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DETERMINANTS OF IMPLEMENTATION OF ASBESTOS WASTE DISPOSAL PROJECTS IN MACHAKOS COUNTY, KENYA

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Abstract

Purpose: The general aim of the study was to assess the determinants of implementation of asbestos waste disposal projects in Machakos County, Kenya. The study specifically aimed to establish the influence of technical factors on implementation of asbestos waste disposal projects; to establish the effect of financial factors on implementation of asbestos waste disposal projects; to ascertain how stakeholder involvement affected implementation of asbestos waste disposal projects and to determine the effect of monitoring and evaluation on implementation of asbestos waste disposal projects in Kenya.

Methodology: The study adopted a descriptive research with a study population of 394 staff working at NEMA Machakos branch, public health department and department of housing Machakos County. The study applied probability sampling design by using a stratified random sampling technique to select a sample size of 80 respondents. The main data collection instruments were the questionnaires containing both open ended and close ended questions which were pretested using a pilot study. Descriptive statistics data analysis method was applied to analyze data. Finally Multiple Linear Regression model was employed to establish the significance of the independent variables on the dependent variable. The findings were presented using tables and charts.

Results: Findings from the study showed that technical factors, financial factors, stakeholder involvement and project monitoring and evaluation affected project implementation in Machakos County. The study concluded that technical factors followed by financial factors then Stakeholder involvement and lastly project monitoring and evaluation had the largest impact respectively on implementation of asbestos disposal projects in Machakos County.

Unique contribution to theory, practice and policy: The study recommended that the management should train all the employees on how to undertake their job tasks effectively, the county should set aside land for disposal of asbestos, stakeholder involvement plans should be developed, public awareness increased through proper communication channels and that participative leadership styles should be employed by the managers.

Key words: *technical factors, financial factors, stakeholder involvement, monitoring and evaluation, waste disposal projects*

1.0 INTRODUCTION

Project implementation involves putting into practice what was proposed in the project proposal into the actual project. It is process whereby project inputs are converted to project outputs. The implementation phase is where the project team actually does the project work to produce the deliverables (Chan, 2011). It is here that the project manager will coordinate and direct project resources to meet the objectives of the project plan.

The basic requirement for starting the implementation process of asbestos disposal projects is to have the work plan ready and understood by all stakeholders. Technical and non-technical requirements have to be clearly defined and the financial, technical and institutional frameworks of the specific project have to be prepared considering the local conditions (Hassan, 2009). The working team should identify their strengths and opportunities which are positive forces that should be exploited to efficiently implement a project. The weaknesses and threats are hindrances that can hinder project implementation and implementers should ensure that they devise means of overcoming them (Klimas, 2010).

Asbestos is a collection of six naturally occurring fibrous silicate minerals with thin and durable fibrous crystals as their composition (WHO, 2018). It is a chemically inert mineral that is inflammable and a non conductor of neither heat nor electricity thus its wide industrial use in many countries. In addition, it is insoluble, has high tensile strength and odorless. In view of the above properties, asbestos has been used widely in the manufacturing industry in production goods like roofing materials, ceiling and floor tiles, paper and cement products, textiles, coatings and friction products such as automobile clutch, brake, transmission parts and sewer pipes. When used due to its resistance to fire or heat, it is woven into fabrics or mats while when used for building material such as roofing sheets, it is often mixed with cement, (NEMA, 2012).

Despite many worldwide studies demonstrating strong links between exposure to asbestos whether directly or indirectly and different types of cancer, some countries still produce and others poorly dispose asbestos containing materials (Lacourt, 2013).The extreme fine fibers of asbestos and its ability to remain suspended in the air makes it hazardous and if not well handled may cause health risks to the public notwithstanding the serious social, emotional and economic problems that follow (NEMA, 2012).

The use and trade of asbestos has therefore been significantly reduced globally by two major factors: the adoption of partial or total legislative bans on asbestos by more than 55 countries, and the progressive reduction of asbestos mining by Canada; which changed from being the world's largest producer in 1977 to a non producer of asbestos in 2012. Also, according to WHO (2018), more than 125 million people in the world are exposed to the mineral at their places of work. This has led to campaigns on safer disposal of asbestos worldwide.

