



Effective Implementation of Environmental Management Strategies during road Construction in Kenya. What are the Determinants?

By

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ABSTRACT

There is widespread discussion on anthropogenic impact on the environment. Organizations are under pressure to determine how they can reduce or eliminate the impact of their activities on the environment. Our involvement in the road industry, whether be in planning, approval, design, asset management or construction, requires us to have practical measures to protect the environment in order to achieve sustainable development.

This paper presents research findings on the determinants of effective Implementation of Environmental Management Strategies during road Construction in Kenya. The paper is focused on road sector but is relevant to other infrastructural projects.

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ABBREVIATIONS AND ACRONYMS

BSC	Balance Score Card
EIA	Environmental Impact Assessment
EA	Environmental Audit
EMCA	Environmental Management Coordination Act of 1999
EMP	Environmental Management Plan
EMS	Environmental Management Strategies
KeNHA	Kenya National Highways Authority
NEMA	National Environmental Management Authority
PESTEL	Political, Economic, Social, Technological, Environmental and Legal
RAP	Resettlement Action Plan
RDT	Resource Dependency Theory
ROK	Republic of Kenya
SIA	Social Impact Assessment
SWOT	Strength, Weakness, Opportunities, Threats

1. INTRODUCTION

Clayton and Bass (2009) noted that the economy and society are intimately dependent upon the health of the environment where environmental assets such as fertile soils, clean water, biomass and biodiversity yield income, offer safety nets for the poor, maintain public health, and drive economic growth. Conversely, environmental hazards like pollution, environmental damage, and climate change – all threaten livelihoods and development. The environment is intrinsically linked to economic development, providing natural resources that fuel growth and ecosystem services that underpin both life and livelihoods.

According to Najab and Runnalls (2007) recent global business and economic activities have strengthened the concerns to address the environmental effects of their operations. Two sources of pressure are responsible for this attitudinal change in business behavior of various industries. Firstly, the availability of natural resources could constrain business operations, affect market processes and even threaten the global environment. Secondly, the various stakeholders are now more concerned about the environmental impacts due to human activities. Issues like global warming, water scarcity, effect of toxic chemicals on human's health, extinction of animal species and many others, increasingly influence how companies and society function.

A primary concern of most organizations now is how to manage their environmental impacts effectively and efficiently. For many organizations, environmental values are now becoming an integral part of their corporate cultures and management processes (UN Global Impact, 2009).

According to Welford (1992), there is need for the development of environmental management strategies which promote quality and a commitment by organizations to environmental issues. This would impact across all levels of business and would be a necessary step in the achievement of sustainability in businesses.

Indicators of effective environmental management strategies include: rehabilitated quarry sites, soil erosion control, re-afforestation & revegetation, soil & water pollution control, dust control,

noise pollution controls, proper solid waste management, HIV/AIDS mainstreaming, timely implementation of Resettlement Action Plans (RAP) among others.

1.1 Problem statement

The management and utilization of the environment and natural resources must be done so as to meet development interests of the present generation without jeopardizing the interests of the future generations to enjoying the same. This is the meeting point between imperatives of development and environmental conservation.

I argue that there is a growing concern in Kenya and at global level that many forms of development activities cause damage to the environment. Development activities have the potential to damage the natural resources upon which the economies are based. It is globally now accepted that development projects must be economically viable, socially acceptable and environmentally sound.

For agencies responsible for road construction to meet the objectives of environmental conservation and protection, sustainable development has to be achieved. There is evidence of poor environmental management characterized by abandoned quarry sites, soil erosion, devegetation and soil pollution among others. This therefore requires appropriate strategies to manage the impacts of construction activities on the environment. Such strategies need to be environmentally non-degrading, technically appropriate, economically and ecologically viable and socially acceptable.

Different mechanisms have been developed by organizations to enable them manage their activities sustainably. One of the mechanisms is formulation and implementation of environmental management strategies. There has been no empirical study to find out the factors affecting effective implementation of *these* strategies during road construction projects in Kenya.

This research sought to uncover the determinants of effective implementation of environmental management strategies by public organizations in road construction sector in Kenya. The study was guided by the following theories/models: Balance Score Card, The Sustainable

Development Approach, MCKINSEY 7S Model, Resource-Based Approach, Resources Dependence Theory (RDT), Systems Theory, PESTEL Analysis and SWOT Analysis.

1.2 Purpose of the research

I hypothesize that the determinants of unsuccessful or successful implementation of environmental management strategies during road construction may include project supervision, financial resources, environmental legislation and training and education of road construction staff among others.

This paper therefore seeks to establish the determinants of implementation of environmental management strategies of public organizations in road construction sector in Kenya, Case of Kenya National Highways Authority

1.3 Research Objectives

This study sought information to address the following objectives.

1. To find out how project organizational structure and project supervision affects implementation of Environmental Management strategies during road construction
2. To establish the extent to which financial resources affects implementation of Environmental Management strategies during road construction
3. To determine the relationship between environmental legislation and implementation of Environmental Management strategies during road construction
4. To investigate how training / education of road construction staff affects implementation of Environmental Management strategies during road construction

1.4 Research Questions

The research questions this study sought to answer are:

1. How does project organizational structure and project supervision affect implementation of Environmental Management strategies during road construction

2. How do financial resources affect implementation of Environmental Management Strategies during road construction
3. What is there a relationship between environmental legislation and implementation of Environmental Management Plans during road construction?
4. How does training / education of road construction staff affect implementation of Environmental Management strategies during road construction?

