

Failures & generic recommendations towards the sustainable management of renewable energy projects in Sub-Saharan Africa (Part 2 of 2)



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ABSTRACT

Renewable energy (RE) generation is expected to become the main source of energy in Sub-Saharan Africa (SSA) over the next century. However, more often than not, the sustainability aspect of these projects is a characteristic that is not clearly defined in terms of projects implemented in SSA. The rate at which projects fail is creating a negative impact towards the full acceptance of renewable energy technologies (RETs).

The aim of this paper is to comprehensively explore the reasons of failures and provide recommendations towards the sustainable management of RE projects in SSA. We accomplish this by combining findings from past literature on the failures of RE projects in SSA with an ethnographic approach and practical experience in the implementation of RE projects in Sub-Saharan Africa. We propose the following solutions: (i) transparency, (ii) ownership, (iii) shared responsibility and (iv) community involvement. We further present hermeneutic recommendations that should be taken into account by stakeholders towards implementation of any sustainable renewable energy project.

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1. Introduction

The true development of the Sub-Sahara is principally hinged on the possibility of the provision of clean energy. Within the countries in Sub-Saharan Africa (SSA), energy is the backbone that to some extent supports all existing sectors. Despite this, so many locations remain without connection to the grid while those connected to the grid experience regular power outages that have become arduous to fathom. Renewable Energy (RE) has been tapped to become the future of energy generation in SSA due to its robustness, cleanliness and sustainability. More importantly, the decentralization of energy generation in order to reach communities in areas without a grid connection or infrastructure is the only viable solution to Africa's energy problems [15,16]. However, the sustainable management of these publicly funded development projects has not provided the expected results as projects more often than not fail after their commissioning [25]. The

sustainable management of RE projects in developing locations such as SSA is one of the important conditions that must be met for projects to attain their sustainability repute. However, few to no studies have been carried out on the sustainable management or the failures of renewable energy development projects in Sub-Saharan Africa. Until recently, Ikejemba et al. [17] presented a study analyzing the failures and absence of sustainable management attributed to RE development projects in SSA. Not only do the failures of RE projects affect their sustainability, they further diminish the belief that the people from the region possess in the technology.

In contrast, one important point is “*which relevant guidelines towards success in the sustainable management of RE projects in SSA does existing literature provide?*”. We have determined that upon the considerably large amount of research conducted on renewable energy and project management no clear interest has been shown by researchers in studying the factors that affect the *sustainable management* of RE projects in SSA. Concerns have been raised among scholars which point to the gap between project management theory and practice, in response to which some attempts have been made to “rethink” project management [13]. Indeed, having a good understanding of theoretical and practical

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aspects of project management is absolutely necessary in all projects, including RE projects in SSA, and we aim to do so here. Project management has reached advanced stages in both theory and practice, but the risk of failure in projects has always been a cause for concern in professional settings. Earlier research in the field of project management focused more on measuring the failure of projects [4]. This has been part of an entire research concentration on identifying critical factors which cause projects to succeed or to fail [10]. The management of RE projects has proven to involve high complexity due to the myriad of factors underpinning the adoption of RE [8,36,39].

RE projects face a lot of unique challenges. Primarily, the adoption of renewable energy technologies (RETs) follows the need to substitute sustainable energy sources for fossil fuel sources in the wake of climate change and global warming. This transformation from fossil sources to RE sources faces systemic challenges which require the intervention of governments, international organizations and corporations. Significant progress has been achieved in efforts to address the systemic changes. This is evident in the intentional formulation of directives and policies for a global transformation towards sustainable development and the investments in research, development and implementation of RETs worldwide [11,19]. However, progress in the area of research, development and implementation of RETs is not equal among nations. On the one hand, developed countries have advanced in research and development of RETs and thereby rely less on technology transfer in the implementation of their RE projects. On the other hand, developing countries rely more on technology transfer to implement their RE projects. This makes it even more demanding to take sustainable management practices more seriously in RE projects in SSA.

Sub-Saharan Africa is one of the regions with a high concentration of developing countries. The proportion of renewable energy produced in these countries is comparatively low. Causal factors include lower investment into research and development of renewable energy technologies, high costs of technology transfer and, more importantly, the failure of renewable energy projects. The paper by Ikejamba et al. [17] - focused on evaluating the empirical situation in SSA and identifying some of the faults which steer RE projects towards failure - is the only paper that comes close to identifying the issues of failures surrounding RE development projects in SSA. However, an in-depth justification is not provided as to how this occurs consequently. In this paper we present and discuss the failures and factors which can contribute to long-term success of RE projects in SSA.

Several reasons are attributed to the failures of renewable energy projects in SSA. Deducing from the study by Ikejamba et al. [17] the authors present the main reasons attributed to these failures that include: the political agenda of the financing government, the process of awarding RE development projects, the encumbrance of participating stakeholders, inadequate planning prior to the implementation of projects, maintenance and management of implemented projects and finally, the public acceptance and inclusion of the beneficiaries as stakeholders. The present study aims to further explore these reasons of failures impacting the sustainability of RE development projects. An important aspect of our study is to realistically present the state of affairs as is, a condition that most articles on Africa tend to circumvent.

