

THE LOCAL ECONOMIC IMPACTS OF RAILWAYS: KENYA'S STANDARD GAUGE RAILWAY (SGR)

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Introduction

The interest of transport economists is in how to solve the economic problems of the movement of goods and people (Button 2010). Transport has long been acknowledged as a vital determining factor of the economic activity location, and therefore, the policy instrument for economic development (Leeson 2014). A major and significant assumption is that transport infrastructure leads to positive socio-economic development in a country. When transport infrastructure is reliable and efficient, it creates several economic and social opportunities and benefits that result in positive multiplier effects such as better accessibility to markets, employment, education, health, and additional investments (Knaap and Oosterhaven 2002). In First World countries, these transport infrastructures were part of the economic development planning which took place during the industrial revolution in the 19th and early 20th centuries, a model that continues to this day, in which transportation planning and investments are associated with the estimated economic development goals of a region (Rashidi and Amir 2012; Rostow 1959). Like several other socio-economic activities that are infrastructure intensive, the transport sector is an essential element of the economy with an impact on development and the welfare of the people (Rodrigues et al. 2011).

Consequently, railway transport has attracted significant investment all over the world and specifically in Africa in the recent past. Railways are regarded as an avenue of socioeconomic development since they link regions, places, people, and economic activities (Banister and Berechman 2001). Researchers have argued that transport and especially railways have one of the highest potentials for job creation. Transportation upgrades have the potential

to significantly alter the population density and employment structure of the domestic economy. When a location is linked to a domestic or international transportation network, its market access increases in comparison to other neighboring locations. Greater market access encourages people and businesses to relocate because there is a greater supply of consumer goods and a higher demand for products. As a result, population density is often higher around transportation access sites such as seaports, airports, railway stations, and highway junctions. However, the benefits of increased access to transportation may not be the same in many regions. Some areas may lose people and jobs to larger or more productive locations. The amount of 'reorganization effects' and 'growth effects' is a prominent problem in both scholarly literature and policy debates (Alvarez et al. 2016). Research on the impacts of the railway on land property values has resulted in mixed findings, both in terms of the total effect on the value of a property as well as differences between properties located nearer and those located far away from a station. As it is commonly believed, the accessibility advantage due to the railway should be reflected in the value of the property (Bowes and Ihlanfeldt 2001; Debrezion, Pels, and Rietveld 2007; Githaiga 2021).

Until recently, Kenya was entirely served by the Kenya-Uganda railway, which was constructed by the colonial government in the early 1890s. Railway extensions in Kenya served white settlers and once that objective was achieved, the government stopped railway constructions (Githaiga 2021). Over the years, Kenya's railway network has been much dilapidated due to poor maintenance and inadequate technological development hence becoming almost obsolete in urban areas and the country at large (Mairura 2010; Mustapha and Greenhill 2017). To address the challenges of railway transport, the Government of Kenya, in collaboration with the Government of the People's Republic of China, undertook the construction of a modern Standard Gauge Railway (SGR) to modernize Kenya's railway transport (Ministry of Transport and Infrastructure (MTI) 2014). The 609 km modern railway line is the largest infrastructure project in Kenya for Cargo and Passenger transportation from Mombasa (the largest Port in East Africa) to the capital city, Nairobi, and is a flagship project of Kenya's Vision 2030 (Mustapha and Greenhill 2017). The Phase 1A railway project construction began in 2013 and was completed and launched in 2017 ("Kenyan President Launches..." 2016) and it was the main focus of this study. This study, therefore, sought to focus on the following research objectives: to establish the employment impacts of the SGR in Kenya; to examine the effects of the SGR on land and property values; and to make policy recommendations.

The role of infrastructure in Africa's development

Infrastructure investments are crucial to achieving the Sustainable Development Goals (SDGs) (Clark et al. 2022). Multiple studies have documented the positive impact of infrastructure on economic growth and inclusive social development at length (Khan et al. 2020; Pradhan et al. 2021; Owusu-Manu et al. 2019). As a component of Gross Domestic Product (GDP) formation and input to the production function of other sectors, infrastructure has a direct impact on productivity and output. For Africa to achieve the Sustainable Development Goals (SDGs) of the United Nations (UN), Agenda 2063 of the African Union (AU), or the High Five Goals of the African Development Bank, high-quality infrastructure is a prerequisite (AfDB 2022). High-quality infrastructure is essential for increasing economic productivity and sustaining economic expansion. Infrastructure has direct and indirect effects on economic growth (AfDB 2018). It directly increases total factor productivity (TFP) because infrastructure services are inputs to production and have an immediate impact on the productivity of businesses. As a result, it promotes total economic output given its contribution to GDP. Africa is a continent of small, open economies where trade, regionally and internationally, is critical as a growth engine. Infrastructure development is therefore crucial for the region's integration (Asche 2021).