In Africa, hazardous waste management and waste management in general face varied and complex problems (Mwesigye *et al.*, 2009). Lack of proper segregation of waste is a common practice while inappropriate disposal of waste has resulted to poor sanitation and inaccessibility to clean drinking water which in turn leads to outbreak of diseases. As a result, governments in Africa have in the recent past taken initiatives to ensure harmful waste is disposed in safer ways through enactment of laws that support such projects.

In Kenya, the National Environment Management Authority (NEMA) requires that asbestos containing material must not be re-used, recovered, recycled or offered for sale but must be disposed through a licensed asbestos landfill. This is the universally most accepted disposal method (NEMA, 2012). However, questions have been raised by environmental activists over the manner of disposal in the country with the cases like KTN's 'Plague For Profit' expose in Owinu-Uhuru slum in Nyali were poor disposal of the waste led to community members developing health complications, dumping of tons of asbestos waste near built up areas in Thika by an unscrupulous contractor and suing of NEMA by Kitui county government over licensing of asbestos waste dumping on water catchment area. The risk of poor disposal of asbestos waste is that pollutants are dispersed to the environment contaminating water sources through ground seepage. The negative impacts of asbestos to the surroundings and to human health are grave and the waste has to be contained and disposed off in a manner that no harm will be caused to the environment (Roussel, 2012).

In Machakos County, concerns have been raised by the residents on numerous occasions over the disposal of asbestos waste from the county. This include the questionable disposal of asbestos from the renovated Machakos level five hospital that led the arrest and charging of environment officers in the county, the illegal disposal on Mavoko sub county that led to protests by residents and thereafter relocation orders by the local leaders as reported by daily nation on June 2015. When asbestos was banned by more than 55 countries in the world including Kenya, materials made with asbestos have no more use, they therefore became waste. Asbestos waste does not pose health risks as long as it is left undisturbed. It is a health danger when disturbed to release its extremely thin fibers to the atmosphere. Thus, according to (NEMA, 2012), the disposal requires specialized executors and successful implementation.

According to NEMA (2012), any asbestos containing material must be removed from the site to an approved landfill as soon as practicably possible. Before removal, the asbestos waste must be placed in tightly sealed containers and marked clearly to indicate the presence of asbestos. A certified asbestos handler must prepare and keep on site an asbestos removal control plan for any approved asbestos disposal work to be undertaken.

1.1 Statement of the Problem

Asbestos is categorized as a human carcinogen by the International Agency for Research on Cancer as it can easily cause lung cancer. According to the Legal Notice No.121 of the Environmental Management and Coordination (Waste Management) Regulations 2006, waste containing asbestos is classified as hazardous waste in Kenya. In addition, the Legal Notice requires that asbestos should be discarded in a specified manner as permitted by the National Environment Management Authority. Machakos County has more than 4000 households with asbestos as the main roofing material (KNBS 2016).

According to the Kenya Network of Cancer Organizations (2016), 70% of the global cancer burden is in low and middle income countries like Kenya with Cancer being the 3rd highest cause of morbidity in the country. There are approximately 39,000 new cases of cancer reported each year with 27,000 thousand deaths per year and the number is rising. Lung cancer is the second most common cancer in both men and women. According to World Health Organization (WHO

2018), exposure to asbestos causes Lung cancer which accounts for about 19% of all new cancer and leads to over 1400 deaths in Machakos County each year.

In spite of the hazardous nature of asbestos, there is illegal dumping of asbestos in the Machakos county dumpsite which is not a licensed disposal site. The waste generated from the Machakos level five hospital, civil servants houses and the Machakos integrated development project (MIDP) houses (NEMA 2018). The risk of asbestos exposure could be minimized through proper implementation of its disposal projects (Hassan, 2009). The study sought to ascertain determinants of implementation of asbestos disposal projects in Machakos County, Kenya.

1.2 Objectives of the Study

The aim of the study was to assess the determinants of implementation of asbestos waste disposal projects in Machakos County, Kenya.

2.0 LITERATURE REVIEW

2.1 Theoretical Framework

Waste Management Theory

The waste management theory proposed by Pongrácz (2002) is a unified body of knowledge about waste and waste management and is founded on the expectation that waste management involves ensuring that waste does not cause harm to the people and environment as well as promoting optimal use of resources (Love, 2002). It is an endeavor to organize the varied factors of waste management system as it is presently. The theory is of importance to the study because any waste deemed to be harmful to human health ought to be disposed in a safe manner to prevent the risks involved both to the present and future generations. It emphasizes on the need to understand the harm asbestos waste can cause and therefore the need for professional skills and the adequate technical assistance in how the waste should be disposed or handled in course of removal.

