilities and fiscal risks	Lending from China to 50 of the 65 BRI countries from AidData and SAIS-CARI, WB's Debtor Reporting System for validity Survey of BRI-related investment commissioned by the World Bank and compiled by WIND, a Chinese consultancy firm	Foresight analysis debt and growth elasticities to investment, to project the evolution of debt-to-GDP ratio in BRI-recipient countries

a <http://documents.worldbank.org/curated/en/723671560782662349/pdf/A-Framework-to-Assess-Debt-Sustainability-and-Fiscal-Risks-under-the-Belt-and-Road-Initiative.pdf>.

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Title	Time released	What is the evaluation about?	Who are the evaluators?	What's the level of analysis?	What evaluation tools are proposed?	What is the source of data?	What analytical methods were applied?
Common transport infrastructure: a quantitative model and estimates from the Belt and Road Initiative	2019	Effect on trade, welfare, and gross domestic product of common transport infrastructure	World Bank (international organization)	Country Sector	Quantify BRI's effect on trade, welfare, and GDP for countries of different income levels and regions One equation per country	Data from GTAP 10 of 107 countries, regions and 31 sectors	Structural general equilibrium model Geography Information System
The Belt and Road initiative: Reshaping Economic Geography in Central Asia	2019	Effect of BRI on employment in manufacturing, export trade cost, import trade cost in Central Asian economies	World Bank (international organization)	Country Region	Economic model to quantify BRI's effect on employment, trade cost	Employment, population, land area, national accounts data on Gross Value Added by sector, trade data, travel time data from national statistical bureau, UN, WB data base and existing simulation results	Computable spatial equilibrium model

(cont.)

Title	Time released	What is the evaluation about?	Who are the evaluators?	What's the level of analysis?	What evaluation tools are proposed?	What is the source of data?	What analytical methods were applied?
The Belt and Road Initiative: Economic, Poverty and Environmental impacts	2019	<ul style="list-style-type: none"> Trade cost reduction Macro results: real income, distribution of gains between China and BRI host countries, BRI and non-BRI countries, global export and import growth, trade volume, value of the time of trade, value added, factor returns Social benefits: factor rewards, labor displacement and poverty implications, emissions implications (CO₂, CH₄, N₂O, FGAS, BC, CO, NH₃, NMVB, NMVF, Nox, OC, PM₁₀, PM_{2.5}, SO₂), welfare gains 	World Bank (international organization)	Country	List of indicators to measure economic effects and tool to project social and environmental benefits Projection by 2030	GTAP	Simulation experiment using Envisage Model – a global, recursive dynamic computable general equilibrium model

(cont.)

Title	Time released	What is the evaluation about?	Who are the evaluators?	What's the level of analysis?	What evaluation tools are proposed?	What is the source of data?	What analytical methods were applied?
Who wins, who loses? Understanding the spatially differentiated effects of the Belt and Road Initiative	2019	<ul style="list-style-type: none"> How regions within countries adjust to trade and transport shocks in Central Asia Aggregate trends: all roads, external and internal integration, export potential A model of structural change and integration: household heterogeneous preferences for locations, consumption, mobility across locations, production technology Economic and welfare impacts of large transport and border investment in China and Central Asia: transport connections, border times, migration costs, wage inequality, national welfare 	World Bank (international organization)	Regions within country	A model of structural change and integration	District administration data, land data from European Satellite Agency, employment in tradables sector, transport costs, migration costs	Quantitative economic geography model New Economic Geography

(cont.)