Generally, Africa lags behind the rest of the world in terms of infrastructure extent and quality (Lakmeeharan et al. 2020). Researchers point to Africa's lack of infrastructure as a major obstacle to the continent's progress. Water, electricity, and transportation are just a few examples of the essential services that cannot be provided to a population without first establishing a solid foundation in the form of an adequate infrastructure. The proportion of funds allocated to infrastructure was drastically reduced by African governments and their partners in development in the 1980s and 1990s, owing to structural adjustment programs, the majority of African nations adopted in accordance with the Washington Consensus (Jackson and Jabbie 2021). Recent projections from the African Development Bank (AfDB) indicate that the continent's infrastructure is in need of \$130–170 billion annually, with a financing gap between \$67.6 billion and \$107.5 billion (AfDB 2018). Further, the gaps in funding and resources worsen the situation. Given the rate at which infrastructure must be constructed, many governments in Africa are struggling to secure sufficient funding to meet demand (The Economist Intelligence Unit 2019). While governments, particularly those in developing countries such as Africa, require access to a portion of the global capital markets due to tight public sector budgets, private investors are discouraged

from investing in infrastructure due to the numerous risks involved, such as the complexity of permitting and the possibility of construction delays, as well as the length of time before assets generate cash flow and produce a return on investment (OECD 2015). Moreover, just like most developing countries where the majority of the world's infrastructure gaps exist, African countries frequently lack the human resources with the necessary skills to plan, deliver, and manage sustainable, resilient infrastructure at the scale required to meet demand (AfDB 2018). Further, a number of governance barriers exist to the development of sustainable infrastructure, including election-cycle-induced short-termism in policy development, a lack of appropriate legislation, codes, and standards, and a lack of capacity (Economist 2019). Given the large sums of money at stake, lack of transparency and corruption are frequently associated with the development of infrastructure assets (Appiah, Onifade, and Gyamfi 2022). Even if no outright graft is involved, the motivations of those developing infrastructure and competing priorities often shape it. The World Bank estimates that, in Sub-Saharan Africa, closing the infrastructure quantity and quality gap relative to the world's top performers could increase annual GDP per capita growth by 2.6% (The Economist Intelligence Unit 2019).

Although infrastructure deficits are not unique to Africa, they must be addressed if the continent is to achieve sustainable development. Africa will need to tap into global capital markets through innovative finance and attract more private investors in the infrastructure sector (The Economist Intelligence Unit 2019). As they increase their focus on more capital, they must improve their spending by improving planning and procurement (Githaiga 2021). Transparency and open procurement are essential if governments are to persuade the private sector to invest in infrastructure; capacity-building initiatives can also improve transparency in some cases. Generally, improving the economic and social well-being of the African population is dependent on resolving the infrastructure gap that plagues so many African countries.

The background of the Standard Gauge Railway (SGR) and China's role

China has played a key role in Kenya's infrastructure development through funding as well as the expertise of Chinese construction firms (Githaiga 2021). As China gains access to new markets, the region is benefiting through the reduction of its enormous infrastructure gap. With the

launch of the Belt and Road Initiative (BRI), which is a cornerstone of China's global ambition, China's involvement in the region's infrastructure development gained more traction (Githaiga et al. 2019). The SGR project is a major infrastructure project in Kenya aimed at upgrading the country's railway system and was implemented as part of China's Belt and Road Initiative, a global infrastructure investment and development strategy aimed at boosting trade and economic ties between China and other countries (Githaiga et al. 2019). The project was initiated in 2013 with the aim of connecting the port city of Mombasa to the capital city of Nairobi, and later extending to other major cities in the country.

This SGR runs parallel to the Uganda Railway, which was built during British colonial rule in 1901 (Githaiga and Bing 2019). At the time of its launch, the SGR was one of Kenya's most expensive infrastructure projects, worth US\$3.6 billion (Githaiga 2021). The China Road & Bridge Corporation (CRBC) was the main contractor while China Communications Construction Company, which is a holding of CRBC, was contracted to operate the line for its first five years. As of 2020, railway operation expenses exceeded revenues. In October 2019, an extension from Nairobi to Suswa was completed, bringing the total length of the line to around 578.8 kilometers (359.6 mi). The Export-Import Bank of China funded 90% of the first phase of the SGR from Mombasa to Nairobi. The Kenyan government covered the remaining project costs. The Exim bank advanced the financing in two loans: concessional loans amounting to \$1.6 billion (KSh136 billion) and a preferential commercial loan of \$1.63 billion (KSh139 billion) (Economy 2014). The East African Railway Master Plan calls for the Mombasa-Nairobi SGR to connect with other East African Community SGRs linking landlocked South Sudan, the eastern Democratic Republic of the Congo, Rwanda, Burundi, and finally Ethiopia, which will then connect directly with Djibouti, providing direct access to the Indian Ocean (Moore 2014).

