Effect of Human Capacity on Sustainable Community Development in KeRRA Road Projects in Uasin Gishu Region, Kenya

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Abstract:

Purpose: *This study examined the effect of human capacity on sustainable community development in Kenya Rural Roads Authority (KeRRA) road projects in Uasin Gishu County, Kenya. The study sought to establish whether human capacity, measured through staff competencies, technical expertise, training, leadership, and knowledge sharing, significantly influences sustainable community development.*

Material/methods: *The study was anchored on the Human Capital Theory and employed an explanatory research design. The target population comprised 1,009 stakeholders involved in KeRRA road projects in Uasin Gishu County, including Regional Engineers, Constituency Road Officers, Constituency Road Committee members, and prequalified contractors. A stratified random sampling technique was used to obtain a sample of 289 respondents. Primary data were collected using structured questionnaires, of which 250 valid responses were analyzed, representing an effective response rate of 86.51%. Data were analyzed using descriptive statistics, Pearson correlation analysis, and hierarchical multiple regression analysis with project size and project duration treated as control variables.*

Findings: *The findings revealed that human capacity had a strong positive and statistically significant relationship with sustainable community development ($r = .571$, $p < .001$). Hierarchical regression analysis further established that human capacity significantly and positively influenced sustainable community development ($\beta = .582$, $p < .001$), while the explanatory power of the model increased from 11.8% to 45.6% after introducing human capacity into the regression model. Project size ($\beta = .288$, $p < .001$) and project duration ($\beta = .236$, $p < .001$) also had significant positive effects on sustainable community development.*

Conclusion: *The study concluded that human capacity is a critical determinant of sustainable community development in KeRRA road projects. Investments in staff training, technical competencies, leadership development, and knowledge management significantly enhance the economic, social, and environmental sustainability outcomes of road infrastructure projects.*

Value: *The study contributes to the Human Capital Theory by demonstrating the importance of investing in human resources to improve sustainable community development in public infrastructure projects. The findings provide practical insights for policymakers, KeRRA management, and project practitioners in strengthening capacity-building initiatives to maximize the long-term sustainability of road projects in Kenya.*

Keywords: *Human Capacity, Sustainable Community Development, Kenya Rural Roads Authority (KeRRA), Human Capital Theory, Road Infrastructure Projects, Uasin Gishu County, Kenya*

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1. Introduction

Sustainable community development has become a key goal of global development policy, especially after the United Nations Sustainable Development Goals (SDGs) were adopted, and SDG 11 focuses on building inclusive, safe, resilient and sustainable cities and communities (United Nations, 2022). Sustainable community development

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involves multiple aspects of improving economic well-being, social inclusion, environmental sustainability, and access to key public services that can help to improve the quality of life of citizens (UNDP, 2022; World Bank, 2022). The importance of infrastructure for sustainable community development has been acknowledged, particularly road transport infrastructure, which plays a vital role in providing access to markets, healthcare, education, employment opportunities and other social amenities (World Bank, 2023). However, institutional shortcomings, lack of stakeholder engagement and poor mechanisms for project implementation have meant there are still inequalities in development outcomes despite significant investments in infrastructure worldwide (OECD, 2021).

In the world, rapid urbanization has accentuated the need for a reliable transport infrastructure. About 56% of the world's population is now living in urban areas, and the United Nations (2022) predicts that this proportion will rise to 68% by 2050. But not commensurate development of urbanization has occurred in the field of infrastructure and public services. UN-Habitat (2023) estimates that over 1.12 billion people in the world still reside in informal settlements, where access to clean water, sanitation, and health care services is limited, and transportation infrastructure is poorly developed. Such deficiencies reduce the economic productivity, social inclusion and overall community welfare (World Bank, 2022). Moreover, only 19% of cities around the world have been found to have strong stakeholder involvement in urban planning processes, which means that infrastructure projects are not responsive to community needs (World Resources Institute, 2022). The above observations indicate that sustainable community development that is reliant on sound physical infrastructure alone is unlikely unless complemented by effective governance mechanisms and meaningful levels of stakeholder participation.

Road infrastructure is one of the most important investments for the socioeconomic development of the country. Rural roads contribute to lower transportation costs, increased market accessibility, increased mobility and economic integration of regions (Calderón & Servén, 2014; World Bank, 2023). Research has consistently shown that the better the road system, the higher the Human Development Index (HDI) score, reflecting the impact of transport systems on improving the living standard (UNDP, 2022). On the other hand, many developing nations still have substandard roads, with almost half of the roads being either unpaved or poorly maintained to hinder service delivery and economic participation (African Development Bank, 2022; World Bank, 2023). As a result, sustainable community development remains out of reach with the rising of public investment in infrastructure.