1.5 Significance of the Study

The study is intended to contribute to better management in the road construction industry and also aims to study the factors that affect implementation of environmental management strategies during road construction.

This study will benefit top management in Kenya National Highways Authority to understand issues of environmental management and in developing appropriate mechanism to effectively implement environmental management strategies during road construction. The result of this will help in mitigation of impacts of road construction to the environment and reduction of reputational risks.

To the Government of Kenya, the study will assist the Ministry of Roads in formulation of appropriate environmental policies and guidelines in road construction.

The research findings will assist other stakeholders and donors in road construction industry like contractors and the general public to conserve and utilize the environment sustainably.

This research will add to the body of knowledge on environmental management strategy implementation by assisting other researchers in the field of environment to borrow ideas which can be replicated in other industries or points of reference.

1.6 Why Bother?

I argue that there is need for the development of environmental management strategies which promote quality and a commitment by the management as well as the employees to environmental issues. This would impact across all levels of business and would be a necessary

step in the achievement of sustainability in businesses. This view is supported by Welford (1992).

I also advance that great strategies are worth nothing if they cannot be implemented. Without successful implementation, a strategy is but a fantasy. This is a view supported by Hambrick and Canella, 1989. In spite of the importance of strategy execution in organizations' success and their achieving their goals, most of them fail to execute those strategies efficiently (Sterling, 2003). Therefore effective implementation of environmental management strategies will make road construction sustainable. What are the determinants of this?

2. METHODOLOGY

This study is a descriptive survey. The study being a descriptive survey sought to describe and interpret various situations.

The study used both qualitative and quantitative paradigms in collecting and analyzing data. Both qualitative and quantitative methods complement each other according to Mugenda and Mugenda, (1999).

2.1 Target population

At the time of the study, there were twenty (20) roads under construction by Kenya National Highways Authority. The roads are located in different parts of the country with different environmental characteristics. The study focused on only staff who deal with management and supervision of road construction works. The management and supervision of road construction work is done at three (3) levels. These are: KeNHA's level represented by Project Engineer (PE), Supervising Consultant's level represented by Resident Engineer (RE) and Contractor's Level represented by road project Site Agent (SA).

The population of interest was therefore twenty (20) Project Engineers, twenty (20) Resident Engineers (RE) and twenty (20) Road project Site Agents (SA).

2.2 Sampling Design

For the above population of sixty (60), no sample was preferred. The researcher instead took a complete census as the target is small. Census inquiries are always considered more representative because all members of the population are chosen.

The researcher took all the target population of 20 on going road projects. In each project one Project Engineer, one Resident Engineer and one Site Agent was chosen. This gave a total of 60 respondents.

2.3 Data Collection Procedures and Instruments

Sources of data for the study were both primary and secondary data in order to realize the set objectives of the study. Primary data was obtained using questionnaires while secondary data was obtained from relevant textbooks, journals, periodicals, academic reports and project reports. Development Plans, internet, Government reports and strategic management publications were used.

The researcher used a questionnaire as the data collection instrument. The questionnaire had open-ended and closed questionnaire on issues related to the problem. The Likert scale was used in the questionnaire in ascribing quantitative value to qualitative data, to make it amenable to statistical analysis. In this study, information was collected using drop and pick method where questionnaires were distributed to the respondents. The researcher used drop and pick method to distribute the questionnaires to the 60 respondents in their offices. The respondents were required to fill the questionnaires as honestly and as completely as possible.

2.4 Validity and Reliability Test

A pilot study was carried out questionnaire to test reliability of the questionnaire. This was done by collecting data from subjects who are not study respondents to avoid respondent contamination, after which corrections and adjustments was done; this ensured reliability. In order to ensure validity and reliability, the questionnaires was composed of carefully constructed questions to avoid ambiguity and in order to facilitate answers to all the research questions.

Triangulation method was used to test the validity of data collected. This was done by engaging multiple methods, such as, observation, interviews and recordings which lead to more valid, reliable and diverse construction of realities. Triangulation techniques increase validity by incorporating several viewpoints and methods. The researcher combined of two or more theories, data sources or methods.

Also, two research experts were used to evaluate the relevance of each item in the instrument to the objectives and rated each item on the scale of; Very relevant (4), quite relevant (3), somewhat relevant (2), and not relevant (1). Validity was then determined using Content

Validity Index (C.V.I). C.V.I is equal items rated 3 or 4 by both charges divided by the total number of items in each research instrument. This is symbolized by:

$$n_{3/4}/n$$

Where $n_{3/4}$ =number of items rated as very relevant and quite relevant

n =total number of items in the research instrument

Items with a validity and reliability coefficients of at least 0.70 are acceptable as valid and reliable (Kathuri and Pals, 1993).

2.5 Data Analysis and Presentation

Data was analyzed both qualitatively and quantitatively. Qualitative data was obtained from the open-ended items in respondent questionnaires. The data was grouped into different categories depending on the responses given by different respondents. Those categories aided in establishing themes, which were coded and entered into a computer. Through the use of the Microsoft office packages, the data was analyzed using descriptive statistics.

Quantitative data was obtained from both the pre-coded and open-ended items. It was coded and entered into the computer for descriptive analysis. Given the outcome the researcher discussed the findings and drew conclusions. Finally the researcher made recommendations and gave suggestions for further research based on the study findings.

3. FINDINGS

3.1 Introduction

A total of forty two (42) questionnaires were completed and returned. This is an adequate response rate which represents 70% of the total response rate and could therefore be used as a basis for conclusions.

