Assessment of Social-Economic Impact of Road Construction Projects in Conserved Areas: Evidence from Ngorongoro Conservation Area Authority in Tanzania

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Abstract
This study was aimed to assess the social-economic impact of road construction projects in Tanzania by using the evidence from Ngorongoro Conservation Area. The area has been reserved because of its importance in providing habitat to a number of wild animals. The study employed a case study design in which 98 respondents from Ngorongoro Conversation Area were involved. Data were collected by questionnaires and were analysed by using Structural Equation Modelling (SEM) technique. The key findings of the study revealed that road construction projects have positive influence on both social and economic performance. Nevertheless, our study posits that social performance can mediate the relationship between road construction projects and economic performance. Our study offers practical and social implications by providing insights through empirical results about the debatable phenomenal on the importance of road infrastructure to the social-economic development of developing countries.

Keywords: Road construction, Social impact, Economic performance, Project Management.

1. Introduction
Road infrastructure is considered as one of the main components of achieving economic growth in the country. It is driven by connecting people to employment, enabling goods delivery, and promoting exchange among different people (Rokicki & Stępniak, 2018). Worldwide, road infrastructure projects are huge, and they’re used for transporting goods and services from one part to another for economic development (Wang et al., 2020). Without good road infrastructure, the flow of products and other goods in the country is critically impeded, thus leading to global disruption of goods, medicines and other consumable items (Palei, 2015). The projected population in cities is expected to reach 5.2 billion by 2050, which will rely mostly on road transport in order to achieve the Sustainable Development Goals (SDGs). A strong supply-side investment was seen to be the development of road infrastructure, which can lead struggling countries out of recession in economic growth (Iimi et al., 2015).

Although construction of road in reserved area such as national parks has adverse impact including increasing the destruction of animal habitat, animal mortalities due to road traffic and speed that result into accidents, restrictions on animal movements, increasing illicit
trades and increased accessibility of natural resources. Such an accessibility would lead to increased exploitation of the same resources but also the road has enormous positive impact to the settlers living near the reserved area including economic attraction such as investments like hotels and cottages for tourism, that are easily accessible to the tourists who visit the national park and also these are always bring other positive economic implications (Caro, 2015). The construction of road projects in conserved area has risen a lot of debatable arguments from conservation scientists, ecologist, and UNSECO about the environmental impact of road on the growth of animal around the conserved area, but on the other side, the politicians, governments and community leaders has also their stand on the analysis of benefits that communities living around the conserved area will benefit from it (Tarimo et al., 2017). In sub-Saharan Africa, road infrastructures have a significant impact on the communities living in conserved areas. According to Samanta (2015), road construction projects lead to substantial impact on the economic development of the communities through improving traveling efficiency, smooth flow of material and labour, quicker connectivity of business premises, and enable easily access to social services such as education, and health services in the conserved area. Due to the importance of road infrastructure to the social-economic development of the country, many governments have invested a lot of tax payer’s money on road construction projects over the past decades (Griškevičiūtė-Griškevičienė & Griškevičienė, 2016; Vaznonienė & Kiaušienė, 2018). The government of Tanzania has recognised the principal role of road construction projects and it has used a lot of government revenue to boost its investment in connecting cities with their districts as well wards. Arusha city is considered as a growing city in the northern part of Tanzania, which has experienced a massive construction of road projects across the city and its peripherals (Fungo, 2018). For example, the construction of the major highways in Eastern, Northern, and Southern side of the city aim at creating a road perimeter surrounding the city. All these projects and including Arusha to Dodoma via Babati road construction projects aim to connect Arusha with other regions of the country. Despite the tremendous significant of road construct projects socially and economically to the communities located along them. However, the situation around reserved or conserved area is different since roads are poorly or not constructed in modern standards (Caro, 2015). Modern standard roads have brought productivity to non-reserved wildlife parks and boosted Gross Domestic Product (GDP). Therefore, this study seeks to evaluate the impacts of road construction projects in social-economic performance at conserved area.

The rest of the paper is organized as follows. First, we review the literature about road construction projects, social performance and economic performance and propose a conceptual model. Then, we introduce the research methodology, conduct statistical tests and present the results. Finally, we discuss the findings, conclusions, and recommendations.

2. Literature Review
This study is guided by socio spatial integration theory. It was developed by (Ruiz-Tagle, 2013), and its main proposition was how segregation base on proximity increase poverty and propose on how reduction of
physical proximity improve social integration and participation in meaningful activities. Road construction reduce physical proximity among societies at reserved area which are usually spaced due to the nature of the area. These area are unique in term of heavy vegetation and land topography. This uniqueness can be handled by reducing proximity among communities through road constructions.

Road construction projects use massive investment and funds to achieve the economic prosperity through facilitating the haulage of materials, goods and services from one place to another (Jedwab et al., 2017). In developing countries like sub-Saharan Africa road infrastructures are the main means that conveying 75% of passengers and freights (Beuran et al., 2015). It is believed that about 50% of the roads in Sub-Saharan African has not yet constructed to connect cities with peri-urban areas (Cobbinah et al., 2015). However, the road infrastructure is considered as the main mode of transport potentially impact the socioeconomic of community in sub-Saharan African (Jedwab et al., 2017).

