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Influence of Socio-Economic Factors on Performance of Road Construction Projects: A Case of Berbera Corridor Road Section between Hargeisa and Berbera

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ABSTRACT

Road projects play a very significant role in post conflict rehabilitation and consolidation of peace and economic stability, growth and development of communities. The Berbera corridor is one of the multimillion projects relevant and important to research. It promotes connectivity of areas internally and across the borders. The study aimed to assess the economic performance of road construction projects on the Berbera Corridor road section between Hargeisa and Berbera, taking into account the socio-economic factors that influenced the performance of these projects. The objectives of the study were; to find out the socio-economic impact of the Berbera-Hargeisa; the socio economic factors that influenced the performance of the Berbera road development project; to assess the best practices used by the Berbera road development contractors between Hargeisa and Berbera. The key questions answered are the socioeconomic impacts of road development in the Berbera Corridor road section between Hargeisa and Berbera the socio-economic factors driving performance of road construction projects in the region as well as best practices used on road development of the Berbera Corridor road section between Hargeisa and Berbera. The study focused on communities traversed by Berbera Corridor, a road section of Berbera and Hargeisa cities. Responses were elicited from the project team, the Ministry of Public Works and Road Construction agency of Somaliland and Dubai Port World staff for their oversight and funding of the road project. The theories and models that informed the study were; the best value procurement model and Project logic. Findings revealed the effectiveness, efficiency and impact created by the Berbera road section between the port and the capital city. Social influence on health and environmental safety and accidents increased in the short run. However, the economic measures and controls used led to completion of the road and reduced the travel time. Accidents reduced though after the road was completed despite people not following the user precautions. Significantly, factors such as price, quality of staff, cultural issues, economic benefits and value anticipated by communities and implementers enabled performance of projects in regard to finish time, reduced accidents and business activities.

Keywords: Best value, Quality control, Internal controls, Environmental safety, and Project outcomes.

INTRODUCTION:

Resilient roads play a vital role of connecting regions and markets for trade and service delivery. No country
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can build a sustainable economy without resilient road infrastructure and strong transport network connecting all business centers and people. However, designing

sustainable roads in a developing post-conflict country can be met with operational challenges (Yahia, October, 2018- March, 2019). Road transport is the principal mode of transportation of goods and people in Somaliland. Somaliland's network is estimated to consist of 770 km of paved roads, 1,225 km of unpaved roads, and approximately 8000 km are unpaved truck roads. Majority of these roads are considered to be in a state of disrepair owing to lack of maintenance. Since inter-regional air, rail, and sea transport is virtually non-existent, these roads-bad as they are they are vital. More than 99% of goods and people transport in region depends road transport system. Rural and feeder road networks are in the worst condition. The paved road that link main towns like Dila, Hargeisa, Berbera, Buroa, Ainabo, and Las Anod is the only inter-urban road in Somaliland (SRA Hussein 2012; Islam *et al.*, 2023; and Must, 2020). Road construction projects are expected to be on high demand in the coming years. Thus, to enable Somaliland's construction industry to realize its substantial contribution to economic growth and development processes of the country. It is essential to adequately understand the construction industry related features and processes, and how activities are carried out and managed (National Development Plan (2012-2016)).

The Berbera corridor road project

The road section between Hargeisa and Berbera is significant in the region, and its management and construction are crucial for the economic development of the area. The project included the sections from Berbera to Hargeisa, through Kalabaydh, to Wajaale at the Ethiopia-Somaliland border. According to Construct Africa, the Berbera-Ethiopia highway works began before May 2021, (Construction Africa News, 2019). Works on the 250km dual carriageway from Somaliland to Ethiopia, was funded by the UAE and the Abu Dhabi Fund for Development Construction Company. The Berbera corridor project poised to boost trade links between Somaliland and Ethiopia. The project once completion assures a trade link through Ethiopia's border town of Togowajaale and Berbera Port in Somaliland, (Further Africa, 2020).