Content analysis and inferential statistics were utilized in data analysis. Also, descriptive statistics were used to analyze the data with the results of the analysis being summarized in tables, percentages and figures. The findings have been summarized in similar manner to the questionnaires.

3.2 Sample characteristic

The demographics relevant to this study are: gender, age, duration worked in road sector, highest qualification and position in the project. The gender of the respondents exhibited an interesting characteristic. From the findings, all the respondents (100%) were all male and no woman is involved in the management of the selected ongoing road projects. *the* majority of the respondents (67%) were above 41 years old while the remaining (33%) were below the age of 41 years old. The majority (36%) are in the age category of 45-50 years. On the highest qualification of the respondents, 36% of the respondents indicated they have Masters degree, 64% indicated they had undergraduate degree qualification. The majority of respondents (61.9) % of the respondents have worked in the road sector for more than 15 years. This means that they are highly experienced.

3.3 Project Organizational Structure and project supervision and Implementation of Environmental Management Strategies

Table 1: Type of Organizational Structure

Type of Organizational Structure	Frequency	Percentage
Line Organizational Structure	0	0
Functional Organizational Structure	0	0
Line and Staff Organizational Structure	0	0
Matrix Organizational Structure	0	
Project Organizational Structure	42	100%
Total	42	100%

Source: Research Data

As evident from table 1, all the road projects (100%) have Project Organizational Structure. This is a type of structure with a number of horizontal organization units to complete projects. The staff team is from diverse fields and is managed by a project Manager. The project staff is separate from and independent of the functional departments. This type of structure allows maximum use of specialist knowledge thus chances of failure are very less and project staff works as a team towards a common goal which results in high motivation.

Organization structure provides communication channels in an organization. This implies that the current project reporting structure is appropriate for developing shared understanding of environmental management activities and priorities. Effective communication is a key requirement for effective strategy implementation. Organizational communication plays an important role in training, knowledge dissemination and learning during the process of strategy implementation. Modern organizational structures combines both *centralized coordination* (top management) an *operational decentralization* (operation management).

Respondents on a Likert scale were asked to rate the efficiency of the communication channels. More than 40.3 % of the respondents agreed that communication channels are not efficient while 59.7% disagreed as shown in table 2.

Table 2: Efficiency of the channels of communication in the project

Description	Frequency	Percentage
Strongly disagree	6	14.3%
Disagree	16	38.1%
Slightly disagree	3	7.1%
Agree	17	40.3%
Strongly agree	0	0%
Total	42	100%

Source: Research Data

Table 3: Respondents' opinion on environmental management decision making process

Description	Frequency	Percentage
Strongly disagree	4	9.5%
Disagree	22	52.4%
Slightly disagree	11	26.2%
Agree	5	11.9%
Strongly agree	0	0%
Total	42	100%

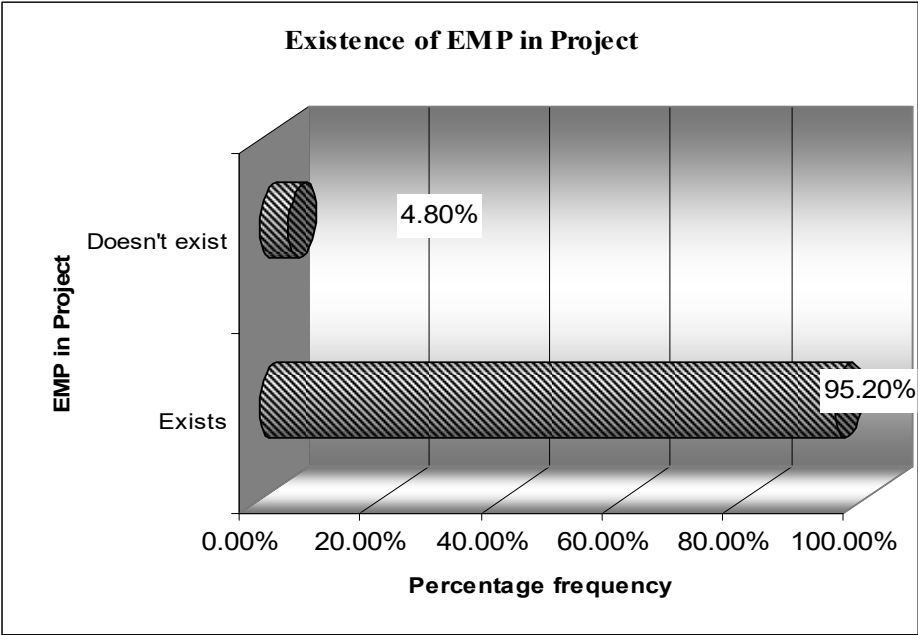
Source: Research Data

Table 3 indicates that more than 80 % of the respondents disagreed that decision making process on environmental management in the project is cumbersome while 20% agreed. This implies that decisions on environmental management in project are quicker and easy to make.

Table 4: Existence of EMP in road Projects

Figure 1 shows that 95.2 % of the respondents indicated that they have environmental management plan for road projects while 4.8 % of the respondents indicated that they have environmental management plan for road projects.