The developed countries' experiences showed that a robust institutional framework is key to achieving the maximum benefits from infrastructure. For example, the United States has relatively high levels of community development, with long-term investments in transport systems, alongside institutionalized stakeholder participation processes to promote inclusive transport planning and service delivery (OECD, 2021; World Resources Institute, 2022). Likewise, China's outstanding poverty alleviation efforts have been blamed mainly on investments in transport networks facilitating greater linkages between rural and urban areas, and hence the provision of opportunities for education, healthcare and markets (World Bank, 2022). But the lack of public engagement in infrastructure planning and concerns about environmental sustainability suggest a need for long-term growth and development to take a more balanced approach to infrastructure growth and institutional accountability and public participation (IEA, 2023).

However, the lack of adequate infrastructure, high level of urbanization, poor governance systems and budget restraints remain paralyzing factors for sustainable community development in Sub-Saharan Africa (African Development Bank, 2022). An estimated 60% of urban population reside in informal settlements and only an estimated 43% of the population have access to all-season roads (UN-Habitat, 2023; African Development Bank, 2022). Poor transport connections are a significant driver of transportation costs, hinder access to markets and social services, and negatively impact economic growth and poverty alleviation (World Bank, 2023). Inadequate road infrastructure and weak institutional coordination are the main drivers of poor community development outcomes in countries like Nigeria, while South Africa, with relatively stronger infrastructure systems, still bears the burden of inequitable development outcomes, limiting equitable access to development opportunities (Statistics South Africa, 2023; OECD, 2021). The results also illustrate that investments in infrastructure do not have an impact if institutions and collaboration among stakeholders are lacking.

In East Africa, governments have agreed infrastructure expansion will be a catalyst for economic transformation. However, existing issues of poor road conditions, seasonal inaccessibility, poor maintenance and low stakeholder engagement remain to threaten the success of these investments (African Development Bank 2022; World Bank 2023). Transport infrastructure was identified as one of the strategic pillars in Kenya's Vision 2030 (Kenya National Bureau of Statistics, 2023) and significant investments have been channeled to enhance the national road network. These initiatives have not succeeded in guaranteeing adequate access to health care facilities, schools, agricultural markets and jobs for all the rural communities, as many roads remain in bad condition and there is inadequate implementation of road initiatives (UNDP, 2022). The challenges indicate that institutional capacity and stakeholder involvement are still key factors in the effectiveness of infrastructure.

The Uasin Gishu County is a typical case of the problems facing road infrastructure projects in Kenya. While the county is a significant commercial and agriculture hub, a significant share of the road network is rural, and access to these roads, especially during the wet season, is often poor, causing disruptions in transport, agricultural productivity, household incomes and access to essential services (Kenya National Bureau of Statistics, 2023; World Bank, 2023). Moreover, poor involvement of stakeholders and institutional capacity gaps have hampered the successful implementation of road infrastructure projects, leaving infrastructure that often does not meet the needs of the community (World Resources Institute, 2022). These obstacles remain in the way of achieving sustainable community development in the County.

While there are many studies that have identified the role of investment in infrastructure in socioeconomic development, fewer have addressed the role that institutional capacity plays alongside stakeholder engagement in producing sustainable development outcomes for communities, in the context of Kenyan Rural Roads Authority (KeRRA) projects. Previous research has mainly examined infrastructure investments from a macro perspective, while less attention has been given to the link between institutional capacity, stakeholder engagement and community development on the project implementation level (OECD, 2021; World Bank, 2023). This knowledge gap is therefore crucial in order to understand the role that institutional mechanisms and participatory approaches can play to increase the effectiveness of the road infrastructure projects to support sustainable community development in Uasin Gishu County, Kenya.

2. Theoretical Review

The Triple Bottom Line (TBL) Theory offers an explanation of this study, which focuses on balancing economic, social and environmental outcomes in order to develop sustainable communities. Human capacity is boosted by the skills of trained personnel, technical expertise, training and effective leadership which facilitate the planning, delivery and upkeep of KeRRA road projects. They equip HR with the skills to work more efficiently, be more accountable and boost project quality, which in turn results in improved infrastructure that drives economic growth, better social welfare because of improved accessibility and reduced environmental degradation. The theory thus bolsters the claim that capacity is essential for sustainable community development because it provides for the long-term economic, social and environmental impact of road projects.