Theory of Planned Behavior

According to Ajzen et al (1996), the willingness to conduct oneself in a certain way or to do something is the main determining factor to a successful behavior or act. This therefore means that if people have purposed to enable activities like disposal of wastes early and are willing to financially support the project, then the projects have a high chance of success since there commitment is highly guaranteed.

With regard to public environmental services or goods, willingness to pay (WTP) will be high if people have a positive mindset towards supporting such services and more if the society collectively supports such services. This ensures that all people are responsible for owning such projects for the greater good of every person and that a culture to support such projects is cultivated (Meyerhoff *et al.*, 2006). The theory is therefore of great significance to the study in that if the public is willing to pay for the safe removal of asbestos waste the more successful the implementation of the projects will be.

Stakeholder Theory

According to Freeman (2007), any organization management has to take care of the needs and aspirations of entities it affects whether directly or indirectly in any way. What exactly represents a stakeholder is a bone of contention as some leaders of organizations have to represent the interests of their employers who have utmost trust and confidence in them. Therefore for every stakeholder in project to be satisfied, there is need to identify them clearly to meet their needs effectively. The support of stakeholders who feel that their needs are met will avoid setbacks like boycotts, legal actions and ensure success of the projects (Miles, 2012).

The concept of stakeholders is very important in asbestos disposal projects. Specifically, stakeholder analysis techniques can provide concerned organizations with ways to identify and meet the needs of all involved parties. Stakeholder theory recognizes the need for organizations to address and meet expectations of every involved party in a project (Pérou, 2012). Jensen, (2010) argues that when decisions are being taken by the management, interests of every stakeholder should be considered in order to provide a smooth environment for projects implementation.

Theory of Change

According to Vogel, (2012), theory of change is the articulation of the underlying beliefs and assumptions that guide or serve delivery strategy and are believed to be critical for producing change and improvement. The theory delves on change and how the organization can meet its main goal if some improvements and adjustments are done to the current way of doing things. It involves looking deeper at the way of contacting affairs currently and how with everyone's support we can challenge ourselves to think outside the box for us to meet our main goals successfully.

Clearly outlined pathways to change enable interventions to make sure that the type of change required can be achieved forming the basis for project evaluation. The linkage in outcome interventions and confidence that interventions will actually lead to sustainable changes enable effective evaluations and monitoring of the projects (James, 2011).

To the study, monitoring and evaluation of the intermediate project outputs and how interventions contribute to the overall goal of the project was consequently carried out based on these change pathways. The theory helps in development of better evaluation questions and identification of key indicators for monitoring.

Conceptual framework

Conceptual framework relates independent and dependent variables. It provides a clear understanding of how the relationship exists (Cargan, 2007). It is linked to the study problem and prepares the researcher for staging of the specific research question that drives the study being reported. In figure 2.1, the independent variables are technical factors, financial factors, stakeholder involvement and monitoring and evaluation while the dependent variable is project implementation.