Figure 1: Existence of EMP in road Projects



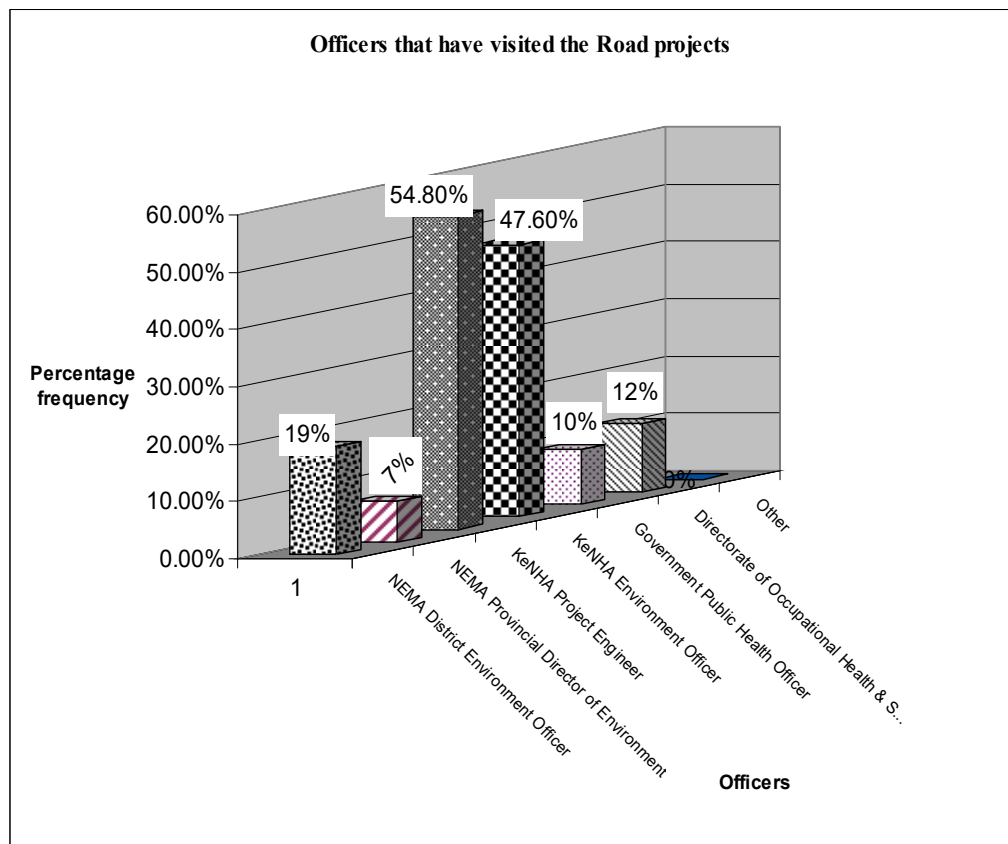
Source: Research Data

Asked why some projects don't have EMP, the respondents indicated that there is no specific requirement for EMP in the project contract, contractors don't have environmental specialist to prepare one and the EMP is not a billed item in the contract as some of the reasons.

From the study, 64 % of the respondents indicated that environmental supervision is not part of the road construction work program while 36 % of the respondents indicated that environmental supervision is part of the road construction work program. For projects where environmental supervision is not part the road construction work program, it is not possible to monitor the implementation of environmental management plan.

Figure 2 indicates the officers who have visited road projects to monitor environmental performance. KeNHA project Engineer and Environment Officer top the list with 54.8% and 47.60% respectively. It is worth noting that officers from NEMA who are mandated by law the role of environmental inspection have made few visits to project sites (19% for NEMA District Environment Officer and 7% for NEMA Provincial Director of Environment).

Figure 2: Officers who have visited the road project to monitor environmental performance in the last three months



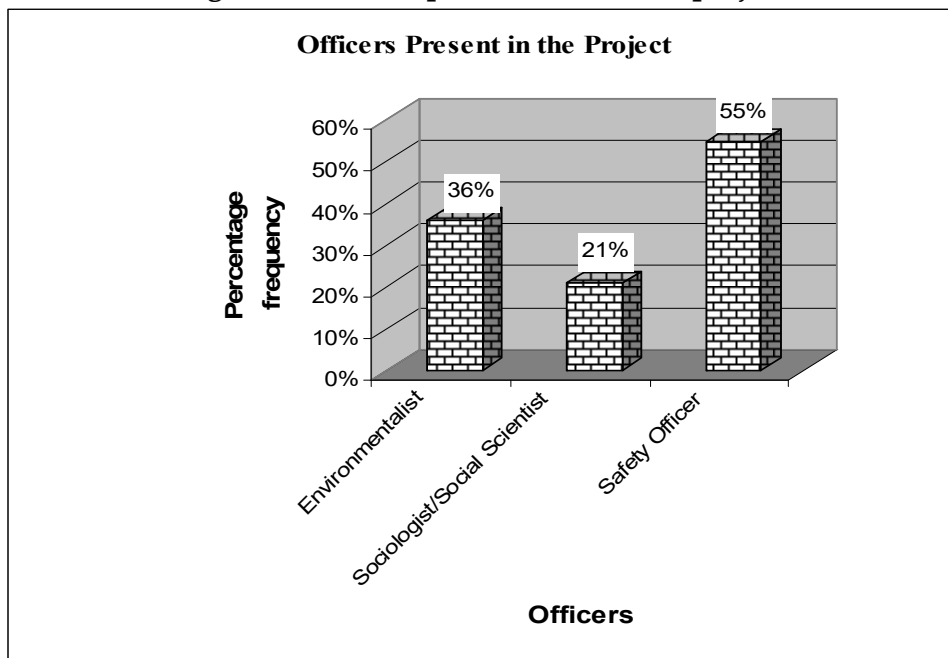
Source: Research Data

Figure 4.0.9 provides information concerning the frequency of preparing environmental monitoring reports. 17 % of the respondents indicated that environmental reports are prepared yearly, 57 % indicated quarterly, 21% indicated monthly while 5% indicated weekly.