3. Empirical Review

Emma E. W. Termeer in the context of The Netherlands and Kenya, published a study in 2022 that examined how social capital in the Kibera informal settlement in Nairobi contributes to sustainable development. This research was done in the context of the special issue of the Wageningen University's Sustainability journal on social capital and the informal settlement, and used a quantitative study on the dimensions of social capital (bonding, bridging and linking) and food security levels of households in Kibera. The authors structured their primary data using surveys and linked varying measures of food security and social capital using statistical models. The stronger the internal networks and external linkages of the communities, the better positioned they were in resource mobilization and adaptability to changing food access. The study highlighted that social capital, and specifically the relational capacity of the people, is a critical determinant of sustainable development in informal communities by enhancing access to critical resources and reducing the community's exposure to food insecurity vulnerability.

In 2025, DO Chiawo et al. published a mixed-methods research article that focused on the impacts of the rights-based public-private development partnership (PPDP) model for the sustainable community development of the counties of Nakuru and Narok, Kenya. The study employed a sequential mixed-methods approach, in which structured household surveys were supplemented by qualitative focus group discussions (FGDs), key informant interviews (KIIs), and discussions with members of the community, county government officials, and development actors. In the context of a five-part stratified purposive sampling model, the quantitative data collected from communities regarding basic service provision (water, health, education), employment, and income, as well as the qualitative data collected from the same communities regarding the extent to which members felt that they were included and empowered, were analyzed. In comparison to control communities, communities that were involved with the PPDP model demonstrated improvements in access to community rights-based services and favorable socio-economic conditions. Furthermore, qualitative data demonstrated that community participation, especially that of youth, women, and persons with disabilities, increased, indicating a new level of human capacity for local decision-making and collective action. The study concluded that a rights-based approach with an emphasis on capacity building should be considered for community development initiatives to ensure the development of profound and sustainable community development outcomes and local agency.

In 2024, Elisha Kiplangat, conducted a mixed-methods case study in Makina Village, Kibera, Nairobi, to determine the role of social capital (a component of human capacity) in the community's resilient fire disaster risk management. Using qualitative interviews

and household surveys, the study analyzed community relationships, collaborative efforts, and the practice of social-based emergency community responses. The surveys demonstrated that a majority of the households had an established support network and a strong sense of community to volunteer disaster response teams, community savings and religious groups, and civil organizational partnerships (as Red Cross and Nairobi County Government) on the capital role of preparedness and response. The study concluded that communities with strong internal networks and a resiliency expectation mutually supportive to one another were better at minimizing the effects of fire disasters and organizing recovery. The study highlighted that social capital as the capacity to act in collaboration underscores that strengthening the relational capacity of marginalized communities, enhances resiliency and sustainable community development.

University of Gothenburg, Ailiana Santosa et al., published a mixed-methods study protocol in 2020, that explores the potential of social capital in urban planning balanced with social equity and health-focused urban design. The protocol incorporates a methodology that quantitatively measures social trust, reciprocity and social networks as well as social participation through surveys, coupled with qualitative interviews and a spatial analysis of the social structure of the neighborhoods in question. While most of the protocol's methodology centers on the operationalization of the social constructs of trust and civic participation as the driving forces behind the decisions made with regards to public space design, service provision, and social inclusion, some of Santosa et al. reflections on social capital suggest that neighborhoods with a high social capital formation, may enhance social participation in the advocacy for and the design of public health facilities, inclusive social services, and comprehensive self-governance frameworks. The study highlights the need for social sustainability in urban planning, and community self-empowerment as a cornerstone of social sustainability in urban ecosystems.

In 2024, MDPI reports on research done in Hungary regarding community development practices and research on sustainability and social cohesion. The researchers from the Community and Civil Research Group of Eötvös University examined what community services and practices contribute to the local level inclusive and sustainable development. Using qualitative case study and participatory observation methods, community workers, policymakers, and residents from the Hungarian settlements were interviewed, and documents regarding national and EU-funded community programs were analyzed. The study established that when the ordinary citizen is empowered through participatory planning, joint decision-making, and collaborative actions, there is a marked improvement in the delivery of services and the social objectives. The research showed that when community development practices and activities focused on fostering civic skills and trust, and cooperation, the communities had the capacity to sustain local services, influence policy, and reduce social problems. The study emphasizes that the most important factor in sustainable community development is the social engagement and community action that constitutes human capacity.

In 2025, Maryam Tavousi, alongside Sarasadat Makain, produced a development-and-analysis focused literature piece on the development of community capacities and sustainability while also addressing the facets of urban tourism and local governance, with examples from a multitude of countries. This study, against the backdrop of the literature, was informed by a theoretical synthesis supported by a technique that allowed the author to juxtapose several cases that brought to the fore the heretofore positive effects of the development of the community's human capacity by means of education, leadership development, participatory planning, and local resource management of a community. This study focused on the development of the communities' human

capacities, stakeholder collaboration, and local frameworks of participatory decision-making in the communities, and synthesized the impacts of these frameworks on the communities' abilities in the areas of environmental, economic, and social development. Based on the findings, the empaneled author identified the human capacity development of the community as being pivotal to the success of the development of the community in a truly sustainable manner.