Independent variables

Dependent variable

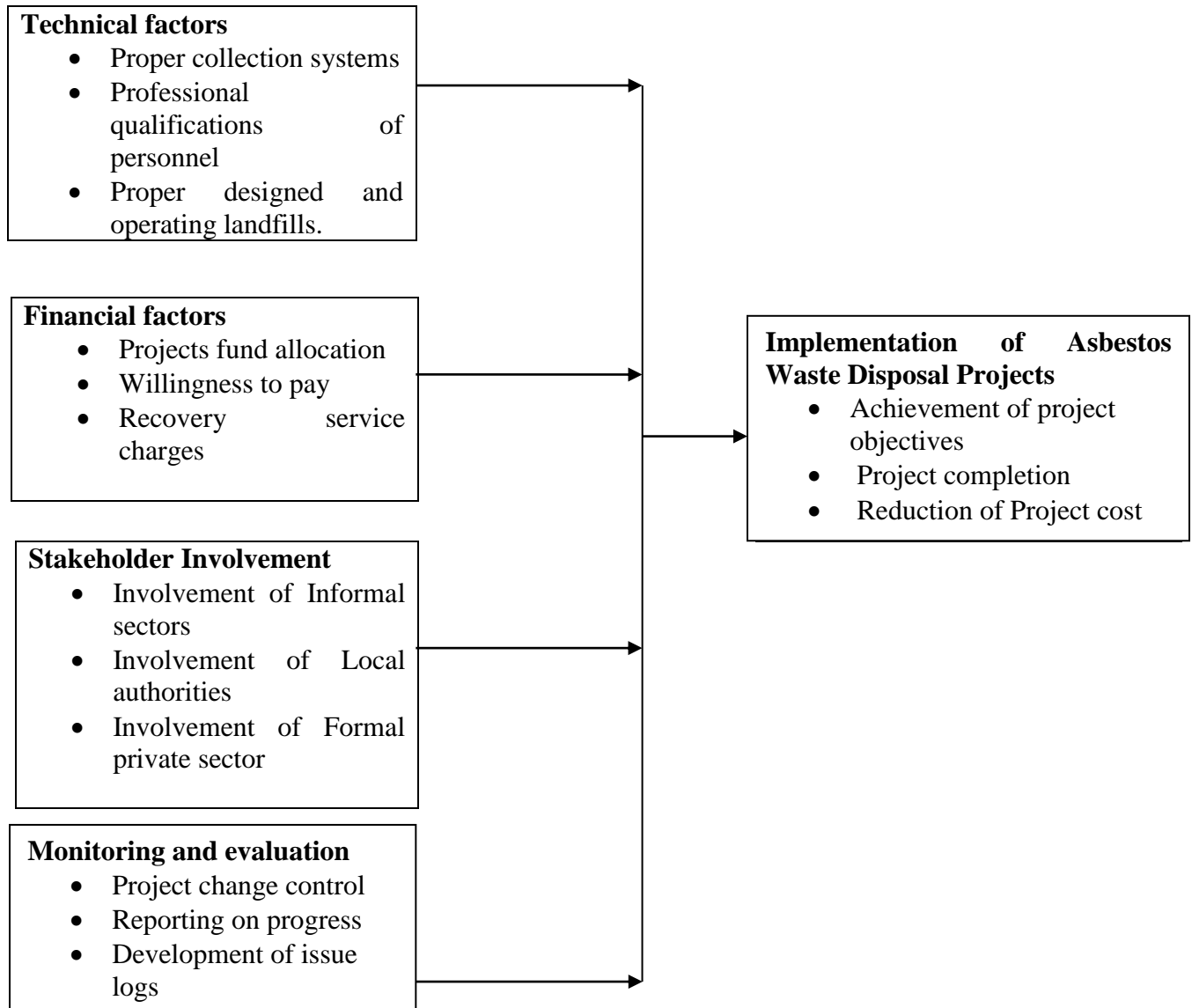


Figure 1 Conceptual Framework

2.2 Empirical review

Technical factors

Technical aspects of asbestos waste disposal involve the collection systems and how they are maintained, professional qualifications of those handling the asbestos waste, where the waste is disposed and how it should be handled in the whole process of disposal to avoid health dangers. A study by Majale (2011) on modernizing solid waste management found out that selection of equipments like transportation trucks and handling technology must be within the organizations

capacity in terms of the initial acquisition and maintenance costs as well as capability of existing disposal amenities

A study by Klundert & Anschutz (2001) found out that technical designs should be done and planned with the input of all stakeholders for them to be more efficient and effective. Engagement of the private sector which might be more organized and efficient has been used in some of the developed countries and proven to be successful over the years. Proper systems ensure that sources of asbestos waste are identified, registered and good management plans developed.

Many researchers and audits by most public institutions have unearthed major inefficiencies in waste management systems. This is because most of the technology and equipments are imported from foreign countries where the geography environments are totally different. The fact that some equipment work well in developed countries is not a guarantee that they will work well in a developing country like Kenya (Zurbrugg (2000). According to Majale (2011), many of the equipment and technology in developing countries are donated while others acquired cheaply. The lack of spare parts and properly trained personnel to operate and maintain such equipment or technology renders them inefficient or under used.