While most studies do not provide specific information on the best practices for road development in Universe PG | www.universepg.com

the Horn of Africa region. However, many studies made recommendations for policymakers and stakeholders involved in road development projects in the region (Yahia, October 2018-March 2019). The feasibility study and detailed engineering design of the paving of the road section between Harar and Jijiga, were carried out in 2000 with financing from development partners (Trademark Africa, 2020). The safety management procedures of Hargeisa- Berbera highway were sensitive to research area, especially for road design. Overall, feasibility study gave comprehensive understanding of the socioeconomic impacts of road development in the region and contribution to development of sustainable road designs that meet the standards for people, goods, and services on road transport (Yahia, October 2018-March, 2019). These are done through tools likes STEPLE among others critical at the project impact assessment stage of the design. Existing data suggests according to (Trademark Africa, 2021); (Africa Business News, 2020) and (Garowe Online, 2020) that; social factors that may have influenced the Berbera Corridor road construction include political, economic, and social stability, poor land transport interconnectedness in the Horn of Africa, and the need to improve infrastructure in the region, (Further Africa, 2020). The Berbera - Togowajale road has been discussed as a major contributor to the region's political, economic, and social stability. It is a timely remedy to poor land transport interconnectedness in the Horn of Africa and greater Africa. The construction of the road connecting Berbera with Ethiopia was necessary since the port handles a much larger volume of Ethiopian trade.

Additionally, the improvement of Berbera-Wajale corridor road sections boosted economic and trade relations between Somaliland and Ethiopia as well as strengthen security in the region. Best practices for procurement processes ensure successful project performance. Suggestions by numerous authors underpin that several best practices for procurement processes to ensure successful project performance in road construction projects. Adoption of best practices and strategies to ensure efficiency and quality delivery of service, including competitive and restricted tendering (Julius Dagba & Gershon Dagba, March 11, 2019).

Another study identified procurement factors among the five main factors influencing the performance of road construction projects. Best-value procurement methods have also been recommended for highway construction projects to assure project quality and enhance performance (Gransberg, June 2003). Additionally, a holistic and systemic approach to procurement processes is necessary to guarantee success at all phases of construction projects. So, careful consideration of all factors is required when selecting the most appropriate procurement approach (Owiti Jacob Omondi, et al, December. 2017). A study by Agung and others recommends that promoting efficient and effective road infrastructure procurement processes by identifying the factors drives the success of the procurement of road infrastructure projects (A Agung *et al.*, 2020). Thus, best practices for procurement processes to ensure successful project performance include; adopting best practices and strategies, using competitive and restricted tendering, using best-value procurement methods, taking a holistic and systemic approach to procurement processes, and identifying the factors that drive the successful road infrastructure projects. However, the gaps in the finish time, finish quality and durability of the road section show that there are critical social and economic issues that were overlooked which this research ascertained.

The best value procurement model. The proponents emphasise that it enhances performance of construction projects than tradition procurement methods. Best-value procurement method leads to high-quality projects by considering factors other than just price when selecting vendors or contractors for a project (Gransberg, Research Gate, 2003). Best-value procurement promises innovative solutions, high-quality results at a fixed price, and stable specifications. Additionally, more construction owners are implementing best-value procurement to assure project quality and enhance performance. Best-value procurement also involves researching vendors or contractors before a detailed project plan is made and looking at past performance to minimize risk (Arnoud Storteboom, 2017). Furthermore, best-value procurement promotes transparency and accountability in the procurement process by considering all established quality criteria when awarding a contract (Law Insider

Inc., 2023). The National Cooperative Highway Research Program (NCHRP) Report 561 found that best-value procurement methods resulted in cost or time improvements or both (National Academies of Sciences, Engineering, and Medicine, 2006). Researchers suggest that, best-value procurement method leads to high-quality projects by considering factors other than just price, promoting transparency and accountability, minimizing risk, and improving cost or time efficiency.