H1: Human capacity has significant effect on sustainable community development

4. Research Methodology

This study was conducted with an explanatory research design which allowed for the analysis of the causality between human capacity and sustainable community development in KeRRA road projects in the Uasin Gishu region of Kenya. The unit of observation was stakeholders in the KeRRA road projects and the unit of analysis was the individual KeRRA road projects. The respondents were stratified and the appropriate strata were determined and a stratified random sampling technique was used to select the study sample.

Sample Size and Data Collection

The study targeted 1,009 stakeholders that participate in the Kenya Rural Roads Authority (KeRRA) road projects in Uasin Gishu County, Kenya. The population included 1 Regional Engineer, 5 Constituency Road Officers, 25 Constituency Road Committee members and 978 prequalified contractors involved in the planning, implementation, supervision and execution of KeRRA road projects throughout the county. The study used stratified random sampling technique which involved dividing the road projects in KeRRA into five sub-counties of Uasin Gishu County; namely, Eldoret North, Eldoret South, Soy, Moiben, and Turbo in order to achieve adequate representation. Respondents were then randomly sampled from within each stratum. In this study, quantitative data was obtained from the field with a well-structured questionnaire which was developed on a five-point Likert scale. The number of stakeholders to be interviewed was determined based on Yamane's (1967) sample size determination formula, which resulted in a final sample size of 289 participants from a target population of 1,009. Before the study area, a pilot study was conducted on 29 respondents which is 10% of the study sample to test the reliability of the research instrument. The reliability analysis showed that the Cronbach alpha of each study construct was above the recommended value of 0.70, which means that the questionnaire was reliable enough to use for the main data collection and statistical analysis.

Measurement of Variables

This section will address the measurement of variables in which human capacity will be the independent variable of the study and sustainable community development is the dependent variable of the study. The study also had looked at control variables such as project duration and project size. Details definitions and measurements of all research variables are provided in Table 1.

Table 1: Measurement of Variables

TYPE OF THE VARIABLE	VARIABLE	INDICATORS OF THE VARIABLE
Sustainable Community Development	dependent	Economical sustainability Social Sustainability Environmental Sustainability
Human Capacity	Independent	Human Capacity
Firm age and project duration	Control variables	Size and age

Data Analysis and Model Specification

The study used a strictly quantitative data analysis technique which involved both inferential and descriptive statistical analysis using SPSS version 25. Both inferential and descriptive which includes mean, standard deviation, percentages minimum and maximum were all used to summarize demographics and study variables. Inferential statistics was also used in the study as both correlation and regression analysis was carried out. To test the proposed hypotheses the following regression equation was adopted:

Model1: Testing the effect of the control variables on sustainable community development of KeRRA project in Uasin Gishu County.

$$Y= \beta 0 +C$$

Model 2: Testing the effect of the independent variables on sustainable community development of KeRRA project in Uasin Gishu County.

$$Y= \beta 0 +C+ \beta 1 X1 + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

KeRRA: Kenya Rural Roads Authority.

5. Findings

The study targeted a sample of 289 respondents drawn from stakeholders involved in Kenya Rural Roads Authority (KeRRA) road projects within the Uasin Gishu region, Kenya. Out of the distributed questionnaires, 272 were returned. After screening for completeness and consistency, 250 questionnaires met the predetermined inclusion criteria and were retained for analysis, yielding an effective response rate of 86.51%. This response rate is considered adequate and acceptable for social science and project management research, where response rates above 70% are generally regarded as sufficient to minimize non-response bias and enhance the reliability of findings (Anseel et al., 2010). The achieved response rate provided sufficient data to examine the moderating effect of stakeholder engagement on the relationship between institutional capacity and sustainable community development in KeRRA road projects in the Uasin Gishu region, Kenya. Similar response rates have been reported in previous organizational and development studies, supporting the adequacy of the sample for statistical analysis and hypothesis testing (Van Waeyenberg et al., 2015; Roberts et al., 2020).