Ogawa (2002) on a study about “solid waste management in developing countries” noted that most institutions do not have good waste management plans. This therefore means that any equipment or technology acquired is without specific use and therefore blindly acquired. Moreover, sustainability of such systems becomes an issue since there are no proper mechanisms to ensure that a system will serve the institution even in years to come smoothly and that it can adapt to the changing environment in asbestos waste management. Research on the emerging issues in the waste disposal sector is very important as this will enable the concerned institutions to plan accordingly. It helps understand the topographical conditions, how landfills and disposal ways will be received by the local community among many factors which in turn prevent loss of funds (Majale, 2011).

A study conducted by Coffey and Coad (2010) on collection of municipal solid waste in developing Countries like Kenya noted that proper designed and operating landfills are a major problem in the disposal of hazardous waste. Many of the counties dispose their waste in neighboring counties although challenges have emerged in the recent past of communities resisting wastes from other counties especially asbestos being disposed on their land. With increasing community awareness and also independence of the counties, acquiring land for disposal of asbestos takes a longer due to negotiation procedures and beauracracy involved.

Financial factors

A study by Brunner (1999) observed that high expenditure on hazardous waste is very expensive to the county governments in Kenya he further argued that lack of monetary support, payment defaulters and fewer workers had made it nearly impossible for asbestos waste management. Brunner further recommends opting for private sector involvement and partnership to ensure efficient and effective implementation of asbestos disposal projects.

According to Contreau (2001), there is scarcity of detailed information on the actual costs incurred in collection, transportation and disposal of asbestos waste in many developing

countries due to insufficient use of full accounting methods and hence difficulties in estimating the actual expenditure on disposal projects. Whenever imbalances exist between revenues and expenditures, then financial constraints set in and this negatively affects the implementation of the disposal projects.

A study by Coffey and Coad (2010) found out that effective and efficient utilization of scarce resources by asbestos waste management institutions is paramount to the success of the projects. They argued that when institutional inefficiencies like overlapping of functions are addressed in the institutions, savings are realized and the financial challenges are addressed. Other ways of raising funds like user pays principle can be employed to collect additional funds. Willingness to pay by the waste generators is vital for the institution to meet its financial obligations. They further noted that when a culture of users paying for the disposal services is cultivated, dependence on the government funds will be low and the system becomes self sufficient.

A study UNEP, (2005) on municipal solid waste management observed that recovery service charges are paid by waste generators for the provision of disposal services and that this supports the polluter pays principle which ensures that the waste generator meets full or part of disposal costs. However, they argue that the system does not always succeed as it is dependent on the affordability by the households and whether they are affected directly by the waste. Poor or weak enforcement by the authorities and unwillingness to pay by households and institutions affect the collection of funds and sustainability of the system. When the implementing institutions embrace transparency, then generators can trust them and in turn support the projects through full payment to support the services.

Stakeholder involvement

In a study about partnerships for urban environmental management, Corinne *et al* (1999) concluded that the success of any environmental problem solving projects and especially hazardous waste management like asbestos depends greatly on the unity of all the involved stakeholders. According to Imad (2011), all those involved and affected whether directly or in some way in the management of any waste compose of the stakeholders and their say is fundamental for the success of management or disposal projects.

According to Joseph (2006), it is important to note that households in a community belong to different social and cultural groups, practices, expenditure patterns, income and this affect implementation of the projects. Leaders whether in the political or social circles play a central role in motivating the expected way of conduct and handling of waste. This is often done best by the leaders directly involving themselves and practicing what they wish their people to do and therefore setting the best examples.

A study by Chaturvedi, Arora and Kilguss (2011) on private sector and waste management in Delhi, India concluded that when private partnerships and engagement of formal private sector in general is done on the basis of knowledge and understanding of the underlying conditions, then such engagements proved to be very helpful in implementation of the projects.

Cointreau, (2001) noted that formal private sector inclusion in asbestos disposal projects helps a lot in improving on efficiency and rallying private investment and thus providing funds for infrastructure and equipment. Partnerships with the formal private sector however need to be

properly mediated and moderated to avoid exploitation of either of the parties and reap maximum benefits from the relationships.

JICA (2005) on a study on supporting capacity development in solid waste management in developing countries noted that people participation is a motivating force for long lasting waste disposal initiatives. Projects where the engagement started early enough at the planning stage have highly succeeded. Also, when the laws and policies are suitably enacted by authorities to support participation and enforcement is upheld, then efficiency and effectiveness are enhanced in the implementation of the projects. The solution to thriving stakeholder engagement is the interest and will of the leaders as concluded by Mwangi (2000).