There a numerous study that examine the relationship between road construction projects and social performance (Meersman & Nazemzadeh, 2017; Mustafa et al., 2021; Pavel et al., 2018). Road construction projects facilitate the social performance in the surrounding community in a different angle. For example, when the government embark on road construction projects in peripheral areas like the districts and village, it tends to give the community power and strength to improve their standard of living(Khanani et al., 2021). When the community have an access to good networks of road that work throughout the year, farmers have an ability to reach the market and sell their products at good prices. Similarly, road connect the villages and cities, so it enables the community members to be able to reach all social service easily and thus improve the economic performance (Li et al., 2018).

According to Shi et al. (2017) the road construction projects increase the standard of living through business opportunities, greater access to the region opportunity, increased access to employment, training and education, and increased funding to improve programs across the region. Maparu and Mazumder (2017) argue that road construction projects create the opportunities for investment, enhance effective flow on the factors of productions including capital, labour and materials and in a nutshell, the road construction projects improve the environment for business in a particular area that attract more investor and in turn lead to economic performance.

In order to answer the empirical question of how road infrastructure impacts on different social groups at the community level in Ngorongoro, the study used a conceptual approach based on two main categories of social and economic aspects (figure 1). Based on social integration theory, social and economic dimensions are likely to emerge when road construction emerges in the community. The road construction is likely to integrate community and a shift from local agriculturally-based economic activities to advanced productivities opportunities (Bodo, 2019; Woltjer, 2014).
Based on above discussion, we propose the following:

\textit{H1: Road construction projects has positive influence on social performance}

\textit{H2: Road construction projects has positive influence on economic performance}

\textit{H3: Social performance has positive influence on economic performance}

\textit{H4: Social performance mediate the relationship between road construction projects and economic performance.}

3. Methodology

This paper employed a quantitative research approach where correlation, regression analysis and structural equation modelling (SEM) was used to analyse the structural relationship between road construction projects, social performance and economic performance. The model specifically has one endogenous variables (road construction projects), and two exogenous variables (social and economic performance). The SEM are formative in nature as the measured variables make the latent variables (Hair Jr et al., 2017). Similarly, social performance is considered as a mediating variable between road construction projects and economic performance. This research work selected Ngorongoro conservation area as the case study, with the reason that is one of the area which is reserved, has enormous wildlife animals, heavy vegetation and unique land structure.

This research work obtained the required respondents using the purposive sampling due to the nature of the study the researcher was targeting only respondents at Ngorongoro who have adequate knowledge concerning infrastructure development and its social-economic performance. For the structural analysis, the researchers adopted the questionnaires as the main data collection instrument and the same were distributed to 100 respondents from whom 92 responded. We made frequent calls and reminders in order to increase the response rate (Westenberg et al., 2020).
With the help of Statistical Package for Social Sciences (SPSS) v.25, we conducted a preliminary data analysis and performing the descriptive statistics, correlation analysis, together with other major analyses of the major constructs. The SMART PLS 3.0 software was used to analyze the structural relationship between variables in this study. SMART PLS 3.0 is the most appropriate and an advanced software for assessing the structural relationship of variables as it has been recommended by Ramayah et al. (2018). This technique was deemed necessary as the study aimed at assessing the direct and indirect effect between road construction, social performance and economic performance as proposed by Hair Jr et al. (2017).

The multi-item scales of the construct were based on previous literatures in order to test the identified hypotheses. All the items of three extract were measured by the means of a 5-point Likert scale manner of “1”- strongly disagree to “5”- strongly agree. All items that are presented through questionnaire in this study were those taken from other studies and that have been tested its reliability and validity.

In order to determine the reliability and validity of scales that were used in this study, one common method was used. Determining the Cronbach alpha for internal consistency. Ideally, the internal consistency is demonstrated when the reliability of each measure in a scale is above 0.60 (Kline, 2015). The Cronbach’s (α) and composite reliability values are explained over the threshold value of 0.60, so it is recommended by Lai (2021). Therefore, on the aspect of reliability, all items have proved to have adequate internal consistency. The study determines, the convergent validity using the threshold of 0.50 of AVE. In this study, AVE measures are above the cut-off of 0.50 for all constructs (Ab Hamid et al., 2017).