METHODOLOGY:

The Hargeisa-Berbera highway is a significant road in the region, and its management and construction are crucial for the economic development of the area the corridor has been designated as high priority by the government in Ethiopia as an alternative to the Djibouti Corridor (IGAD, 2020). Work has begun on the construction of a 250km dual carriageway between the Somaliland Port City of Berbera and the Ethiopian border, to be funded by the Abu Dhabi Fund for Development (GCR, 2019). The Unit of analysis was the project activities on the section of the road between Berbera and Hargeisa. Respondents for this study are the people who members of communities served by the road construction project. These include the users and the people living in the communities traversed by the road between Berbera and Hargeisa. The traders and drivers of commercial vehicles including buses and haulage trucks-the main respondents. Also the road contractors' team and the Ministry of Works and Transportation project focal office at the ministry formed the key informants.

The local districts of Hargeisa and Berbera were involved in the study participants. The literature reviewed the project management literature, secondary information on the and strategy of the road project by the organizations involved including Trademark Africa, Dubai Port World, Government of Somaliland and Ethiopia Updated report, working papers and policy documents. A theoretical review of the procurement theory of project-The best value procurement model and Project logic were used. The methodology applied was the mixed method including both qualitative survey methods and quantitative techniques; these were applied to both data collection and analysis.

Sample size and Sample calculation

The study targeted population was over 3000 households traversed by the Berbera Hargeisa road section. These are basically agro-pastoral communities with small business done in the small towns. An accessible population was determined. The accessible population including leaders of organizations made 341. Sample selection from this group was calculated using Slovenes formula. The study also targeted leaders in the communities, business men, and drivers of cargo trucks. From these groups the sample of participants was selected from 341 accessible populations. These included both project staff and staff of key organizations responsible for the project such as ministry of Public works engineers, Somaliland road authority, project focal persons, implementing contractor and DP World which represents the UAE. Using Krejcie and Morgan (1970) table Sample determination the sample population was selected. A population of 3000 HH are estimated, based on the proportion of adults in communities of the target districts. According to Amin, (2005:257) if the study population is up $N=3000$ and beyond the population is irrelevant and 300 is an adequate target population from which a sample can be selected. However, using Slovenes' formula, a sample was determined from the target population.

The sample size was determined using Slovene's formula of sample size determination ($n = N / (1 + Ne^2)$). Based on 95% confidence level and margin of error 0.5. $n = N / (1 + N (0.05)^2)$

The Slovene formula is a method used to determine the sample size for a given population when the desired level of precision and confidence level are known. The formula is:

$$n = N / (1 + N (e^2/z^2))$$

Assuming a desired level of precision of 0.05 (i.e., 5%) and a confidence level of 1.96 (corresponding to a 95% confidence level), the Slovene formula was used to determine the sample from accessible population of 341 as follows:

$$n = 341 / (1 + 341(0.05^2/1.96^2))$$
$$n = 184.21$$

Rounding up to the nearest whole number, the sample size required for a population of 341 with a desired level of precision of 5% the sample studied was 185.

These categorized in two groups namely; community beneficiaries and administrative level of the project. Community members were the respondents of the study. 184 participants were accessible including community members like students using the road, business people, drivers, business leaders, and other heads of households in the community selected between Berbera and Hargeisa. At management level, 15 key informants were selected. These included; district administration officers (2) Community leaders (4), ministry staff (2), and 5 construction engineers and DP World staff (2). They confirmed perceptions and opinions on design, implementation, and sustainability of project, opportunities, concerns and achievement of objectives of the project. Respondents were randomly selected for the two case studies. The two cases were selected to discern the perceived variations in economic impact and social factors' implications on the project performance on one hand and socio and economic factors of the project on the other. The project management dilemma herein addressed warranted evaluation of situations in urban and rural settings for comparative value. This was confirmed by Cooper & Schindler who said, understanding the scope through evaluation aids making useful judgments. Even in crude estimates that reflect an orderly way like estimate of outcomes in uncertain conditions (Cooper & Schindler, 2006).