Monitoring and evaluation

Project monitoring is the logical, routine gathering and breakdown of information over a period of time based on targets as well as objectives of the project. It's an ongoing process conducted when the project is being implemented, (UNEP, 2008). It helps the management to keep track of activities and raise alarm when things go wrong. On the other hand, Gitonga, (2012), defines evaluation as periodic checks that compare the actual and set targets. It can take place when project on going or on completion.

Dijk and Kwarlenge (2007) undertook a study on urban management and solid waste management issues in Africa and noted that through investment in monitoring and evaluation, effectiveness in delivery of waste disposal services can be highly enhanced since issues which are really affecting the project and not those leaders think are addressed. WRAP (2010), through monitoring and evaluation were able to understand attitudes and behavior of residents in Barnet, England towards waste collection and encouraged them to participate more through public campaigns after which uptake increased.

A study by Shrenash and Sawant, (2013) on effect of project cost and time monitoring on progress of construction projects noted that as projects grow complex and the need for accountability increases, monitoring and evaluation have become key in all projects. Project stakeholders require information on the progress of projects and what to expect. Performance indicators are simple and reliable measures that can be used to identify critical areas that need action in a project. They provide key information that supports decision making and strategic planning.

As stated by U.S environmental protection agency (2012), many complex factors in asbestos management have necessitated monitoring and evaluation to help implementation. Introduction of new programs like pay as throw and applying polluter pays principle would require monitoring and evaluation to determine their effectiveness. Also, helps planners to know whether such interventions would support the project and if not then other ways are employed early enough to avoid stalling of projects.

Burke (1999) noted that development of issue logs can help a lot in monitoring of asbestos disposal projects. Issue logs are records of issues or problems that arise unexpectedly during the project and need to be resolved as soon as possible. They help project monitoring in that the impact of any arising issues to the project need to be addressed and in determining what actions

are required. Monitoring should be done periodically and considering that each project is unique, stakeholders should be involved in making plans for proper monitoring,

In the cause of improving monitoring and evaluation systems around the world, the World Bank noted that the support of leaders is key to the favorable outcome of the programs. The project leaders help in creating capacity and access to evidence based data and indicators to maintain monitoring and evaluation systems. The achievement can be witnessed in countries like Chile where stable monitoring and evaluation systems have been set up with the help and commitment of the government and project leaders, (World Bank, 2013).

3.0 RESEARCH METHODOLOGY

The study adopted a descriptive research with a study population of 394 staff working at NEMA Machakos branch, public health department and department of housing Machakos County. The study applied probability sampling design by using a stratified random sampling technique to select a sample size of 80 respondents. The main data collection instruments were the questionnaires containing both open ended and close ended questions which were pretested using a pilot study. Descriptive statistics data analysis method was applied to analyze data aided by Statistical Package for Social Sciences (SPSS) to compute response frequencies, percentage mean and standard deviation results. Finally Multiple Linear Regression model was employed to establish the significance of the independent variables on the dependent variable. The findings were presented using tables and charts.

4.0 FINDINGS AND DISCUSSION

Technical Factors

The first objective of the study sought to ascertain the effect of technical factors on implementation of asbestos waste disposal projects in Machakos County.

Table 1: Technical Factors

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Proper collection guidelines are in place for asbestos disposal projects	38%	23%	4%	35%	0%
All people handling asbestos have professional skills	40%	1%	16%	39%	4%
The county has Proper designed and operating disposal sites	13%	12%	12%	55%	8%
Personnel handling asbestos are always in personal protective equipment (PPEs)	49%	6%	2%	39%	4%
There are enough equipment to facilitate safe disposal of asbestos	39%	0%	12%	41%	8%
There are enough licensed transporters of asbestos	27%	0%	6%	51%	16%

The study findings implies that majority of the respondents agreed that technical factors influence project implementation in the county. The findings also corroborates findings by Hassan (2011) where he confirmed that the reasons why many organizations fail to achieve project implementation goals is as result of lack of proper orientation of project implementation teams, and lack of knowledge sharing amongst project implementation teams.

Financial Factors

The study aimed to assess how financial factors affected implementation of asbestos waste disposal projects in Machakos County. These findings imply that majority of the respondents agreed that all the financial factors influenced implementation of projects in the county.