Title	Time released	What is the evaluation about?	Who are the evaluators?	What's the level of analysis?	What evaluation tools are proposed?	What is the source of data?	What analytical methods were applied?
Trade effects of the New Silk Road: a gravity analysis	2019	– Estimated trade time	World Bank (international organization)	Country	Simulation results	Geo-referenced data	Geographical information system analysis, network analysis
Grading China's Belt and Road	2019	– National sovereignty upholding – Transparency – Financial sustainability – Engagement with local economic needs – Geopolitical risks – Environmental sustainability – Corruption resistance	Center for a New American Security (CNAS), United States (think tank)	Project	Checklist	10 projects from Latin America, Europe, Africa, Middle East, South and Central Asia, Southeast Asia, and Pacific Islands	Case study
Five Connectivity Index	2018	– Policy coordination – Facilities connectivity – Unimpeded trade – Financial integration – People-to-people bond	Peking University Regional Studies Center	Country			

(cont.)

Title	Time released	What is the evaluation about?	Who are the evaluators?	What's the level of analysis?	What evaluation tools are proposed?	What is the source of data?	What analytical methods were applied?
Energy investment risk assessment		<ul style="list-style-type: none"> – Political and regulatory risk – Currency – Liquidity and refinancing risk – Resource risk 	University	Country	Simulation and modeling	50 countries in BRI, IDRG, World Bank, EIA, Statistical Bulletin of China's Foreign Direct Investment, UN Comtrade	Fuzzy integrated evaluation model based on entropy weight
Early stage dynamic quantitative indicator system for BRI project evaluation	2018	<ul style="list-style-type: none"> – Investment risks – Culture and value dissemination – Shaping of China's overseas image – Social integration and adaptation Social responsibility – International talent development 	Party School of the CPC Central Committee, China (university)	Project	Domain and sub-domain indicators	Expert rating Examples of BRI projects covering 5 examples of "hard connectivity" and 5 examples of "soft connectivity"	Weighted sum of expert rating on key indicators Case study
Carbon emission intensity of electricity generation in the Belt and Road Initiative Countries	2019	CO ₂ emission intensity of electricity generation			Empirical analysis	CO ₂ emission data in BRI countries	Logarithmic mean Divisa index methodology, benchmarking analysis

(cont.)

Title	Time released	What is the evaluation about?	Who are the evaluators?	What's the level of analysis?	What evaluation tools are proposed?	What is the source of data?	What analytical methods were applied?
Regional differences and spatial patterns of health status of the member states in BRI	2019	Health status <ul style="list-style-type: none"> – Life expectancy at birth – Maternal mortality rate – Total fertility rate – HIV prevalence, incidence rate; – Hepatitis B surface antigen prevalence rate – TB incidence rate – Malaria parasite prevalence rate among children – Malaria incidence rate – Cancer incidence, by type of cancer 	Ningxia University, Yinchuan University, Chinese Academy of Social Sciences (university/think tank)	National	List of indicators, empirical analysis	Selected statistical data on disease and socioeconomics in 68 BRI countries from 2015 publication by WB and WHO	Geographical detector, a novel spatial statistical method
Economic evaluation of the Belt and Road Initiative from an unimpeded trade perspective	2019	BRI project from an unimpeded trade perspective: impact on GDP, social welfare, import, export, trade pattern, sectoral change,	Anhui University of Finance and Economics (university)	Country Sector	Empirical analysis	GTAP	Simulation

(cont.)

Title	Time released	What is the evaluation about?	Who are the evaluators?	What's the level of analysis?	What evaluation tools are proposed?	What is the source of data?	What analytical methods were applied?
Impact of financial development and economic growth on environmental quality: an empirical analysis from BRI countries	2019	CO ₂ emission per capita	Institute of Technology, Guangdong University of Foreign Studies (university)	Country	Empirical analysis	Data from World Development Indicators (CO ₂ emission, GDP, electricity consumption)	Dynamic seemingly unrelated regression; Dumitrescu and Hurlin panel causality approach
Governing local sourcing practices of overseas projects for the Belt and Road Initiative: a framework and evaluation	2019	Ex-post factors of local sourcing practices in overseas infrastructure projects, including 12 governance factors in 4 dimensions <ul style="list-style-type: none"> – Coordinated adaptation – Control and safeguarding – Incentives and payment structure – Policies and regulations 	University	Factors	Network and relationship analysis	Expert panel	Fuzzy Decision Making Trial and Evaluation Laboratory (DEMAT-EL) Relational approach
China's Belt and Road Initiative: a preliminary quantitative assessment	2018	Trade cost reduction Energy efficiency improvement	The Croesus Group's Beijing Office (think tank / consultancy)	Country	Simulation	Investment, infrastructure stock, trade cost from various sources	Computable general equilibrium

(cont.)