Quantitative research techniques were applied during gathering and analysis of data to establish quantitative relationships among variables as Creswell and Fadeel assert, (Creswell, 2004; Fadeel, 2008) emphasize. Descriptive statistics of this study, derived or validated facts and figures of multifactorial relevance. Like Barbara Hazard, (1997) in (Ssimbwa, 2023) argued, these were useful to measurement of characteristics of differing values, significance or intervals. Qualitative methods of research were applied to elicit opinions and views manifested in qualitative statements of respondents. The survey included questions about the social and economic considerations made during the design, socioeconomic impacts of road development, the performance of road construction projects, and best practices for road development. The qualitative data will be collected through in-depth interviews with a subset of survey participants. The interviews provided

a more detailed understanding of the experiences of stakeholders with road development in the region. Triangulation of both results and data collection was done to ensure establishment of any causal effects cross verification of sources and testing findings consistency linked qualitative and quantitative data and instruments. Both data primary and secondary were collected including the feasibility assessments report, National development plan, Policy documents and project concept, giving a fuller picture and validation of results. Primary data collection used survey methods that is to say; in-depth key informant interviews for project management team, and government leaders, questionnaires and focus group discussions. Focus Group Discussions (FGDs) with community groups composed on gendered selection criteria were done for both categories selected to participate. Through FGDs views, experiences and opinions, practices, values and perceptions of communities and project administrators shall be elicited in selected cases. The researcher's strategy included selection of leaders to be interviewed, composition of focused discussion groups of members in communities. Focus groups were made of both female and male participants as indicated in the table above.

Procedural Methodology

Reliability and Validity

During design, the designed tools were consistent with relevance and clarity of questions, clear enough to avoid confusion in response. Adjustments were made following expert advices and judgement at pretesting. Using pilot study, the tools were tested for reliability using a set of ten items of Likert scale to determine Cronbach's coefficient alpha reliability of questionnaires. Relevance of the tool analysis gave Cronbach's alpha $\alpha=0.624$ and exploratory responsiveness of $\alpha=0.838$ which are all acceptable in terms of internal consistency of results.

Validity was tested by CVI method. The scale rating of content by experts was used to compute the content validity index (CVI). Using the formula $CVI=S-CVI/UA$. Based on scale validity index (S-CVI) divided by universal agreement thus, the researcher determined that; based on rating of the tools using the S-CVI technique during pre-testing by 4 experts' judgement. 3 out of 4 experts universally agreed to

valid tool, giving an S-CVI= .75. A mean I-CVI of >0.917 is acceptable by the standard of not less than 0.8.

Statistical analysis

The qualitative data analysis methods used were content analysis, narrative analysis, case study analysis, grounded analysis and interpretive phenomenological analysis. By using content analysis, the researcher coded responses into excel and SPSS, the process was iterative; generating codes and gaining consensus on codes and their meaning. Evidence to support these codes was linked, creating relationships that were then merged into emerging sub-themes or grouped under pre-defined themes in relation to objectives and respective research questions to portray data on respective variables under study. Quantitative data processing and analysis was done in Excel statistical software, after extraction from tools. Text data captured on some parts of the questionnaire were coded numerically according to emerging topics before analysis was undertaken. Means, frequencies, and percentages were used to summarize the data. Analysis was disaggregated by age, level of education, regions from which respondents resided. Tabular representation was used to appropriately compare values of some performance quality and socio-economic indicators time, finish quality, cost and involvement in the mapping and assessment during implementation of the project

RESULTS:

The study critical question was which social and economic factors influenced the Berbera-Hargeisa road construction the project performance. The findings point out the important criteria for measuring the performance of road projects and the factors that influence road construction project of Berbera Road corridor. The best practices were found out as used by the implementing team and the process of design and working on the project to ensure that the aims of its founders and the beneficiaries are achieved.