Majority of the respondents (55%) indicated that road projects have Safety Officers, 36% indicated that they have environmentalist while 21% indicated that they have sociologist/social

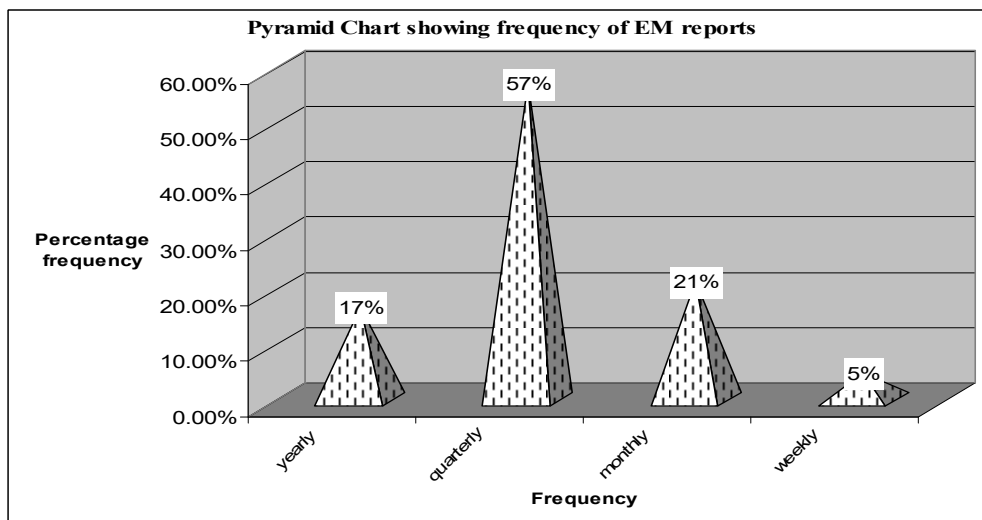
scientist in their road projects. For effective implementation of environmental management strategies all road projects need to have the officers.

Figure 3: Officers present in the road project



Source: Research Data

Figure 4: Frequency of preparing Environmental Monitoring (EM) reports



Source: Research Data

Asked what activities that can be done to improve environmental supervision during road construction majority of the respondents (61.9%) indicated provision of more funds for

monitoring environmental matters followed by engaging environmental specialists in road projects (50%) as shown in table 4.0.7.

Table 4: Activities to improve environmental supervision during road construction

Activity	Frequency	Percentage
Increase the frequency of visits by field officers	3	7.1%
Involve local people and local community	4	9.5%
Increase the number of field officers	6	14.3%
Make EMP implementation part of the billed items	13	31.0%
External Auditors to audit environmental compliance	3	7.1%
More frequent audits and implement audit findings	16	38.1%
Provide more funds for monitoring environmental matters	26	61.9%
Engage Environmental specialist in road projects	21	50.0%
Penalties for Environmental noncompliance	6	14.3%
Training of road supervision staff	4	9.5%

Source: Research Data

Table 5: Reasons why Environmental Management Plans are not adequately implemented

Reason	Frequency	Percentage
Lack of funds	7	16.7%
Time constraints	2	4.8%
Lack of training for supervision staff	4	9.5%
Contractors not taking EMP implementation seriously	11	26.2%
No permanent staff responsible for environment on site	15	35.7%
EMP not well articulated in the contract	18	42.9%
EMP not a bill item in the contract	20	47.6%

Source: Research Data

Respondents were asked to give reasons why EMPs are not adequately implemented. Majority of the respondents (47.6%) indicated that EMP is not a billed item in the contract. Other reasons include: EMP is not well articulated in the contract (42.9%), no permanent staff responsible for environment on site (35.7%) and contractors not taking EMP implementation seriously (26.2%) among others.

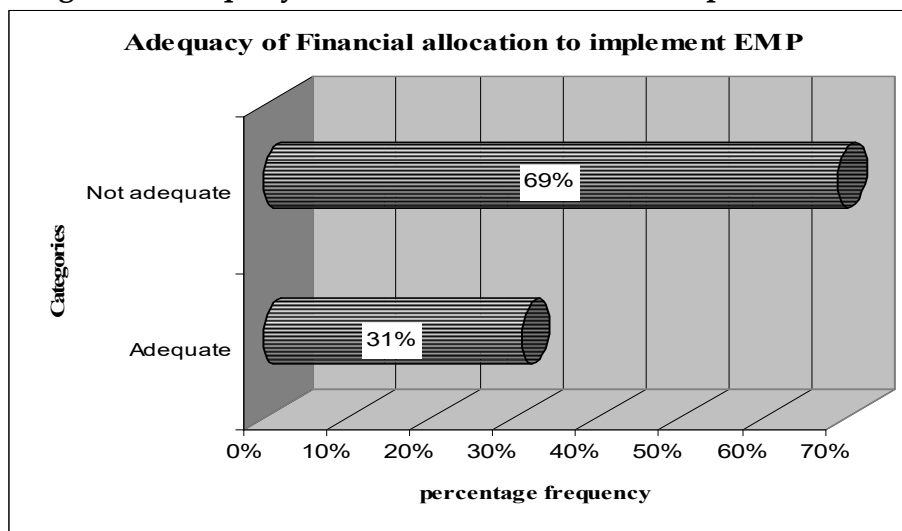
Table 6: Adequacy of Environmental Management Plans implementation during road construction