Title	Time released	What is the evaluation about?	Who are the evaluators?	What's the level of analysis?	What evaluation tools are proposed?	What is the source of data?	What analytical methods were applied?
Under-standing China's Belt and Road Initiative: motiva-tion, frame-work and assess-ment	2016	<p>Assessment frame-work based on the five pillars of BRI:</p> <ul style="list-style-type: none"> – Policy dialogue – Infrastructure connectivity – Unimpeded trade – Financial sup-port – People-to-people exchange <p>Risks associated with BRI</p> <ul style="list-style-type: none"> – Coordination mechanism – Clash of political values – China's export of excess capacity and its conse-quences – Financial sustainability of cross-country projects 	China Party School (think tank/university)	Initiative	Descrip-tive	BRI policy documents	Descrip-tive

SOURCE: THE AUTHOR'S SUMMARY OF EXISTING LITERATURE ON THE BELT AND ROAD INITIATIVE

References

- Africa Waste and Environment Management Centre (AWEMC). (2012). *Environmental and Social Impact Assessment Study Report for the Proposed Mombasa-Nairobi Standard Gauge Railway Project*. AWEMC: Nairobi. Retrieved from <https://africog.org/wp-content/uploads/2017/06/SGR-EAS-Impact-report.pdf>.
- African Development Bank. (2011). *Infrastructure Outlook 2010: Programme for Infrastructure Development in Africa*. Retrieved from https://afdb-org.jp/wp-content/uploads/2016/01/PIDA_EN_140523_ONRI-Rapport.pdf.
- Ascensao, F., Fahrig, L., Clevenger, A. P., Corlett, R. T., Jaeger, J. A. G., Laurance, W. F., & Pereira, H. M. (2018). Environmental challenges for the Belt and Road Initiative. *Nature Sustainability*, 1(5), 206–209. doi:10.1038/s41893-018-0059-3.
- Asian Society. (2019). *Navigating the Belt and Road Initiative*. Report, Retrieved from https://asiasociety.org/sites/default/files/2019-06/Navigating%20the%20Belt%20and%20Road%20Initiative_2.pdf.
- BBC. (2017, June 8). Will Kenya get value for money from its new railway? BBC, Retrieved from <https://www.bbc.com/news/world-africa-40171095>.
- Business and Human Rights Resource Center. (2016). Kenya. Govt. agency attributes high HIV/AIDS to ongoing road & railway construction. Retrieved from <https://www.business-humanrights.org/en/kenya-govt-agency-attributes-high-hiv-aids-to-ongoing-road-railway-construction>.
- Business Daily (2018, July 2). Sh534bn China debt now 72pc of bilateral loans pile. Business Daily, Retrieved from <https://www.businessdailyafrica.com/economy/Sh534bn-China-debt-now-72pc-of-bilateral-loans-pile/3946234-4642122-743gtxz/index.html>.
- Chen, J., Bergquist, R., Zhou, X. N., Xue, J. B., & Qian, M. B. (2019). Combating infectious disease epidemics through China's Belt and Road Initiative. *Plos Neglected Tropical Diseases*, 13(4), e0007107. doi: 0.1371/journal.pntd.0007107.
- China News (2018, August 15). Belt and Road Early Stage Project Dynamic Assessment Report Release. China News, Retrieved from <https://www.chinanews.com/gn/2018/01-15/8424656.shtml>.
- CNAS. (2019). Grading China's Belt and Road. Retrieved from <https://www.cnas.org/publications/reports/beltandroad>.
- Council of Foreign Relations. (2019). China's Massive Belt and Road Initiative. Retrieved from <https://www.cfr.org/background/chinas-massive-belt-and-road-initiative>.
- CRBC. (2016). China Road and Bridge Corporation Social Responsibility Report 2015 on Mombasa Nairobi SGR Project. n.l. CRBC.
- CRBC. (2018). China Road and Bridge Corporation Social Responsibility Report 2016 on Mombasa Nairobi SGR Project. n.l. CRBC.