4. Findings and discussions

Based on the measurement model, the structural relationship between road construction and performance has been indicated in figure 2. The final model indicates that both the t-value and p-value for hypothesis 1, 2, 3, and 4 are greater than 1.96 and less than 0.05 (5%). For example, the model indicates that road construction has a significant relationship with social performance ($\beta=0.426$, $p<0.001$) hence it supports H1. Similarly, road construction had strong relationship with economic performance ($\beta=0.922$, $p<0.001$) hence it supports H2. In addition, the H3 was assessing the relationship between social performance and economic performance ($\beta=0.072$, $p<0.05$) hence supported the H3. Consistently, the study also examined the mediating relationship between road construction and economic performance through social performance ($\beta=0.032p<0.05$), hence it supports H4. This structural equation modelling results were also compared with regression results and there was found communality of the results between the two methods. The findings are supported with several spate of literatures conducted in similar stream (Baporikar, 2016; Khanani et al., 2021).
Figure 2. SEM results

Table 2. Factor loading and t-statistics of each item

<table>
<thead>
<tr>
<th>Factor loading</th>
<th>Standard Deviation</th>
<th>T Statistics</th>
<th>P Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>V2.1 &lt; Road projects</td>
<td>0.939</td>
<td>0.025</td>
<td>37.404</td>
</tr>
<tr>
<td>V2.2 &lt; Road projects</td>
<td>0.944</td>
<td>0.026</td>
<td>36.28</td>
</tr>
<tr>
<td>V2.3 &lt; Road projects</td>
<td>0.86</td>
<td>0.06</td>
<td>14.364</td>
</tr>
<tr>
<td>V2.4 &lt; Road projects</td>
<td>0.834</td>
<td>0.068</td>
<td>12.262</td>
</tr>
<tr>
<td>V2.5 &lt; Road projects</td>
<td>0.808</td>
<td>0.089</td>
<td>9.1</td>
</tr>
<tr>
<td>V4.1 &lt; Economic performance</td>
<td>0.842</td>
<td>0.065</td>
<td>12.868</td>
</tr>
<tr>
<td>V4.2 &lt; Economic performance</td>
<td>0.834</td>
<td>0.068</td>
<td>12.357</td>
</tr>
</tbody>
</table>

Table 1. Direct and indirect effect

<table>
<thead>
<tr>
<th>Estimate (β)</th>
<th>Standard Deviation</th>
<th>T Statistics</th>
<th>P Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Road projects -&gt; Social performance</td>
<td>0.426</td>
<td>0.082</td>
<td>5.197</td>
</tr>
<tr>
<td>H2: Road projects -&gt; Economic performance</td>
<td>0.922</td>
<td>0.023</td>
<td>40.434</td>
</tr>
<tr>
<td>H3: Social performance -&gt; Economic performance</td>
<td>0.074</td>
<td>0.031</td>
<td>2.426</td>
</tr>
<tr>
<td>Road projects -&gt; Social performance -&gt; Economic performance</td>
<td>0.032</td>
<td>0.016</td>
<td>2.038</td>
</tr>
</tbody>
</table>
Table 3. Correlation analysis

<table>
<thead>
<tr>
<th></th>
<th>Road projects</th>
<th>Social performance</th>
<th>Economic performance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Road projects</strong></td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.429**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>92</td>
<td>92</td>
<td>92</td>
</tr>
<tr>
<td><strong>Social performance</strong></td>
<td>Pearson Correlation</td>
<td>.429**</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>92</td>
<td>92</td>
<td>92</td>
</tr>
<tr>
<td><strong>Economic performance</strong></td>
<td>Pearson Correlation</td>
<td>.647**</td>
<td>.472**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>92</td>
<td>92</td>
<td>92</td>
</tr>
</tbody>
</table>

*Correlation is significant at the 0.01 level (2-tailed).

Table 1. Summary of hypothesis testing

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Relationship</th>
<th>Estimate (β)</th>
<th>P Values</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Road projects -&gt; Social performance</td>
<td>0.426</td>
<td>0.000</td>
<td>Accepted</td>
</tr>
<tr>
<td>H2</td>
<td>Road projects -&gt; Economic performance</td>
<td>0.922</td>
<td>0.000</td>
<td>Accepted</td>
</tr>
<tr>
<td>H3</td>
<td>Social performance -&gt; Economic performance</td>
<td>0.074</td>
<td>0.016</td>
<td>Accepted</td>
</tr>
<tr>
<td>H4</td>
<td>Road projects -&gt; Social performance -&gt; Economic performance</td>
<td>0.032</td>
<td>0.042</td>
<td>Accepted</td>
</tr>
</tbody>
</table>
5. Conclusions and Recommendations

It is worth to conclude that road construction projects have significant influence on both social and economic performance because the study reveals that when the government invests on road construction infrastructure, it improves the social performance and at the same time it improves the economic performance. Similarly, this study concludes that there is a positive relationship between social performance and economic performance as far as road construction projects are concerned. Finally, the study shows that social performance can also mediate the relationships between road construction and economic performance. Thus, when the road infrastructure exists, it enhances the social improvement in the community through strengthening the business opportunities, enlarging the market for the community which attracts more business investors to invest on different angles that equally improve the economic performance of the community.

This study makes the following recommendations; First, Ngorongoro Conservation Area authority and Tanzania National Parks (TANAPA) in general that they should strive to invest on road construction across the national parks and game reserves that are surrounded by local community because these road infrastructures support the community socially and economically. Second, the government should work closely with these national park authorities to ensure the districts and villages are connected with road infrastructure and eliminate the notion that road infrastructure across these game reserves will affect the biodiversity of animals and affect tourism. This study has provided empirical evidence which is being supported by structural relationships that road constructions projects will lead to better social performance and economic performance to the community, region and the country at large.

References