Relationship between socio-economic factors and performance of road construction of Berbera road corridor

The simple linear regression was done on economic measures and concerns raised by the community

beneficiaries from the project among others. It was determined that Multiple R of 0.189452124 was obtained by the calculator. The R square of 0.035892107 was calculated and this signifies variation of 3.58%. However, the significance of economic measures on community concerns was insignificant considering the 0.082464047 F values of this regression. So the social factors and economic factors were not significantly causing concerns of the community other than other factors like workmanship, environment factors and geographical inconsistencies. This is so because the values are greater than 0.05. The relationship would have been rejected if the p-value was less than 0.05.

Relationship between road construction speed and economic measures taken

According to the regression statistics, it is observed that there is a strong linear relationship between the road construction speed of Berbera and Hargeisa and socio-economic factors. The multiple R value of 0.654237 of project speed and economic measures that were taken by the project team. The variance by the coefficient value showed the variance of up to 43% due to economic factors considered among others availability of the resources, planning and evaluation of the extent to which controls were implemented by the team. The standard error of 0.588057 was observed and this was precise enough not to cause huge biases in the variables i.e. the IV and DV. The significance F values obtained were tested to prove the hypotheses, that is, the null hypothesis that there was not a linear relationship between speed and time of completion of project with economic factors including economic standards that were set by the implementing team. The F value of 1.13E-10 signifies a strong positive relationship between Berbera-Hargeisa road construction speed and economic measures that were set up by the stakeholders during design and implementation of the project. Therefore, the alternative hypothesis was rejected because of the P-values higher than 0.05.

Berbera-Hargeisa road construction performance indicator

Performance measurement is integral to any project and provides a basis for continuous improvement in performance. The highly competitive nature of the construction industry and profound technological Universe PG | www.universepg.com

changes forced construction executives to continuously improve the performance of their projects. It is commonly accepted that project success is measured by the performance of a project in terms of cost, time and quality. The progressive cost-benefit analysis by participants indicated that; as per the statistics showed that, 23.53% of respondent indicated that this new Berbera corridor has reduced the cost of material, such as repair, fuel, etc., while 22.35% of respondent indicated drive time reduction. Beneficiary satisfaction was rated at 23.53%, but a number of concerns were noted including safety, quality and health and were pointed out by number of respondents. But few concerns from the total quality of the project were noted during the conducted study. Health wise, however, it was noted that only 7.06% were worried of health concerns of the project. So significant precautions were taken in that regard.

Economic considerations that influenced the construction of the Berbera Road

According to the field findings, construction-production demands were high by the road construction especially, the rise was because of increased economic activities, there are many economic factors that affect the implementation of construction projects. Organizations everywhere are being compelled to keep a close eye on projects and make adjustments in their performance as a result of economic factors. Historically, the most common criteria for measuring construction performance have been economic factors such as profit, income, and return on investment. Unfortunately, the construction sector particularly road maintenance in Somaliland is the most neglected and chaotic. However, roads are vital revenue sources in form of road tax (Road tax, license tax, movement of goods tax, etc.) A substantial amount of research has been conducted to investigate the factors that influence the performance of construction projects.. Education is a crucial factor for setting up roads in Somaliland, roads are known to stimulate economic growth, and development, and they lead to increased employment and economic growth. Actually most of the team that was involved with the road works indicated having a degree or master level education which increased successful project implementations. Construction industrialists must be economically competitive in the

market due to advancements in technology and techniques applied to roads construction that reduce time and cost of haulage of materials. The findings show that economic factors were crucial to achieving adequate performance of construction work in beneficiary area from the Berbera port to Hargeisa, and the four main districts, and small villages along the way to Hargeisa., These factors are identified and summarized in the statistics included; Somaliland market access, regional development, productivity and local market access were the most vital economic factors that influence road construction. In this case Berbera corridor road construction performance was influenced economic gains perceived by users. These were rated as 23.53%, 11.76% and 17.65% respectively.

Social factors that influenced the road construction of the Berbera-Hargeisa section of the Berbera corridor

The construction industry is critical to society's advancement and achievement of its goals. Working in the construction industry is critical to achieving and expanding public goals. Social performance refers to the extent to which construction projects have met the needs of current and future generations. Because of this, it is critical to include participants/beneficiaries who represent those who will be affected by the project on a direct or indirect basis, and who have the power to influence it positively or negatively. The social aspects that inspired communities to support or indifference to the road construction project included; Accidents, shopping tourism and recreation, land Value, transportation and migration. Prior to the Berbera corridor road project, accidents were common.