Table 2: Response Rate

Distributed Questionnaires	Received Questionnaire	Usable Questionnaires	Response Rate
289	272	250	86.51%

Source: Primary Data (2026)

Firm Characteristics

The descriptive statistics showed that the size of the project and the duration of the project were the project characteristics that respondents generally agreed were important. The mean score of the items of project size (FS) ranged from 3.45 to 3.50 with standard deviation of 0.811 to 0.851, representing moderate level of agreement and consistency in responding. The mean of the overall project size was 3.47 (SD = 0.73) indicating that project size is perceived as an important factor in project implementation. The mean scores of the project duration (PD) items ranged from 3.49 to 3.51, and the standard deviations were from 0.818 to 0.865. The mean for the overall project duration was 3.50 (SD = 0.75) which reflects overall consensus that project duration was an important factor determining implementation and performance of projects.

Descriptive Statistics for Sustainable Community Development

Sustainability variable was measured using 15 items each rated on the Likert scale; 5 = Strongly Agree, 4 = Agree, 3 = undecided, 2 = Disagree, 1=Strongly Disagree. These descriptive statistics help to interpret the distribution of the data, detect outliers and facilitate the analysis of the data for making informed decisions. The descriptive statistics for ECO1 were mean score = 3.50, std dev. = 0.813. The mean value score is above the middle of the five-point Likert scale indicating that, overall, the respondents agreed that income generation opportunities in the community offer a range of opportunities that are sustainable and are likely to increase the economic resilience of households and lessen their vulnerability to poverty. The standard deviation is overall relatively low, suggesting low variation in responses to this statement, indicating a moderate consensus that the community offers some real opportunities for income generation and poverty reduction. The results showed a mean score of 3.52 with a standard deviation of 0.756 for ECO2. The mean value for the economic sustainability indicators suggests that the respondents were generally more positive about access to financial services being equitable and that financial services (such as credit, savings and insurance) are available at affordable prices that boost the entrepreneurial growth and economic empowerment of local people in the community. The lower SD than other items suggests a higher degree of agreement among respondents and a consistent perception that financial inclusion mechanisms are available and have a positive impact on local economic development. The mean score for the descriptive statistics for ECO3 was 3.50 with a standard deviation of 0.808. The overall average indicates that the community members' answer to the question was generally positive on how the local economy supports stable and decent employment opportunities that create long-term livelihood security for community members. The standard deviation shows low variation in answers, suggesting that most people had positive views on employment opportunities, but that there were some variations in experiences for different parts of the community. The mean score for ECO4 was 3.47 (SD = 0.787). Based on the mean value, there is a moderate consensus amongst respondents that local policies and community initiatives have a positive impact on the success of small and medium businesses, and thus contribute to the development of local economies and sustainability. The relatively small standard deviation suggests it is a relatively consistent opinion among the respondents that SMEs are seen positively, although there is a slight drop in the mean compared with other indicators, which may indicate that there is scope for improving the implementation of policy and enterprise support initiatives. The descriptive statistics for ECO5 showed a mean score of 3.47 and SD score of 0.817. The mean score shows that the general opinion is that the community's economic advantages are generally shared across various social groups, fostering

inclusion and minimizing income gaps. The SD is the largest of the economic sustainability indicators, however, and there seems to have been a relatively high level of variability in the perceptions of the respondents with regard to equity in economic benefit distribution. This is a difference that can be attributed to varying experiences of community groups with access to economic opportunities and resources. Overall, the mean scores for the economic sustainability dimension ranged from 3.47 to 3.52, indicating that generally, respondents agree that their communities have characteristics that are indicative of economic sustainability. Moreover, the standard deviation of the community scores indicates moderate standard deviations from 0.756 to 0.817, indicating a moderate variance in the responses and constructive consensus about the economic sustainability conditions in their communities.

The mean score obtained for the findings on SOC1 (Income distribution within the community is fair and equitable and the vulnerable groups access to the economic resources and opportunities to improve their living standards is fair) was 3.49 and the standard deviation was 0.777. The mean score is higher than the middle of the scale, suggesting that participants overall believed that income and economic opportunities in their community are fairly distributed. The mean and standard deviation were relatively low, indicating that the participants responded quite similarly about this dimension of social sustainability, and therefore a moderate level of agreement on the issue of equity access to resources and better living conditions. SOC2 related to the community's levels of social cohesion, including trust, mutual support and shared values that promote collective action for achieving SDGs, had a mean value of 3.51 and a standard deviation of 0.842. The mean score shows that the respondents were generally in agreement that social cohesion is present in their communities and has positive impact on sustainable development efforts. The standard deviation (SD) is slightly larger than the SD for SOC1; however, it is still below one and shows acceptable level of agreement among respondents, although there is some variation in perceptions about the extent of trust and collective action. The mean score for the item, SOC3 (access to quality education and health services is inclusive and equitable, and supports human capital development and social well-being) was 3.48 with a standard deviation of 0.837. The mean indicated a moderate level of agreement that educational and/or healthcare services are reasonably available to people from all social groups. The standard deviation shows moderate variation in answers, with many respondents saying they had good access to such services but others saying that education and health services were unequal. The results for SOC4 (who measures the inclusiveness of community participation and enables members of minority groups to actively participate in governance and development activities) had a mean score of 3.46 with a standard deviation of 0.807. The mean value indicates moderate agreement that community participation mechanisms are relatively inclusive. The responses were spread out not much, with an average of about 1.25, indicating that participants had similar opinions about their involvement in governance processes, but there is still a need to increase the participation of marginalized groups. The mean score for SOC5 (cultural preservation and social identity) was 3.50 (SD = 0.803), indicating that cultural preservation and social identity were actively promoted and that the development initiatives respected local traditions and heritage. With the Mean, respondents, in overall, felt cultural heritage and local identity is taken into account in development initiatives. The average scores of the standard deviation analyses are relatively low, which indicates that there was a high level of agreement amongst respondents about the issues of importance and proaction of cultural preservation in sustainable community development projects. The social sustainability indicators had a mean score of between 3.46 and 3.51, indicating