Description	Frequency	Percentage
To a very great extent	0	0%
To a great extent	11	26.2%
To a moderate extent	31	73.8%
To a little extent	0	0%
To a very low extent	0	0%
Total	42	100%

Source: Research Data

3.4 Financial Resources for Implementing Environmental Management Strategies

Figure 5: Adequacy of financial Allocations to implement EMP



Source: Research Data

Figure 5 shows that majority (69 %) of the respondents indicated that inadequate financial resources have been allocated to implementation of Environmental Management Plans for road project. On the other hand 31 % of the respondents indicated that adequate financial resources

have been allocated to implementation of Environmental Management Plans for road project. The implication of this is that the environmental management strategies cannot be implemented without adequate financial resources. Financial resources are important if environmental management strategies are to be effectively implemented.

Eighty Six (86) percent of the respondents indicated that the cost of implementing Environmental Management Plan (EMP) is not part of road construction cost. On the other hand 14 % of the respondents indicated that the cost of implementing Environmental Management Plan (EMP) is part of road construction cost. The implication of this is that no financial resources are set aside to implement environmental management strategies.

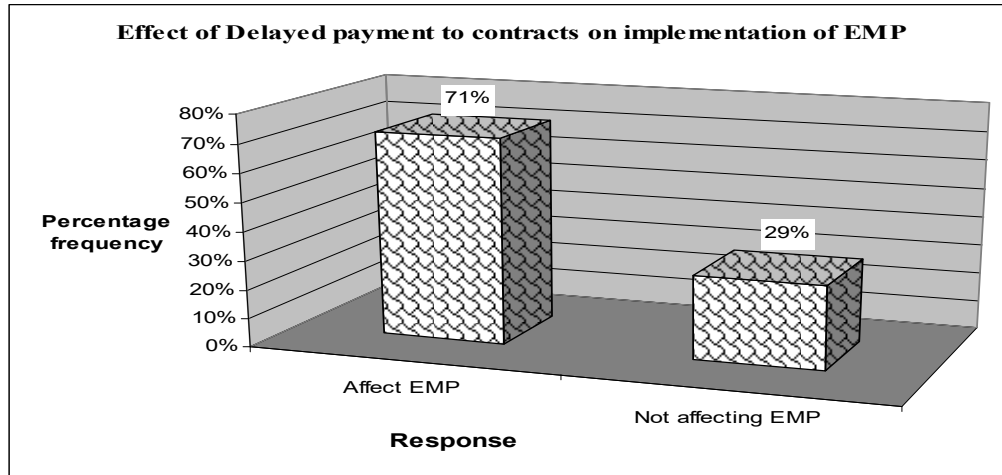
Table 7: Cost of implementing Environmental Management Plan as a bill item in road construction opinions.

Description	Frequency	Percentage
Strongly disagree	5	11.9%
Disagree	6	14.3%
Slightly disagree	2	4.8%
Agree	18	42.9%
Strongly agree	11	26.2%
Total	42	100%

Source: Research Data

Table 5 indicates that 69.1 % of the respondents agreed that cost of implementing Environmental Management Plan should be a bill item in road construction while 30.9 % disagreed. This implies that those involved in road project management would like this to be done to make environmental management in project effective. This will ensure that the contractors' environmental performance is measured. Balance Score Card model affirms that measurement motivates and this resonates well with Resources Dependence Theory.

Figure 6: Opinion on whether delayed payment affects implementation of EMP



Source: Research Data

Majority of the respondents (71%) indicated that delayed payments to the contractors affect the implementation of Environmental Management while 29% of the respondents indicated delayed payments to the contractors do not affect the implementation of Environmental Management Plan. One of the reasons given by respondents why delayed payment doesn't affect EMP implementation is because EMP Implementation is not a bill item.

3.5 Environmental Legislations and Implementation of Environmental Management Strategies

Table 8: Presence of EIA License for road projects

Description	Frequency	Percentage
Projects which have	42	100%
Projects without	0	0%
Total	42	100%

Source: Research Data

Table 6 indicates that all the road projects have Environmental Impact Assessment License and per the requirements of EMCA, 1999. This is a good indication on environmental legislation compliance.

Table 9: Environmental audit for the road projects

Description	Frequency	Percentage
Done	6	14.3
Not Done	36	85.7
Total		

Source: Research Data

Majority of the respondents (36) indicated that environmental audit has been carried on the road projects (representing 85.7%) have carried out annual environmental Audit while the remaining percentage (14.7%) have not carried out the environmental audit. The reason for not having carried out environmental audit because the road projects have just started and not finished one (1) year. Environmental Audit is done annually as per EMCA, 1999.

Table 10: Initiation of Environmental Audit

Description	Frequency	Percentage
Project Engineer	13	31.0%
Resident Engineer	27	64.3%
Site Agent	3	7.1%
NEMA Officials	7	16.7%
Other	0	0%

Source: Research Data

When asked about who initiated the environmental audit to be carried out, 64.3% of the respondents indicated the resident Engineer, 31% indicated Project Engineer, 16.7% indicated NEMA officials while 7.1% indicated Site Agent. The ideal situation is that the Resident Engineer should be one to initiate and this should be in the work program.