- CRBC. (2019). China Road and Bridge Corporation Social Responsibility Report 2017–18 on Mombasa Nairobi SGR Project. n.l. CRBC.
- Daily Nations. (2018, November 25). Seven officials held as detectives probe SGR tickets scandal. Daily Nations, Retrieved from <https://www.nation.co.ke/news/Seven-officials-held-as-detectives-probe-SGR-tickets-scandal/1056-4867580-ftcfnsz/index.html>.
- Daily Nations. (2019, May 29). Excessive borrowing is hurting economy. *Daily Nations*, <https://www.nation.co.ke/oped/editorial/Excessive-borrowing-is-hurting-economy/440804-5135856-m3ompmz/index.html>.
- Dong, L., Yang, X. H., & Li, H. T. (2018). The Belt and Road Initiative and the 2030 Agenda for Sustainable Development: seeking linkages for global environmental governance. *Chinese Journal of Population Resources and Environment*, 16(3), 203–210. doi:10.1080/10042857.2018.1487745.
- Dossani, R., Bouey, J., & Zhu, K. (2019). Developmental Impacts of the BRI in the Asia-Pacific. Working Paper, RAND Center for Asia Pacific Policy.
- Dossani, R., Bouey, J. and Zhu, K. (2020). Demystifying the Belt and Road Initiative; A Clarification of its Key Features, Objectives and Impacts. RAND Corporation. Retrieved from https://www.rand.org/pubs/working_papers/WR1338.html.
- Duflo, E., & Pande, R. (2005). Dams. Working Papers 923, Economic Growth Center, Yale University.
- Fahri, J., Biesenthal, C., Pollack, J., Sankaran, S. (2002). Understanding megaproject success beyond the project close-out stage. *Construction Economics and Building*, 15(3), 48–58. doi:10.5130/AJCEB.v15i3.4611.
- FOCAC, 2017. <https://www.focac.org/chn/zfgx/jmhzt/1471951.htm>.
- FOCAC, 2019. <https://www.focac.org/chn/zfgx/jmhzt/1626532.htm>.
- FOCAC, 2019. <https://www.focac.org/chn/zfgx/jmhzt/1669034.htm>.
- FOCAC, 2019. <https://www.focac.org/chn/zfgx/jmhzt/1669034.htm>.
- Hu, Y., Chan, A. P. C., Le, Y., Xu, Y. & Shan, M. (2015). Developing a program organization performance index for delivering construction megaprojects in China: Fuzzy synthetic evaluation analysis. *Journal of Management in Engineering*, 32(4). doi:10.1061/(ASCE)ME.1943-5479.0000432.
- Huaxia. (2020, July 7). Kenya SGR operator says railway contributes to mitigating spread of COVID-19. *Xinhua*, Retrieved from http://www.xinhuanet.com/english/2020-07/07/c_139194938.htm.
- Institute of Chinese Studies (ISC). (2019). China's Infrastructure Development in Africa: An Examination of Projects and Tanzania and Kenya. Retrieved from <https://www.icsin.org/uploads/2019/12/11/c924317a941e3d430099f6f7d652abf2.pdf>.