Table 2: Financial Factors

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Enough funds are allocated to ensure asbestos is disposed safely	31%	2%	6%	49%	12%
People are willing to pay for safe disposal of asbestos	9%	12%	20%	27%	32%
The charges for disposal of asbestos are normally fair	21%	2%	16%	39%	22%
There is always competent staff on site during asbestos disposal	39%	6%	33%	12%	10%
Staff handling asbestos are well compensated	25%	2%	12%	49%	12%

Stakeholder Involvement

The study sought to ascertain the influence of stakeholder involvement on implementation of asbestos waste disposal projects in Machakos County. From the study, it is evident that the county government has no strong cooperation with the private sector to help in disposal of asbestos.

Table 3: Stakeholder Involvement

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Enough funds are allocated to ensure asbestos is disposed safely	31%	2%	6%	49%	12%
People are willing to pay for safe disposal of asbestos	9%	12%	20%	27%	32%
The charges for disposal of asbestos are normally fair	21%	2%	16%	39%	22%
There is always competent staff on site during asbestos disposal	39%	6%	33%	12%	10%
Staff handling asbestos are well compensated	25%	2%	12%	49%	12%

Monitoring and Evaluation

The study aimed to determine the effect of monitoring and evaluation on implementation of asbestos waste disposal projects in Machakos County. Giving reports on projects on progress was also found to be efficient.

Table 4 Monitoring and Evaluation

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
There are mandatory site visits when asbestos is being disposed	35%	22%	14%	25%	4%
There is no regular Reporting on progress of projects	45%	2%	10%	41%	2%
Issue logs are developed to monitor progress	21%	6%	16%	21%	36%
log frames are used for monitoring and evaluation of projects	35%	0%	18%	41%	6%
There are other effective tools in place to monitor and evaluate projects	39%	0%	20%	33%	8%

Implementation of Asbestos Waste Disposal Projects

The study focused on the factors that determine implementation of asbestos disposal projects in the Machakos County. The findings thus indicated that achievement of project objectives; project budget; project completion; project specifications are the major factors determining successful project implementation in the organization.

Table 5 Implementation of Asbestos Waste Disposal Projects

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Projects are completed within stipulated time	33%	2%	4%	45%	16%
Projects are completed within the set budget	21%	6%	14%	37%	22%
All projects have achieved their set objectives	29%	2%	12%	41%	16%
Projects have been according to set specifications	31%	0%	16%	43%	10%

Regression Analysis

The study conducted a multiple regression analysis so as to test relationship among variables. The summary of regression model results in table 6 shows that the coefficient of determination (R^2) is 62.1 and R is 0.788 at 0.05 significance level. This therefore implies that all the four independent variables notably; (X_1) technical factors, (X_2) financial factors, (X_3) stakeholder involvement and (X_4) project monitoring and evaluation significantly affected the dependent variable (Y) which was project implementation.

The coefficient of determination (R^2 , 0.621) indicates that 62.1% of the variation in project implementation at Machakos County is determined by technical factors, financial factors, stakeholder involvement and project monitoring and evaluation. The remaining 37.9% of the variation in project implementation is determined by other variables not included by the study model. This shows that the model has a good fit since the value of R^2 is above 50%. This concurred with Graham (2002) that (R^2) is always between 0 and 100%: 0% indicates that the model explains none of the variability of the response data around its mean and 100% indicates that the model explains all the variability of the response data around its mean.

Table 6 Regression Model Summary

Model Summary	R	R Square	Adjusted Square	R Std. Error of the Estimate
1	.788 ^a	.621	.585	.011

a. Predictors: (Constant), X_1 , X_2 , X_3 , X_4

Analysis of Variance (ANOVA)

The study therefore applied Analysis of Variance (ANOVA) in order to test the significance of the overall regression model. Table 7 indicates that the value of F-calculated was 24.538 greater than F -Table (2.57) with significance of 0.004. Since the significance level of 0.004 is less than 0.05 we conclude that all the independent variables; technical factors, financial factors, stakeholder involvement and project monitoring and evaluation significantly determined project implementation in Machakos County.

Table 7 ANOVA Results

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	18.943	4	4.736	24.538	.004
Residual	8.875	46	0.193		
Total	27.368	50			

Regression Coefficients

Table 8 further presents the results of the test of beta coefficients for each independent variable. As presented in the table, (X_1) technical factors had a beta coefficient of 0.777 positive at 0.000 significant level. (X_2) financial factors had a beta coefficient of 0.742 positive at 0.001 significant levels. (X_3) stakeholder involvement had a beta coefficient of 0.678 positive at 0.003 significant level and (X_4) project monitoring and evaluation had a beta coefficient of 0.623 which was found to be positive at 0.004 significant levels.