3.6 Training/Education in Environmental Management

Table 11: Respondents training in Environmental Management

Description	Frequency	Percentage
Environmental Impact Assessment	16	38.1%
Environmental Audit	8	19.0%
Environmental Monitoring	8	19.0%
Social Impact Assessment	3	7.1%
Resettlement Action Plan Implementation	1	2.4%

Source: Research Data

Majority of the respondents (38.1%) indicated they have training in environmental impact assessment, 19% in environmental audit and environmental monitoring, 7.1% on social impact assessment and 2.4% on Resettlement Action Plan Implementation. For implementation of environmental management strategies, officers involved in road project management should be trained in all the areas.

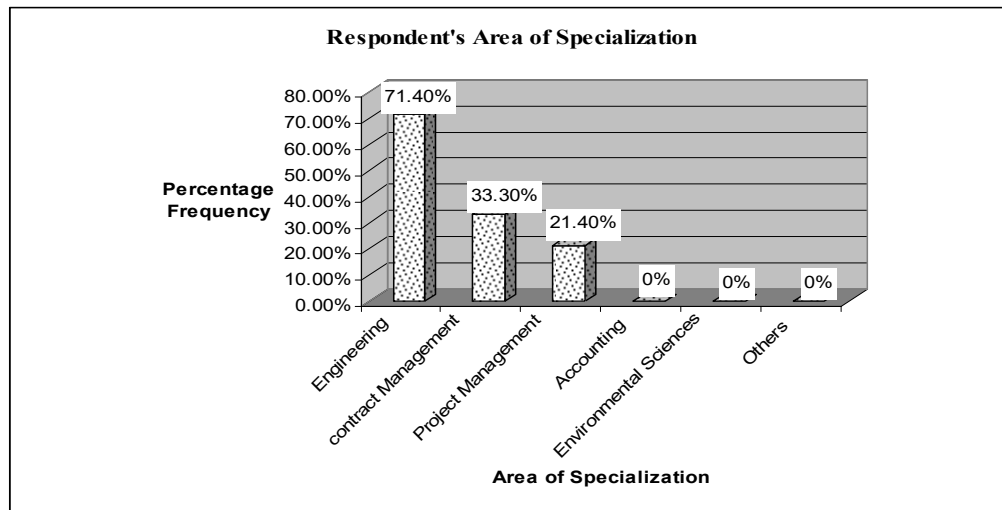
Table 12: Respondents rating of their skills in environmental Management

Description	Frequency	Percentage
Very high	0	0%
Somewhat high	3	7.1%
Neither high nor low	27	64.3%
Somewhat low	9	21.4%
Very Low	3	7.1%
Total	42	100%

Source: Research Data

When asked to rate their skills on environmental management, majority of the respondents (64.4%) indicated that its neither high nor low. 28.5% indicated that their skills are low while only 7.1 % indicated that it is high. The success of implementing environmental management strategies in road project need relevant environmental skills.

Figure 7: Respondents area of specialization



Source: Research Data

Figure 7 indicates that majority of the respondents (71.4%) are specialized in engineering, 33.3% in contract management and 21% in project management. None of the respondents is specialized in environmental sciences and accounting.

3.7 Effective Implementation of Environmental Strategies (EMS)

Table 13: Effectiveness of the EMS

Environmental Management Strategy	% Rating				
	Very effective	Effective	Somewhat effective	Not Effective	Very ineffective
Rehabilitation of quarry sites	4 (10%)	8 (19%)	12 (29%)	18 (43%)	0 (0%)
Soil erosion control measures	6 (14%)	21 (50%)	10 (24%)	5 (12%)	0 (0%)
Tree planting & revegetation	5 (12%)	25 (59%)	9 (21%)	3 (7%)	0 (0%)
Soil & water pollution control	4 (10%)	14 (33%)	4 (10%)	20 (48%)	0 (0%)

Environmental Management Strategy	% Rating				
	Very effective	Effective	Somewhat effective	Not Effective	Very ineffective
Dust control	3 (7%)	5 (12%)	21 (50%)	13 (31%)	0 (0%)
Noise pollution controls	3 (7%)	6 (14%)	14 (33%)	19 (45%)	0 (0%)
Proper solid waste management	5 (12%)	12 (29%)	18 (43%)	6 (14%)	0 (0%)

Source: Research Data

Respondents we asked to rate the effectiveness of the environmental management strategies. Majority of the respondents (72%) indicated that rehabilitation of quarry sites is not effective,

Sixty four percent of respondents indicated that soil erosion control measures is effective, 71% indicate that tree planting and revegetation is effective, 58% indicated that soil and water pollution control is not effective, 81% indicated that dust control is not effective, 78% indicated that noise pollution controls and 57% indicated that solid waste management is not effective. This implies that most environmental management strategies are not implemented effectively.

4. CONCLUSIONS

The paper concludes that:

- All the road projects studied have Project Organizational Structure. This structure provides effective environmental management strategies communication channels hence effective implementation.
- The absence of ESMP in some road projects, is due to absence of specific requirement for ESMP in the project contract, contractors don't have environmental specialist to prepare and implement it and the ESMP is not a billed item in the roads contract.
- Majority of 64 % of the respondents (64%) indicated that environmental supervision is not part of the road construction work program while 36 % of the indicated that environmental supervision is part of the road construction work program. For projects where environmental supervision is not part of the road construction work program, it is not possible to monitor the implementation of environmental management plan.
- Strategies fail when enough financial resources are not allocated to successfully implement them. Majority (69 %) of the respondents indicated that inadequate financial resources have been allocated to implementation of Environmental Management Plans for road project. Delayed payments exacerbate the issue. The implication of this is that the environmental management strategies cannot be implemented effectively without

adequate financial resources. The central proposition is that the way the financial resources are allocated in the firm shapes the realized strategy of the firm.