- Kembayev, Z. (2019). The emerging Eurasian common energy market: What is its potential impact on China's Belt and Road Initiative? *Journal of World Investment & Trade*, 20(2–3), 401–424. doi:10.1163/22119000-12340137.
- Kenya China Economic and Trade Association and Embassy of the People's Republic of China in the Republic of Kenya. (2019). *Chinese Enterprises in Kenya Social Responsibility Report 2018–2019*. Nairobi.
- Kilman, D., Rush, D., Lee, K., & Cooper, Z. (2019). *Grading China's Belt and Road*. Center for A New American Security.
- Lehtonen, M. (2014). Evaluating megaprojects: From the 'iron triangle' to network mapping. *Evaluation*, 20(3), 278–295. doi:10.1177/1356389014539868.
- Lehtonen, M., Joly, P., & Aparico, L. (Eds.). (1991). *Socioeconomic Evaluation of Megaprojects: Dealing with Uncertainties*. Routledge.
- Li, H. X., Huang, Y. X., & Tian, S. C. (2019). Risk probability predictions for coal enterprise infrastructure projects in countries along the Belt and Road Initiative. *International Journal of Industrial Ergonomics*, 69, 110–117. doi:10.1016/j.ergon.2018.10.006.
- Li, J., Xui, F. J., Sun, Z. J., & Wang, J. F. (2019). Regional differences and spatial patterns of health status of the member states in the "Belt and Road" Initiative. *Plos One*, 14(1), e0211264. doi:10.1371/journal.pone.0211264.
- Li, Y., & Taube, M. (2018). The implications of the 'Belt and Road Initiative' on globalization and inclusive growth for the Eurasian continent. *Journal of Chinese Economic and Business Studies*, 16(3), 233–240. doi:10.1080/14765284.2018.1491667.
- Lu, H., Rohr, C., Hafner, R., & Knack, A. (2018). *China Belt and Road Initiative: Measuring the Impact of Improving Transportation Connectivity on Trade in the Region*. RAND.
- Macaes, B. (2019). *Belt and Road: A Chinese World Order*. Hurst & Company.
- McDavid, J. C., Huse, I., & Hawthorn, L. R. L. (2019). *Program Evaluation and Performance Measurement: An Introduction to Practice*, 3rd Edition. Sage Publishing.
- Merrow, E. W. (2011). *Industrial Megaprojects: Concepts, Strategies, and Practices for Success*. Wiley.
- Ministry of Commerce (MOFCOM). (2017). *The Belt and Road Initiative Selection of Early Achievements*. Xinhua Publishing.
- Ministry of Transport, Infrastructure, Housing, and Urban Development. (2017). *Environmental and Social Assessment Project Report (ESIA)*.
- National Development and Reform Commission (NDRC), Ministry of Commerce (MOFCOM) and Ministry of Foreign Affairs (MFA). (2017). *Building the Belt and Road: Concept, Practice and China's Contribution*. NDRC, MOFCOM and MFA.
- National Development and Reform Commission (NDRC), Ministry of Commerce (MOFCOM) and Ministry of Foreign Affairs (MFA). (2015). *Belt and Road: Vision and Action*. NDRC, MOFCOM and MFA.