China's involvement in the Kenya SGR project is claimed to be part of a larger strategy to insert itself into the economic and political landscape of the African continent (Basu and Janiec 2021). China has been investing heavily in infrastructure projects throughout Africa, including Kenya, in order to secure access to natural resources and markets for its products and services (Kelley 2011). Moreover, China aims to establish itself as a major player in the development of African infrastructure, consequently strengthening its strategic position in the region (Yu 2017).

The Kenya SGR project is regarded as a success story of China-Africa cooperation, as it has contributed to the improvement of Kenya's trans-

portation infrastructure and the acceleration of its economic development (Githaiga and Bing 2019). However, concerns have been raised over the economic viability of the project (Wissenbach and Wang 2016); corruption (Taylor and Zajontz 2020); debt accumulated by Kenya in order to finance the project (Sanghi and Johnson 2016), as well as the perceived lack of local gains in terms of employment and knowledge transfer (Plummer 2019).

Overall, the Kenya SGR project is a crucial component of China's insertion strategy into the African continent, as it indicates China's commitment to investing in African infrastructure and contributing to the region's growth.

Railway transport and employment creation

Transportation improvements have the ability to drastically alter the domestic economy's population density and job structure. When a location is connected to a domestic or international transportation network, it gains market access in comparison to its neighbors. Increased market access encourages people and businesses to relocate as the supply of consumer goods and the demand for products increase. As a result, population density is frequently higher in areas with easy access to transportation, such as seaports, airports, railway stations, and highway interchanges. However, the benefits of expanded transit availability may vary by region. Certain areas may lose residents and jobs to larger, more productive areas. The magnitude of 'reorganization effects' and 'growth effects' is a contentious issue in both academic research and policy debates (Alvarez et al. 2016; Githaiga et al. 2019).

Researchers have argued that railways have one of the highest potentials for job creation. Research done in Brazil shows that the railway accounted for 37 thousand potential direct jobs and 110 thousand total jobs, and R\$ 70 billion in investments (Corre et al. 2017). However, they also noted that job creation in this sector tends to have a low to medium level of sustainability since most of the workforce is dismissed after the completion of the construction project, requiring fewer people for operation and maintenance. According to Matovu (2012), when the government gives transport infrastructure priority, the impacts on growth become significant as a result of improved household productivity, which leads to the positive externalities linked with sound infrastructures such as employment and markets. Williamson and Canagarajah (2003) added that efficient railways, agriculture, roads, and waterways might lead to higher employment returns and the creation of

income, alleviating poverty as well as promoting economic development. Ajayi (2005) adds that the railway has a significant role in socio-economic development through the generation of employment. In a report by Michael Reilly investigating the economic growth effects of California's High-Speed Railway, it was concluded that the railway led to modest state-wide increases in employment and population (Reilly 2007).

Based on forecasts, estimation of railway construction effects often indicates considerable gains, which provides an argument in support of building railway infrastructure. For instance, the cross-rail plan proposed to link North England and London by 2026 would lead to the creation of more than 22,000 direct and indirect jobs in a span of five years after ground-breaking (Eyles 2013). The planned Paris-Bordeaux-Vitoria-Madrid was estimated to create 100,000 jobs – 40% direct jobs, 30% indirect jobs, and 30% from induced effects (Fernández-Macho et al. 2012) – while in California, the estimated number of jobs to be created by 2020 through a planned High-Speed Railway would be between ten thousand to sixteen thousand jobs (Administration 2012). Using an input-output model from fieldwork among the employees and businesses involved in the building of the SEA railway line connecting Bordeaux and Tours in France, Fouqueray, and Manceau (2016) found out that the project led to the creation of about 14,000 jobs, 755 Million Euros in value addition and 1.6 Billion Euros in production in the three regions where construction took place; 18%-25% of the total gains were from induced effects (Fouqueray and Manceau 2016). In Kenya, the colonial railway is seen to have positively contributed to employment creation (Clayton and Savage 1974). Focusing on the productivity of the economy of the United States of America (U.S.) between 1948-1987, Munnell (1990) observed that transport infrastructure and economic development are indirectly connected concerning employment creation. During this period, the study revealed that multifactor productivity fell to 1.1% between 1969-1987, yet the previous growth of the same between 1948-1969 was 2.5%. This decrease in labor productivity growth was credited to insignificant investment in the transport sector during this period, both in new infrastructural projects and the maintenance of the existing ones.

These positive impacts of railway transport on employment, however, cannot be generalized. Different researchers have obtained varying results. Using the difference-in-difference technique (Brage-Ardao, Graham, and Melo 2013) observed no substantial difference in the growth rate of employment between areas with and without rail links. There were also no differences before and after the construction of the rail lines. In France, there was no correlation between the growth of employment and the extension of the

railway (Yves 2016). Generally, investing in transport infrastructure leads to job creation through the implementation of projects that require manual labor. Thus, having significant impacts on labor demand (Kreciglowska 2018).