The results in table 8 showed that the coefficients of all the four independent variables; X_1 , X_2 , X_3 and X_4 are all significant. The respective calculated t-statistics for the coefficients are 7.076, 6.254, 4.876 and 3.771 with P-values of 0.000, 0.001, 0.003 and 0.004 respectively. These p-values are all less than 0.05 implying that all the independent variables significantly determined project implementation in Machakos County. The regression model generated was thus expressed as;

$$Y = 10.004 + 0.777X_1 + 0.742X_2 + 0.678X_3 + 0.623X_4 + \epsilon$$

The regression model implies that, a unit increase in technical factors leads to a 0.777 increase in project implementation; a unit increase in financial factors leads to a 0.742 increase in project implementation; a unit increase in stakeholder involvement leads to a 0.678 increase in project implementation and a unit increase in project monitoring and evaluation leads to a 0.623 increase in project implementation. The study results thus demonstrated that technical factors followed by financial factors then Stakeholder involvement and lastly project monitoring and evaluation had the largest impact respectively on implementation of asbestos disposal projects in Machakos County.

These findings relate to findings by Joseph (2006) who acknowledges that recognition as well as involvement of diverse stakeholders in affected locality is supreme in their synchronization and ultimately success of the disposal projects. The findings also concur with those of Chinn and Kramer (2010) which concluded that the major factors that affect effective execution of project implementation activities in any organization includes the technical capabilities and the effectiveness of the applied project monitoring and evaluation.

Table 8 Coefficient Results

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
<i>(Constant)</i>	10.004	1.3137		7.615	.000
Technical factors	.777	.110	.765	7.076	.000
Financing	.742	.119	.654	6.254	.001
Stakeholder involvement	.678	.139	.555	4.876	.003
Monitoring & evaluation	.623	.165	.532	3.771	.004

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

The study established that the county had in place proper collection guidelines for asbestos disposal projects as pointed out by the majority of the respondents. It also emerged that majority of the county staff handling asbestos were well trained and had the required skills. The research also established that less funds are allocated and hence hindering the service delivery. It further established that the rates charged by the counties are not fair and hence many of the waste generators would rather use alternative means of disposal.

The researcher established that majority of the stakeholders are well involved in the disposal projects. Partnership with formal private sector was however not satisfactory as expressed by majority of the respondents. The study established that the County did not embrace Monitoring and evaluation of the projects whether in progress or after completion. Most employees never felt as part of the projects as majority felt not involved in the site visits and reporting on the projects progress.

Conclusion

The study concluded that technical factors followed by financial factors then Stakeholder involvement and lastly project monitoring and evaluation affected project implementation in Machakos County. Under technical factors, lack of proper designed landfills, enough equipment to facilitate safe disposal of asbestos and enough licensed transporters of asbestos meant that the technical capabilities of the county were affected and this hinders successful project implementation. On financial factors, high costs charged to the waste generators has led to unwillingness to pay, this compounded with lack of proper financing from the government has led to dwindling revenues against rising expenses which in turn hinders successful project implementation of the projects.

Recommendations

To improve on their technical capabilities which as established have an impact on implementation, the county or organization involved should ensure that its employees have the required skills to undertake their job tasks effectively. The county needs to set aside land for sole disposal of asbestos and any other hazardous wastes as well as partnering with licensed transporters to facilitate efficient and effective movement of the waste. To manage the rising expenses in the disposal process, the management should work towards lowering the fees charged to the waste generators. The county government should work towards allocating more funds in order to enable smooth project implementation. Lastly, to improve on project monitoring and evaluation, the project managers should employ effective project evaluation techniques such as Project Evaluation Review Technique (PERT); regular site visits should be contacted; project progress reporting methods should be applied; and the management must make commitment to embrace monitoring and evaluation.

Areas for Further Research

- i. The researcher recommends further research should be done on the factors influencing implementation of asbestos waste disposal projects in other counties in Kenya
- ii. Finally more detailed study on effect of stakeholder involvement on other hazardous waste disposal projects in Kenya is suggested.

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