- Majority of the respondents (64.4%) indicated their environmental management skills are neither high nor low. The success of implementing environmental management strategies in road projects needs relevant environmental skills. This is supported by the Resource Based Approach Model which affirms that competencies and skills are strategic assets for a firm. McKinsey 7S model likewise provides that skills are needed in strategy implementation.
- Road projects are not adequately staffed with trained and experienced Environmental and Social Safeguards specialists. For effective implementation of environmental management strategies all road projects need to have the officers.
- Environmental Management Plans are not adequately implemented during road construction. The reasons why implementation of EMPs is no effect include EMP is not billed item in the contract (47.6%), EMP is not well articulated in the contract (42.9%), no permanent staff responsible for environment on site (35.7%), contractors not taking EMP implementation seriously (26.2%), lack of funds (16.7%) and insufficient environmental skills and training for supervision staff (9.5%) among others.
- Effective Environmental Management Strategy implementation is achieved when rehabilitation of quarry sites, soil erosion control measures, tree planting & revegetation, soil & water pollution control, dust control, noise pollution controls and proper solid waste management takes place in a road project.
- Majority of the respondents (72%) indicated that rehabilitation of quarry sites is not effective, 64% indicated that soil erosion control measures is effective, 71% indicate that tree planting and revegetation is effective, 58% indicated that soil and water pollution control is not effective, 81% indicated that dust control is not effective, 78% indicated

that noise pollution controls and 57% indicated that solid waste management is not effective. This implies that most environmental management strategies are not implemented effectively and that Environmental Management Strategy implementation in road projects is not very effective.

Where do we go from here?

One of the reasons why Environmental Management Plans are not adequately implemented is because Environmental Management Plans are not a bill item in the road contract. This makes Contractors not to take the implementation Environmental Management Plans seriously. There is need for KeNHA to include environmental management in the bill of quantities (BOQ) during the tendering. This will ensure that environmental management strategy activities are itemized. It will also detail the terms and conditions of the road construction to enable a contractor to price the work for which he or she is bidding. The inclusion of environmental management elements in the contract documents of road construction projects is a sustainable development strategy. This will offer leverage to project implementers in improving environmental performance.

Limited financial resources are a key issue in successful strategy implementation. The Implementation of Environmental Management strategies in road project require substantial financial resources. This is because road construction is an extractive industry whereby a lot of materials are extracted from the environment and the environment is damaged. All the road projects in the study have environmental management plans but no adequate financial resources are allocated to implement them. KeNHA should dedicate adequate financial resources in project budget to be used in environmental management. There should be no

trade-off between environmental performance and financial performance. Environmental performance and financial performance are interrelated.

A program of works detailing schedule of the various construction tasks to be performed, length of time needed, resources needed, anticipated obstacles and measurable outputs is important. Scheduling of activities reduces chances of incurring losses. When preparing work program for civil works, KeNHA should ensure that environmental supervision forms part of the road construction work program in all the KeNHA road projects.

It is my contention that effective Management of the Environment requires trained human resources who are skilled and knowledgeable in environmental issues. Successful execution of environmental management strategies depends greatly on trained and competent personnel. Likewise each road project should have full time resident Environmentalist, Sociologist and Safety Officer.

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APPENDICES

List of on-going Kenya National Highways Authority road projects at the time of the study.

No.	Name of Road Project	Length (km)	Location-County	Contractor
1.	Voi-Mwatate-Wundanyi	52	Taita Taveta	Kundan Singh
2.	Marsabit-Turbi	121	Marsabit	Jiangxi Zhongmei Eng. Ltd
3.	Loruk-Barpelo	62	West Pokot	Intex Construction Limited
4.	Timboroa-Eldoret	73	Uasin Gishu	China WU YI
5.	Mau Summit - Kericho Road (B1/A1)	58	Keicho	SBI International
6.	Kericho - Nyamasaria Road (A1)	76	Kericho and Kisumu	SBI International
7.	Nyamasaria - Kisumu Airport	24	Kisumu	Sinohydro Corporation
8.	Homa Bay-Mbita	43	Homa Bay	Put Sarajero
9.	Londiani - Fortenan	63	Kericho/ Kisumu	Jiangxi Zhongmei Eng. Ltd
10.	Kaloleni-Kilifi	35	Mombasa/ Kilifi	Murji/Devraj
11.	KCC (Sotik)-Ndanai-Gorgor	28	Bomet	China Railway No.5
12.	Enjinja-Bumala	37	Bungoma	HayerBishan
13.	Chebilat-Ikongge-Chabera	37.2	Bomet/Nyamira/ Homa Bay	Victory Construction Company
14.	Chepterit-Kimondi	12	Nandi	Kabuito Construction Company
15.	Kangema-Gacharage	60	Muranga	SS Mehta
16.	Chiakariga-Meru	35	Meru	Intex Construction Limited
17.	Eldoret - Webuye	60	Uasin Gishu/ Kakamega	Maltauro/H.Young
18.	Webuye - Malaba	61	Kakamega/ Bungoma	Maltauro/H.Young
19.	Webuye-Kitale	61	Kakamega/ Trans Nzoia	Jiangxy Zhongmei Engineering
20.	Nairobi-Southern Bypass	28.6	Nairobi	China Roads and Bridge Construction

Source: Kenya National Highways Authority, Planning and Environment Department