This review of the employment effects of railway projects leads to some points. First, if the area under construction is large, the direct economic impacts will be weightier because the tendency for local consumption will be stronger. Second, though some skills developed by employees or businesses during project implementation can later be used in successive jobs, the economic benefits are usually temporary. Considering the effects on economic development and job creation, Kenya could benefit from stimulating investments in infrastructure as a whole. The selection of specific projects to be prioritized should rely on a holistic and systematic approach, even though job creation potential is a critical factor as it may help alleviate some of the country's infrastructure bottlenecks, driving costs down, and helping overcome the current economic downturn.

Railway transport and land and property value effects

Research on the impacts of the railway on land property values has resulted in mixed findings, both in terms of the total effect on the value of a property as well as differences between properties located nearer and those located far away from a station. As it is commonly believed, accessibility advantage due to railway should be reflected in the value of the property (Bowes and Ihlanfeldt 2001; Debrezion, Pels, and Rietveld 2007).

Railway stations serve as nodes in transportation networks as well as locations in urban environments. They have accessibility and environmental effects that affect property value (Debrezion, Pels, and Rietveld 2007). A study by Debrezion, Pels, and Rietveld (2003) revealed that different kinds of rail stations have different impact magnitudes on the value of property; commuter rails have moderately higher impacts on the value of properties. More so, rail stations are different in terms of the quality and level of facilities, and thus, the higher the quality and level of facilities, the more significant the impact on the nearby properties. In their research, Bowes and Ihlanfeldt (2001) carried out an analysis of the impacts of light rail on economic development through examination of the effects on changes in local crime rate, the value of the property, as well as local retail businesses, increase. Their research revealed that there was an interplay of all three variables with local development more so in the regions near the rail stations. Additionally, there

was an overall positive impact on the values of the property as a result of the proximity to the stations. However, the property's proximity to the Central Business District (CBD) more significantly determined the level of the impact. Property that was close to the station but far from the CBD were on average, more impacted than those of relatively similar distance to the station but nearer to the CBD (Garrett 2004). The basic theory of real estate prices is as follows: demand rises when a site's features make it more attractive, and bidding drives up prices. The project's transportation savings benefit property next to the investment region (railway stations). Price curves should slope downward as we go away from the station. In general, railway stations have a greater impact on commercial properties than residential ones within a short distance (Cervero and Duncan 2002a; Cervero and Duncan 2008).

The influence of a railway station on residential properties is greater, while the impact on commercial properties is limited to the immediate vicinity. There is also evidence that railway stations affect business properties more than residential dwellings (Cervero and Duncan 2002b). Railway stations, being hubs of commerce, boost commercial property prices. A railway station's impact on property value is also influenced by demographic factors. Because low-income households rely on public transportation, residing near a train station has a higher value in low-income neighborhoods than in high-income neighborhoods (Bowes and Ihlanfeldt 2001).

The urban economic theory, however, contends that proximity to tracks and rail stations is associated with negative externalities. This includes the adverse effects on the value of properties due to noise and vibration increase from the rail network (Weinberger 2001). This is echoed by Bowes and Ihlanfeldt (2001) who argue that the noise effect from the stations negatively affects the prices and value of houses. The price and value of property and houses increase as one moves away from the station and along the tracks as a result of the noise effect at the stations and along the railway (Debrezion, Pels, and Rietveld 2006).

Moreover, rail station effects on commercial property are different from those on residential property; the effect on the value of commercial property happens at short distances. The area range impacts of Railway stations are higher for residential properties while the impact on commercial property is restricted to the areas directly adjacent to the stations (Debrezion, Pels, and Rietveld 2007; Debrezion, Pels, and Rietveld 2003).

Additionally, some researchers hold that closeness to the rail stations increases the chance of criminal activities taking place in a particular area since criminals have both a higher number of targets (train users) as well as

the freedom of movement in the surroundings (Bowes and Ihlanfeldt 2001; Cervero and Landis 1997). This negatively affects the value of a property as well as the choice of commuters on where and how to use the train while boarding (Kim, Ulfarsson, and Todd Hennessy 2007). Further, as the prices of real estate in cities close to the railway increase, their attractiveness for the industry setup decreases resulting in an economic geography based on specialization by function from one based on specialization by sector level (Puga 2001; Chen and Silva 2013). Thus, for the property directly next to the railway line, the property value is not always positively affected as argued by Arndt et al. (2009). Instead, the most substantial impacts are found in areas near the stations as rail accessibility increases the value of the nearby property.