that the respondents were generally satisfied that their communities had a moderate to high level of social sustainability. The relatively low standard deviations (0.777-0.842) suggest uniform respondents' perception across the different aspects of social sustainability.

The results for EVE1 about the impact of the presence of local employment opportunities on the economic resilience of the community were a mean of 3.50 with a standard deviation of 0.818. The mean value suggests that generally, job opportunities have had a positive influence on community resilience and economic stability. Within the box chart, 50% of respondents agree that employment opportunities contribute to sustainability outcomes moderately. The results showed a mean score of 3.46 with a standard deviation of 0.797 for EVE2 on access to affordable credit and financial services, which has improved entrepreneurial activities in the community. The mean indicates that individuals were somewhat agreeable with the statements in which financial inclusion and access to credit encourages entrepreneurship and local economic growth. The relative low standard deviation suggests that the views of the participants on the role of financial services in advancing sustainability are relatively consistent. For EVE3 which concerned the equity of distribution of economic resources for the sustainable livelihoods of all demographic groups, the mean was 3.48 with a standard deviation of 0.803. Moderate agreement: the mean value represents moderate agreement that economic resources are distributed in ways that support sustainable livelihoods. The standard deviation shows that respondents generally perceive resources in a similar way and that the opinions about distribution of resources were quite homogenous. The results on EVE4 (the level of incorporation of local development initiatives in long-term planning for sustainable development) showed a mean of 3.46 and a standard deviation of 0.792. The mean represents the moderate level of agreement about the economic development activities that are consistent with sustainable goals. The relatively low standard deviation indicates that the respondents had similar perceptions about how integration of the economic growth initiatives is linked to long-term sustainability planning. The answers to the EVE5 question on whether community economic policies encourage investments in sustainable industries and green technologies yielded a mean score of 3.50 and a standard deviation of 0.847. The mean indicates a consensus on the part of the respondents that local policies promote environmentally friendly investments and innovations. The standard deviation is the largest among the environmental sustainability indicators, but it still does not exceed one, meaning that the respondents agreed quite well on the indicator, albeit with some different views on the effectiveness of the policies. The overall mean scores of the environmental sustainability indicators were between 3.46 and 3.50, suggesting general agreement among the respondents that actions to improve the environment and economy are present in their communities. The standard deviations of the responses range from 0.792 to 0.847 which represents relatively low variation, indicating a fair level of agreement among the respondents in relation to the concept of environmental sustainability practices.

Overall mean score for sustainable community development was 3.4885 with a standard deviation of 0.66609. The mean score (significantly higher than the scale's midpoint of 3.0) suggests that the general opinion among respondents was that their communities were at a moderate level of sustainable community development. This indicates that there are good achievements in the areas of social inclusion, equitable resource distribution, governance participation, cultural preservation, financial inclusion, employment creation and environmentally responsible economic development within the communities. In addition, the relatively low standard deviation (0.66609) suggests

that there is consistency in the perceptions of the respondents, that is, there is a broad consensus about the condition of sustainable community development. Overall, these results indicate that there has been significant progress in the efforts to achieve sustainability goals, but there is still room for further initiatives to improve outcomes for sustainable community development through strengthening inclusiveness, equity, and long-term sustainability planning.