- Ndiho Media. (2018, August 17). Environmental Costs Of China-Kenya's New Standard Gauge Railway. Retrieved from <https://paulndiho.com/2018/08/17/environmental-costs-of-china-kenyas-new-standard-gauge-railway/>.
- Olingo, A. (2019, June 11). After SGR, Kenya's next Sh900bn debt trap for power project. *Daily Nations*, Retrieved from <https://www.nation.co.ke/After-SGR--Kenya-s-next-Sh900bn-debt-trap-/1056-5152386-1hbg2r/index.html>.
- Quartz Africa. (2018, October 7). China now owns more than 70% of Kenya's bilateral debt. Retrieved from <https://qz.com/africa/1324618/china-is-kenyas-largest-creditor-with-72-of-total-bilateral-debt/>.
- Reuters. (2018, January 8). Kenya Arrests Two Top Officials Suspected for Corruption over 3-Billion Railway. Retrieved from <https://www.reuters.com/article/us-kenya-corruption-railway/kenya-arrests-two-top-officials-for-suspected-corruption-over-new-3-billion-railway-idUSKBN1KW07L>.
- Rolland, N. (2017). *China's Eurasian Century: Political and Strategic Implications of the Belt and Road Initiative*. The National Bureau of Asian Research.
- Rossi, P. H., Lipsey, M. W., & Henry, G. T. (2019). *Evaluation: A Systematic Approach, 8th Edition*. Sage.
- Rupa, M. (2019). BRI Economics: Opportunities and Risks of Transport Corridor. World Bank.
- Saud, S., Chen, S. S., Danish, & Haseeb, A. (2019). Impact of financial development and economic growth on environmental quality: an empirical analysis from Belt and Road Initiative (BRI) countries. *Environmental Science and Pollution Research*, 26(3), 2253–2269. doi:10.1007/s11356-018-3688-1.
- Scobell, A., Lin, B., Shatz, H. J., Johnson, M., Hanauer, L., & Chase, M. S. (2018). *At the Dawn of Belt and Road: China in the Developing World*. RAND.
- Silver, H. (2015) The Contexts of Social Inclusion. United Nations Department of Economic and Social Affairs Working Paper no. 144.
- Teo, H. C., Lechner, A. M., Walton, G. W., Chan, F. K. S., Cheshmehzangi, A., Tan-Mullins, M., Chan, H. K., Sternberg, T., & Campos-Arceiz, A. (2019). Environmental impacts of infrastructure development under the Belt and Road Initiative. *Environments*, 6(6), 72. doi:10.3390/environments6060072.
- The Star. (2019, January 5). "New HIV infections double along SGR counties – report", The Star, Retrieved from <https://www.the-star.co.ke/news/2019-05-01-new-hiv-infections-double-along-sgr-counties-report/>.
- The Star. (2019, May 30). Kenya's debt to GDP ratio shrinks marginally – IMF report. The Star, Retrieved from <https://www.the-star.co.ke/business/2019-05-30-kenyas-debt-to-gdp-ratio-shrinks-marginally-imf-report/>.

- UNCTAD & World Bank. (2018). Environmental and Social Impact Assessments. Responsible Agricultural Investment (RAI) Knowledge Into Action Note, no. 14. World Bank.
- Wang, J. J., & Yau, S. (2018). Case studies on transport infrastructure projects in belt and road initiative: An actor network theory perspective. *Journal of Transport Geography*, 71, 213–223. doi:10.1016/j.jtrangeo.2018.01.007.
- Wang, S., Song, J. N., Wang, X. E., & Yang, W. (2019). The spatial and temporal research on the coupling and coordinated relationship between social economy and energy environment in the Belt and Road Initiatives. *Sustainability*, 11(2), 407. doi:10.3390/su11020407.
- Wang, Y., & Wissenbach, U. (2019). Clientelism at work? A case study of Kenyan Standard Gauge Railway project. *Economic History of Developing Regions*, 34(3), 280–299. doi:10.1080/20780389.2019.1678026.
- Wong, A. (2019). China's economic statecraft under Xi Jinping, Retrieved from <https://www.brookings.edu/articles/chinas-economic-statecraft-under-xi-jinping/>.
- World Bank Blog. (2011). Strategies for Evaluating the impact of Big Infrastructure Projects: How Can we tell if One Big Thing Works? Retrieved from <https://blogs.worldbank.org/impactevaluations/strategies-for-evaluating-the-impact-of-big-infrastructure-projects-how-can-we-tell-if-one-big-thing>.
- World Bank. (2019). *Belt and Road Economics: Opportunities and Risks of Transport Corridors*. World Bank.
- Zhu, C. Z., & Gao, D. W. (2019). A research on the factors influencing Carbon emission of transportation industry in “the Belt and Road Initiative” countries based on panel data. *Energies*, 12(12), 2405. doi:10.3390/en12122405.