Bowes and Ihlanfeldt (2001) conclude that the different results on the land and property value are due to the interplay of four different factors, two of which may increase the value of a property, and the other two may lower the value of the property. Firstly, Rail transit leads to an accessibility effect, and secondly, an increase in accessibility and higher value of the property may lead to the attraction of new commercial activities, especially retail businesses to a region. These two positive effects are countered by two negative factors, i.e., the noise and crime effects. The interaction of these factors and the degree of one in comparison to another determines the overall effect of rail transit on property and land value (Bowes and Ihlanfeldt 2001).

Railway stations have a varying effect on the value of various property kinds. Railway stations, on average, are predicted to have a more favorable influence on commercial properties than on residential properties within a short distance of the stations. Commuter railway stations, of the four types of railway stations, are predicted to have a greater impact on property prices.

Transport Economics Theory

In 1959, John R. Meyer developed the transport economics theory. The theory explains how transportation sector resources are allocated and the resulting effects. In his book titled "Transport Economics Theory", Diaz (2007) posits that activities in transport entail individuals and goods movement both in space and time; hence, transport production analysis entails resource assignment for the generation of trips between various spatial points in different times.

The theory contends that there are costs, benefits, and opportunity costs associated with transport infrastructure that is essential to transport pro-

jects and policy evaluations, both economically and otherwise. Opportunity costs and indirect internal costs are difficult to observe and quantify, but they can be quantified in monetary terms based on choice behavior. In addition, transport infrastructure has societal externalities; these developments have an impact on the safety and well-being of others in the form of air quality through emissions, traffic accidents, noise, land, and water pollution, wildlife, and endangered species, among other effects. Transport infrastructure has an impact on emissions, which alters travel patterns and influences land use and property value. The permanency of transport infrastructure has an effect on land use, land values, and wages (Button 2010). Transport improvement results in changes in accessibility and mobility, which have subsequent effects on business and residential choices and, consequently, on land and property values.

In this theory, mobility and accessibility are two key concepts that describe the relationship between transportation and location. Mobility is concerned with efficiency and movement scope, particularly in terms of distances and travel speeds. Accessibility refers to the ease with which one can reach quality destinations, which reflects both the attractiveness of potential destinations and the ease of reaching them (Srouf, Kockelman, and Dunn 2002). Investments in transport, especially rail, are often perceived as triggers for economic regeneration in central cities (Ryan 1999). Such perceptions have made decisions on transport investment heated debate topics amongst policymakers.

Research methodology

This research employed a mixed research method, which creates a synergy between quantitative (questionnaire) and qualitative (interviews, observation, document analysis) methods. The combination of the two methods enhanced the validity of this study. The research design adopted in this research was descriptive in the form of a survey. Quantitative and qualitative data from both primary and secondary sources were used. Quantitative data was collected through questionnaires and analyzed through SPSS, while qualitative data was collected through interviews, observation, and document analysis. The target population was inhabitants along the SGR route, with a particular emphasis on coastal provinces, where the SGR begins, and which form the bulk of the SGR route. It has an estimated population of 3.325 million people.

This research used Yamane's (1967) sampling formula $n = N/(1 + Ne)$ for the sample size determination, where "n" represents the size of the sample, "N" represents the size of the population, and "e" represents the marginal error, for example at 95% level of confidence. As per the formula, the sample size for ordinary train users was calculated as follows:

$$\text{Sample size} = 3,325,000 / (1 + 3,325,000(0.052)) = 399$$

A stratified sampling technique was employed to divide the respondents' sample size into five strata for the five main routes covered by the SGR in coastal provinces: Mtito Andei, Mombasa, Voi, Mariakani, and Miasenyi. Each had 80 respondents. Simple random sampling was then used to select the respondents. In this method, every member of the sample population has a known and equal chance of being selected (Kothari 2004). Those identified and selected filled and submitted the questionnaires voluntarily. Purposeful sampling was also used to select 30 residents for interviews from these areas.

Response rate

343 of the 399 questionnaires distributed to respondents were found to be valid and complete for analysis, representing an 86% response rate. In addition, thirty locals were interviewed. The high response rate indicated that sufficient data was collected to conduct the study (Field 2005).

Objective 1: Employment Creation

Results

Regarding the effects of SGR and employment creation in Kenya, the items revealed a small deviation from the mean, indicating that the responses were close to the mean (homogeneity) – see Table 1. According to the findings of the study, the majority of passengers believe that the SGR has created sufficient direct and indirect jobs for Kenyans (mean=2.09). However, they are dissatisfied with the quality of jobs offered to Kenyans (mean=1.94) and the level of Kenyan involvement in the management and operation of the SGR (mean=1.99). Additionally, a majority (mean=3.52) disagreed that there is sufficient technology transfer from the SGR. The researcher also observed that the majority of the train's employees were Kenyans, while the drivers and

supervisors were notably Chinese. Even though Kenyans are satisfied with the direct and indirect jobs created by the SGR, they are less pleased with the extent of involvement, transfer of skills, and quality of jobs provided to locals. One respondent in an open-ended question responded

...As a Kenyan, I am happy that the SGR has created jobs for many jobless Kenyans. I am happy because my son now works at the SGR too. However, the Government of Kenya must ensure that Kenyans get quality jobs and take charge of the operations of the train. I see Chinese drivers every time I use the SGR. Kenyans have gradually attained the required skills and competencies through the training in Chinese universities, and I believe they can take charge.