Descriptive Statistics for Human Capacity

Institutional capacity variable was measured with the help of 5 items rated on a Likert scale, in which 5= Strongly Agree, 4= Agree, 3= undecided, 2= Disagree, 1= Strongly Disagree. The descriptive statistics give an idea of data distribution, what is an outlier and how to make an informed decision based on the data analyzed with simplicity. The descriptive statistics of the human capacity reveal that the majority of respondents indicated that they have a satisfactory human resource capacity in their organization in relation to its performance. Specifically, the mean score of HC1 (whether the institution has highly skilled and adequately trained personnel who are able to execute complex organizational tasks and achieve strategic objectives) was 3.48 with a SD of 0.818. The mean value of >3.0 suggests a moderate level of agreement amongst respondents regarding the competence and skilled personnel of their institutions, and the relatively low standard deviation indicates a reasonable level of consensus amongst respondents' perceptions. The mean and SD of HC2 (continuous professional development and capacity building programs in a systematic way to increase the competency of the employees and adapt to the changing needs of the institution) were 3.47 and 0.827, respectively. The result indicates that respondents overall felt that staff development and training activities took place within their institutions, but there were differences in the perception of effectiveness and consistency of these activities across institutions. HC3 assessed the knowledge, expertise, and technical skills of human resources in the institution, to ensure that they have a good grasp of the skills required to be efficient and innovative in services provided to the institution. The average score for the item was 3.51 and the standard deviation was 0.803. The higher mean indicates that the respondents believed that their institutions had knowledgeable and technically competent employees, and the lower SD shows that there was high uniformity of opinion on this aspect among the respondents.

HC4 evaluated the extent to which the institution promotes leadership and managerial skills to support effective decision making, coordination and strategic alignment of human capital. Within the human capacity construct, this item had the highest score mean of 3.52, and the lowest SD of 0.846. The results suggest that most of the respondents felt their institutions have good leadership and managerial skills and are supportive of strategic decision-making and co-ordination. HC5 analyzed the extent of a team culture, knowledge-sharing and collaboration within staff which promotes institutional performance and learning. The average score for this item was 3.49, with a standard deviation of 0.827. The mean value showed an intermediate agreement about the existence of collaborative practices and knowledge sharing mechanisms in their institutions, and the standard deviation shows that there was not a great difference between the perceptions of the respondents.

ECO: Economic sustainability, SOC: Social sustainability, EVE: Environmental sustainability, HC: Human capacity, FS: Firm size, PD: Project duration, SD: Standard deviation

Correlation Analysis

The correlation analysis was employed to investigate the relationships between the firm size (FS), project duration (PD), human capacity (HC) and sustainable community

development (SD). The results show that human capacity is the most positive and statistically significant correlation with sustainable community development (r = .571, p = .000), implying that increase in human capacity is correlated with increase in sustainable community development level in KeRRA road projects. The project duration also had a weak but significant positive correlation with sustainable community development (r = .201, p = .001) and the firm size had a weak positive and significant correlation with sustainable community development (r = .264, p = .000). Due to the low and insignificant correlation among the independent variables, there are no serious concerns about multicollinearity.

Table 3: Correlation Analysis

		FS	PD	HC	SD
FS	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	250			
PD	Pearson Correlation	-.066	1		
	Sig. (2-tailed)	.302			
	N	250	250		
HC	Pearson Correlation	-.015	-.027	1	
	Sig. (2-tailed)	.817	.674		
	N	250	250	250	
SD	Pearson Correlation	.264**	.201**	.571**	1
	Sig. (2-tailed)	.000	.001	.000	
	N	250	250	250	250

Regression Analysis and Hypothesis Testing

In the first model, only the control variables, namely project size and project duration, were entered into the regression model. The findings revealed that the model was statistically significant (F = 16.508, p < .001), indicating that the control variables jointly explained variations in sustainable community development. The coefficient of determination (R^2 = .118) shows that project size and project duration accounted for 11.8% of the variance in sustainable community development. Specifically, project size had a positive and significant effect on sustainable community development (β = .279, p < .001), while project duration also exhibited a positive and significant effect (β = .220, p < .001). This implies that larger projects and projects implemented over longer periods tend to generate greater sustainability outcomes within communities.

The second model included the human capacity in addition to the control factors. The R^2 improved significantly, from 11.8% to 45.6%, showing that more variance in sustainable community development was accounted for by the inclusion of human capacity. The model was still significant (F = 68.680, p < .001). The best predictor for sustainable community development was human capacity (β = .582, p < .001), indicating that human resources capacity development within a project is more likely to result in sustainable community development when KeRRA road projects have sufficient skilled manpower, technical expertise, staff competence, training and effective human resource capacity. Larger projects and projects of an appropriate duration were also significant predictors (Project size (β = .288, p < .001) and Project duration (β = .236, p < .001)), which indicates that, both project size and duration implemented within an appropriate time frame, positively contribute to the sustainable

community development. The results of these findings show that building human capacity has a considerable effect on sustainable community development in the road project in the Uasin Gishu region in Kenya, Kenya, especially in the KeRRA road projects.