Uncontrollably, occurring on the stretch between Berbera and Hargeisa immense damage and injuries were caused. Accidents are common and occur at a higher rate in the construction industry than in any other industry 23% of respondent indicated that maintenance/ construction roads of standard quality are major ways that reduced accident during data collection of this study

The growing sector of tourism and recreation is put forward as crucial to modern Somaliland. Tourism is an important part of modern society. It has the

potential to revitalize the physical environment by assisting in the development of infrastructure and the provision of recreational facilities for resident and reduced traffic also noted. The community realization that improved transportation is fundamentally crucial to connecting places drove commitment of the stakeholders to a better road project output. Better transportation system also improved logistical efficiency, reduced material costs to and from construction sites, and, most importantly, aid in project time, schedule, and quality management. A good transportation system shortens project time, improves project schedules, and improves project quality. A good road transportation system boosts project efficiency while closing the gap between expectation and execution. This allows materials to be transported just-in-time as needed, keeping the site clear of obstacles and, as a result, creating a much safer environment for the workers and for the surrounding communities hence empathy. Migration trends to the Somali territories have enabled many projects including the Berbera corridor to get a cheap supply of cheap skilled and semi-skilled labour. These range from migrant workers from neighboring countries and migrants settled in Somaliland. In the communities traversed by the Berbera-Hargeisa road section the expectation that the land value rises when roads construction is successful won support of the community members to the road. Not only in the small towns but also the value of land rises in all Somaliland capitals, and surrounding areas, around 58% individual survey indicated that the value of land rise whenever road project started in that area generally and according to the Somaliland culture. The cost of construction is directly related to the value of the land attracts various types of building and infrastructure projects as per the FGDs and KIIs that confirmed 58% and 60% respectively.

CONCLUSION AND RECOMMENDATIONS:

While there is always a significant relationship between socio-economic factor and performance of projects in terms of cost, quality of services, and satisfaction of the beneficiaries with the roads and bridges, it is important for the project teams to involve as many beneficiaries as possible. It was observed that 65 % of the respondents to the survey did not know

their role in the road construction. It was eminent from the project team that they adhered the best procurement standards. Most internal controls included planned design, monitoring and evaluation of activities of the project periodically. While most of the respondent did not know precisely when the project had lasted but they were aware of it before it started and they were sensitive to community concerns and they raised any concerns related to quality, accidents or adverse effects on or of the project to the project team for action or they had mechanisms of reporting to the responsible government officers. A strong team was involved technically including engineers at the district level as well as ministerial team.

However, there was high level indifference to what was going on since the local officers were not so practically involved. This kind of practice affects the projects negatively especially when it comes to the accountability to the beneficiaries when substandard work or products are delivered. The set-up of the road was inspired by a range of social factor and economic factors. The social factors that were important to the Berbera road development included reduction of accidents, cope with the increased traffic, enhance transportation of goods, people and services, protect the Health of people, Safety of places, and Migration of people across regions among others. In the end of the project better roads increased the land value and improved Community Interaction and increased accessibility and connectivity of places between Ethiopia and Somaliland.

In future projects, government officers and local communities are well sensitized on their role in performance of projects in terms of quality monitoring by the project authorities. The ministry and local government responsibilities should be clearly communicated to all stakeholders by the ministry responsible for public services and also adhere to the constitution so that collision is avoided when it comes to country programs and project which cause dissatisfaction among. Engagement of the communities as stakeholders at different levels of projects and society stratification should be carried out at design stage through the life cycle of the project is recommended. This is so because of the benefits the

Berbera corridor road construction success attributed to best practices like multiple stakeholder engagement.

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CONFLICTS OF INTEREST:

The author (s) declares that there are no potential conflicts of interest concerning the research, authorship and or publication of this article.

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