Table 1: Descriptive Statistics for employment creation

	N	Min	Max	Mean	Std. Dev.
SGR has created enough direct jobs for Kenyans	343	1	5	2.09	.813
Insufficient quality of jobs provided to Kenyans	343	1	5	1.94	.731
Inadequate involvement of Kenyans in the management and operations	343	1	5	2.09	.813
SGR has created sufficient indirect jobs for Kenyans	343	1	4	1.88	.609
There is sufficient technology transfer alongside the employment	343	1	5	3.52	1.216
Valid N (list-wise)	343				

Source: elaborated by the author, based on Nascimento (2004).

Discussion of results

The majority of respondents believe that the SGR has created sufficient direct and indirect employment opportunities for Kenyans. These findings are in agreement with Corre et al. (2017) who argued that railways have one of the highest potentials for job creation and poverty reduction leading to economic development, while Ajayi (2005) adds that railway has a great role in socio-economic development through generation of employment. Previous research showed that investors from China in various sectors of the economy in Kenya employ a majority of locals in their projects (Sanghi and Johnson 2016; Githaiga and Bing 2019). Overall, infrastructure spending can create

jobs by implementing construction projects that are built using manual labor. It can have a substantial impact on the demand for labor (Kreciglowa 2018). To put the current findings into context, according to the Kenya SGR Project Social Responsibility Report 2017/2018, more than 46,000 Kenyans were employed in the construction of the Mombasa-Nairobi SGR, and approximately 1,000 locally sourced suppliers were contracted for various services or products, such as construction materials (KCETA 2018). Besides, there was an indirect creation of employment through various opportunities in entrepreneurship resulting from the need for goods and services by the SGR workers and travelers including entertainment, catering, etc. (Githaiga and Bing 2019). In addition, the SGR trains have approximately 52 wagons with a maximum capacity of 4,000 tonnes, or 216 twenty-foot equivalent units (TEUs) (KCETA 2018). This results in employment opportunities for loaders and unloaders, as well as retail and wholesale distribution services for end users. This should enhance the basic social welfare of Kenyans with jobs and their families. In addition, Kenyans are continually trained to become experts in train operations and services, and some have already been absorbed into train operations and are undergoing field training under the supervision of Chinese experts (Githaiga and Bing 2019). CRBC established railway operations, management, and engineering training programs in Kenya (Li 2016). In addition, data shows that CRBC has sponsored approximately 100 Kenyans to pursue engineering and railway-related studies at Beijing Jiaotong University in China (Mutethya 2018). This is being done to promote local skill development and close the local skills gap.

On the other hand, the majority of respondents were dissatisfied with the level of Kenyan involvement in the management and operations of the SGR, as well as the quality of the jobs provided to Kenyans. Previous research shows that job creation in railway construction has a low to moderate level of sustainability, as the majority of the workforce is let go after the completion of the construction project, and fewer people are needed for operation and maintenance, which could leave both the workers and the locals aggrieved (Corre et al. 2017). Allegations in Kenyan media in July 2018 could partially explain why the respondents are dissatisfied, including allegations that Kenyan-trained employees lack opportunities to utilize their talents and that Chinese personnel is in charge of the operations (Wafula 2018). Though the government strongly refuted these allegations, they may have affected Kenyans' perceptions of the type and quality of jobs that the SGR has provided for Kenyans, as well as their participation in day-to-day operations and management; it has often been claimed that the type of jobs offered to Kenyans, despite their abundance, are of poor quality because the

majority are casual and unskilled (Githaiga and Bing 2019; Githaiga 2019). During the research, respondents claimed, for instance, that Chinese drivers are in charge of the trains instead of Kenyans, despite the latter's training.

The majority of respondents also noted that the SGR's level of technology transfer is insufficient. This corroborates the research findings of Wang, Mao, and Gou (2014), who concluded that although Chinese investment brings with it massive employment creation, there are limited technology transfers to the host economies for two major reasons: first, the skills acquired by the locals during Chinese-funded project implementation do not always correspond to the work required in operations' sustenance, and second, language barriers hinder Chinese investments' technology transfers. Therefore, direct supervision by Chinese managers is inevitable (Wang, Mao, and Gou 2014).