Table 4: Hierarchical Regression Model

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	-.372	.282		-1.321	.188
	FS	.248	.042	.273	5.881	.000
	PD	.236	.042	.265	5.639	.000
	HC	.447	.051	.480	8.685	.000

Dependent Variable: SD

HC: Human capacity, FS: Firm size, PD: Project duration, SD: Sustainable community development

6. Discussion

The results show that human capacity is a critical factor towards strengthening sustainable community development of the road projects under KeRRA in Uasin Gishu County. The correlation analysis showed a strong positive and statistically significant correlation between human capacity and sustainable community development ($r = .571$, $p < .001$), meaning that the more skilled personnel, technical expertise and capacity of the staffs a project has, the more likely it will achieve sustainable development outcomes. This is in line with the Human Capital Theory which suggests that investing in employee knowledge, skills and abilities increases organizational performance and long-term development. This relationship was also confirmed in the regression analysis, where human capacity was the most significant predictor of SC development ($\beta = .480$, $p < .001$) even after controlling for project size and project duration. The addition of human capacity shows that it has a significant explanatory power for influencing sustainable community development as the coefficient of determination increased significantly from 11.8% to 45.6%. The positive and significant relationships of project size and project duration also imply that projects with adequate resources and project durations provide positive conditions for sustainability. The results are aligned with previous empirical studies that found that effective HRs, regular training, technical knowledge, and efficient development of capacities can significantly boost the efficiency of project implementation and increase the chances of community development results in public infrastructure projects to be sustainable.

7. Conclusion

The study concludes that human capacity is a key factor in sustainable community development of KeRRA road initiatives in Uasin Gishu County. The results show that a more robust knowledge, technical skill, competency, and capacity of project staff are a powerful and crucial way to improve sustainable community development results. Correlation and regression analyses further substantiate that there is a strong, positive and statistically significant relationship between human capacity and sustainable community development, thereby highlighting the importance of the investments made in human resources for the sustainability of a project. The significant improvement of the model's explanatory power after adding human capacity also suggests that it is one

of the most important factors influencing sustainable community development. The results of this study support the Human Capital Theory that the investment in human knowledge and skills leads to better company performance and development. In addition, the positive impacts of project size and project duration indicate that project resources and project time are important factors that contribute to the overall project environment that enables sustainable impacts. Overall, it is concluded that increasing human capacity through continuous training, professional development, technical support, and effective knowledge management is crucial to strengthening the sustainability of the KeRRA road projects. Improving human capacity should therefore continue to be a key focus of policy and project managers aiming to maximize the long-term social, economic and environmental benefits of road infrastructure projects.

8. Recommendations of the Study

8.1. Managerial Recommendation

Human capacity building should be a key enabler for sustainable development and improvement of communities through the management of KeRRA road projects. This can be done through ongoing staff training, professional development, technical skills development and competency-based staff selection to provide project management by qualified staff. Project managers also need to set up mentorship programs, regular staff capacity assessments, and knowledge sharing programs to boost staff performance and project execution. Skilled manpower distribution at different stages of the project and efficient performance monitoring systems will improve the efficiency of the project, utilization of project resources, and project sustainability measures, which will maximize project benefits to society in the long run.

8.2. Policy Makers' Recommendation

Policy makers, such as the Ministry of Roads and Transport and KeRRA, should draft and implement policies that focus on building the capacity of the people in the road infrastructure projects. The allocation of sufficient resources by national and county governments for the continuous professional training, certification and technical capacity development of project staff should be ensured. Policies need to also include the contractors and implementing agencies to ensure that they have minimum competency standards and deliver regular staff development during project implementation. Improved institutional arrangements to facilitate knowledge transfer, professional qualification and work force development will increase project quality, increase accountability and support sustainable community development for road infrastructure projects that will be delivered and maintained better.

8.3. Theoretical Implications

The findings have empirical support for the Human Capital Theory, as they have shown an increase in sustainable community development outcomes in road infrastructure projects when investments are made in the knowledge, technical skills and competencies of employees. As the results show, there's a strong positive correlation between human capacity and sustainable community development, which indicates that human capital is a valuable organizational resource that can enhance project performance and sustainability. The notable explanatory power that is gained with the addition of human capacity further strengthens the theory's claim that skilled personnel are responsible for creating organizational value and long-term development. Thus, the study brings the concepts of Human Capital Theory to the context of Public Road Infrastructure Projects in Kenya, specifically in KeRRA projects in Uasin Gishu County.

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