Taking everything into account, given that the SGR is a modern form of transport infrastructure in Kenya and Africa as a whole, it is essential to note that Kenyan engineers may not possess the necessary and adequate skills to manage such a project. As a result, it is necessary for Chinese engineers to oversee the gradual training of the locals. In this regard, it was determined that China Road and Bridge Corporation (CRBC) in conjunction with Kenya Railways has established a joint training program for training the Kenyan workforce in Chinese universities to familiarize them with operating the SGR system and attain the skills and expertise required in SGR trains' operations, as Kenya prepares to fully take over the train's operations in 2027 according to the current schedule. China has played a significant role in training Kenyans to operate and manage the railway, but the two countries should make more concerted efforts to eliminate any skill gaps.

Objective 2: land and property value effects

Results

On the impacts of the SGR on land and property prices during the SGR planning and construction, the means for the individual items were below 2.5 on a 5-point Likert scale, indicating that all the items had a strong impact – see Table 2. Besides, the items revealed a small deviation from the mean which is an indicator that the responses were homogenous. The results reveal the respondents agreed that there were positive changes in land use patterns and distribution ($M=2.03$), as well as an increase in prices of land ($M=2.10$) and property ($M=2.10$). On average, the participants also agreed that

there were increased business activities along the route and near the railway stations ($M=1.87$). On the impacts of the SGR on land and property prices after the SGR construction (see Table 3), the respondents disagreed that there has been an increase in the prices of land ($M=3.52$) and property ($M=3.62$). On average, the participants also disagreed that there were increased business activities along the route and near the railway stations ($M=3.54$).

The opinions of the interviewees were divided regarding positive and negative changes to the value and prices of land and property along the SGR route. During the planning and construction phase of the SGR, 62% of respondents observed an increase in land and property prices. They attributed this to the government's haste to provide compensation while the increase in land demand was a result of speculation. In addition, they observed that residential and commercial real estate prices increased more near train stations than in other areas along the railway. However, when asked the same questions about the effect on property after the construction of the SGR, 82% of respondents indicated that the effect on land and property prices was negative. They cited factors such as noise for those living close to the SGR line and a decrease in demand for land and real estate, which led to a sharp decline in prices.

Table 2: Descriptive Statistics for Land and Property Prices during the SGR planning and construction

	N	Min	Max	Mean	Std. Dev.
There are changes in land use patterns and distribution due to the railway	343	1	5	2.03	.711
Land prices have increased	343	1	5	2.01	.741
Property prices have increased	343	1	5	2.10	.804
Increased business activities along the route and near the railway stations	343	1	5	1.87	.678
Valid N (list-wise)	343				

Source: elaborated by the authors.

Table 3: Descriptive Statistics for Land and Property Prices after the SGR construction

	N	Min	Max	Mean	Std. Dev.
Land prices have increased	343	1	5	3.52	1.216
Property prices have increased	343	1	5	3.62	1.190

	N	Min	Max	Mean	Std. Dev.
Increased business activities along the route and near the railway stations	343	1	5	3.54	1.20
Valid N (list-wise)	343				

Source: elaborated by the authors.

Discussion of results

During the planning and construction of the SGR, land and property values increased as a result of changes in distribution and land-use patterns, as shown in Table 2. These findings are in line with research by Bowes and Ihlanfeldt (2001), who concluded that there was an overall positive benefit in property values resulting from proximity to rail stations. Additionally, enhanced accessibility of a region is an essential factor in property value increase, though it is not sufficient on its own; other factors are also responsible for property value increase. The impacts of enhanced accessibility rely on both the magnitude of investment and on the contribution of the new railway to the transport network of a region (Martínez and Viegas 2007). Research shows that Commuter railways have a relatively high impact on property value and the high population activity in the local vicinity promotes the growth of retail operations, resulting in benefits on the worth of commercial assets (Debrezion, Pels, and Rietveld 2003). Contextually, land and property values along the route increased as a result of the SGR's construction. For example, Kapiti Plains in Kajiado County, located off Mombasa Road and along the SGR route, has been used for grazing cattle for many years. Due to the development of the SGR and the area's proximity, it is currently a desirable location for real estate investors. Individuals and institutions purchased real estate in these regions. According to one of the local newspapers, residents reported that, depending on the region, the price of an acre rose from 400,000 to 3.5 million Kenyan shillings (Wainaina 2016).

Numerous factors, including speculation, government compensation, and high demand for commercial space, contributed to a significant increase in land value. Along the Mombasa-Nairobi highway, which is part of the SGR route, multiple hardware stores selling construction materials as well as various ongoing construction projects, particularly buildings, were spotted during fieldwork. However, this construction was concentrated around train stations, and as the distance from the stations increased, construction activities decreased. All of these are indicators of a thriving real estate market. This corroborates previous research by Michaels (2008), who concluded that the advent of the U.S. Interstate rail network caused counties along those

routes to experience increased activities related to trade, such as retail sales. Inferentially, rising property and land prices will encourage consumer spending and wealth redistribution across the economy, resulting in increased economic growth and development in Kenya.

In contrast, the results indicate that after the construction of the SGR, land and property prices decreased, as did economic activity along the route and in the vicinity of the railway stations. According to urban economic theory, proximity to railroad tracks and stations is associated with negative externalities which have a negative impact on property values due to increased noise and vibration from the rail network; the noise effect from the stations has a negative impact on home prices and values (Weinberger 2001). In addition, as real estate prices in cities adjacent to railroads rise, their attractiveness for industry setup declines, resulting in an economic geography based on specialization by function as opposed to one based on specialization by sector level (Puga 2001; Chen and Silva 2013).

Both positive and negative effects on land and property values resulted from the construction of the SGR. Numerous strategies could be used in the mitigation of the negative effects, balancing the positive and negative impacts, and protecting land and property values in the affected areas such as railroad operators installing noise barriers along the railway line to lessen the impact of noise on residents and property values; landscaping and beautifying the area surrounding the railroad to increase the area's aesthetic appeal and property values, and involving the local community.

Conclusion

The results suggest that the SGR project had mixed economic effects in Kenya. The SGR has generated sufficient direct and indirect employment for Kenyans. Nevertheless, there was widespread discontent with the level of local participation in the SGR's management and operations, as well as the caliber of jobs offered to Kenyans. Additionally, it was acknowledged that the level of technological transfer was insufficient. During the planning and construction of the SGR, land, and property values, as well as commercial activities along the route, increased in response to changes in distribution and land-use patterns. However, after construction was completed, land and property values and commercial activities decreased significantly.

Kenya struggles with high unemployment rates, especially among its youth. Through skilled and semi-skilled labor opportunities associated with the operation, management, and maintenance of the rail line, as well as the transportation of passengers and goods, the construction and operation of

the SGR have created significant employment opportunities for locals. As envisioned in Vision 2030, employment creation is essential for Kenya's socioeconomic growth and development, particularly in terms of enhancing the living standards of local residents and reducing poverty. In addition, the increase in property and land values along the SGR route will stimulate consumer spending and wealth redistribution throughout the economy, leading to increased economic growth and development in Kenya. Because the SGR is a public good, any improvement to public transportation is beneficial to the entire community.

Kenya and China must focus their efforts on resolving employment issues that have arisen since the completion of phase one of the project. China has been instrumental in preparing Kenyans to operate and manage the train. Additionally, Kenya should make a concerted effort to address any skill gaps. Kenya could accomplish this by equipping some of its academic institutions with modern facilities and infrastructure for modern railway technology in order to train more Indigenous personnel, and by mandating in-service training for current railway engineers and academicians who lack skills in modern railway technology. In addition, Kenya could fund more locals to study railway technology at Chinese and other international institutions, thereby expanding the country's railway workforce. This will help close the skills gap and supplement the workforce that is already being trained in China. As the project progresses, it will not only address immediate concerns but also long-term ones, as it will give Kenya a future competitive advantage in sourcing skilled labor as SGR construction continues in other African nations. Staffing and skill transfer issues must be carefully addressed to avoid hostility between local employees and their Chinese counterparts, as well as a public backlash against foreign investments in Kenya. While attempting to alleviate Chinese investors' employment concerns toward the local people, many sociocultural perspectives must be considered. Employment practices can benefit both Kenyans and Chinese through shared learning and the convergence of diverse cultural beliefs and practices. More jobs are expected as the project's future phases are implemented, empowering thousands of households and alleviating poverty.

Generally, the SGR represents the modernization and growth of Kenya's transportation industry and society as a whole. In addition, Kenya's growing industrialization and urbanization are likely to create new transportation challenges that can only be effectively addressed by modern rail networks such as the SGR. Broadly speaking, the local economic implications of the SGR in Kenya are multidimensional, and the success of the project in

promoting sustainable economic development will depend on a thorough evaluation of both its negative and positive impacts.

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ABSTRACT

The interest of transportation economists is how to solve the economic problems of the movement of goods and people. Transportation has long been recognized as a vital determinant of the location of economic activity and therefore a policy tool for economic development. This study, hence, focused on Phase 1 of Kenya's SGR to examine its impacts on employment as well as its effects on land and property values. The study sampled 399 respondents through questionnaires and 30 through interviews, using a mixed research approach and a descriptive research design. From the data, the SGR project in Kenya has mixed economic effects. SGR generated

enough direct and indirect jobs for Kenyans. However, there was widespread dissatisfaction with the level of local participation in the management and operations of the SGR, as well as the caliber of jobs offered to Kenyans. As the number of qualified Kenyans increases, so should their involvement in SGR operations. Indisputably, SGR represents the modernization and growth of Kenya's transport industry and society as a whole.

KEYWORDS

Kenya. SGR. Economic Impacts. Railway. Infrastructure.

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