The rest of the paper is outlined as follows. In Section 2 we present our research approach. In Section 3 we present the ethnography responses and analyze in-depth the reason for failures concurrently. In line with that, Section 4 outlines the subsequent potential solutions. Finally, Section 5 presents conclusions and further recommendations.

2. Research approach

This study utilizes the ethnographic approach to obtain primary data. It involved the direct observation and analysis (cross-validation of responses) of 29 public RE projects in ten SSA countries. The countries include: Nigeria, Ghana, Kenya, Gabon, South Africa, Tanzania, Mozambique, Ethiopia, Malawi and Uganda. However, due to the instability in Uganda at the time of the study, none of the projects studied in the country was directly observed. Hence, Uganda is excluded (see Table 1: Project & Data Information).

Ethnography allows for researchers to go into analysis of specific areas, identify contextual factors and examine the cultural and institutional dimensions of the topic. RE projects in SSA are not entirely private affairs, but involve different stakeholders such as communities, corporations, research institutions and governments. Ethnography brings the researcher into direct contact with the empirical situation and the actors therein. *The main reason for the utilization of this approach was the absence of up-to-date reports about the conditions of the RE projects. Additionally, data on the management of renewable energy projects is scarce and only ethnography offers the opportunity to get into direct contact with the stakeholders and institutions involved in the project.* Although each project investigated had peculiar challenges, most of the problems with sustainable management were common among all projects, and pointed to the possibility of identifying common solutions. We did engage project managers who indicated the sensitivity of the information they provided and requested that we uphold anonymity of their projects. Their responses mainly corroborated the observations we made and assumptions we formulated based on the literature review we conducted on the failure of renewable energy projects in SSA.

3. Analysis of the attributed failures & ethnographic responses¹

In this section, we present an in-depth analysis (Section 3.1–3.6) associated to understanding why RE projects fail in Sub-Saharan Africa. Foremost, we begin by highlighting in Fig. 1 the main focus on the failures of these projects and their interconnection with the participating stakeholders that has been presented in existing studies and actual projects [17].

In Fig. 1, the interconnection between stakeholders (financing government, implementing organization, public) and the issues connected to each of them has been indicated. With the government awarding the project, one issue that affects the overall management of an RE project is the specific political agenda that the government harbors. This affects the process by which the project is awarded to the implementing organization and as such the issues of planning, implementation and maintenance are not clearly defined and enforced. This results in an unsustainable implemented project that creates a negative mannerism towards the adoption and acceptance of renewable energy projects by the public. In addition, this affects the relationship between the implementing organization and the local communities. The following sections discuss the issues in-depth and subsequently provide solutions to the problems and the interconnections.

3.1. Political agenda

We cannot rule politics out of public RE projects in SSA

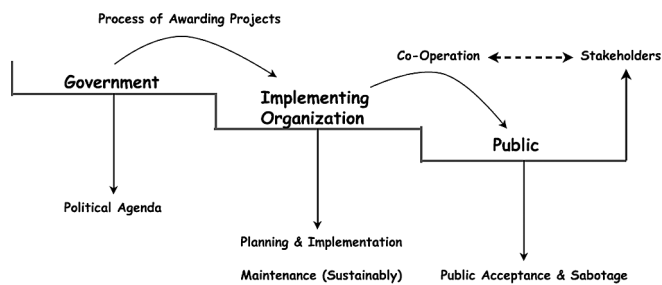
¹ All responses provided by stakeholders for this study are cross-validated with all responses from other stakeholders and the physical state of the corresponding project. These responses have not been coded along a specific set of categories and involve explicit interpretation of the meanings and functions.

Table 1
Project & data information.

Project Number	Project Location	Project Type	Physical Analysis	Method	Timeline
N1	Nigeria	Street Light	Yes	II, FI, GD	December 2015–January 2016
N2	Nigeria	Public Hospital	Yes	FI, TC	February & March 2016
N3	Nigeria	Public Office	Yes	FI	March 2016
N4	Nigeria	Street Light	Yes	II, GD	December 2015–January 2016
N5	Nigeria	Street Light	Yes	II	December 2015–January 2016
N6	Nigeria	Public School	Yes	II, GD	January 2016
N7	Nigeria	Public Infrastructure	Yes	II, FI	January 2016
N8	Nigeria	Public Infrastructure	Yes	FI, TC	March 2016
N9	Nigeria	Street Light	Yes	II, GD	December 2015–January 2016
N10	Nigeria	Public Hospital	Yes	II, FI, GD	February & March 2016
G1	Ghana	Public Office	Yes	FI	February 2016
G2	Ghana	Street Light	Yes	FI, GD	March 2016
G3	Ghana	Remote Village Off-Grid	Yes	II, GD	December 2015–January 2016
G4	Ghana	Public Infrastructure	Yes	II, TC	March 2016
K1	Kenya	Remote Village Off-Grid	Yes	II, FI, GD	March 2016
K2	Kenya	Public Infrastructure	Yes	FI, GD	February & March 2016
K3	Kenya	Street Light	Yes	GD	March & April 2016
GA1	Gabon	Street Light	Yes	II, GD	February & March 2016
GA2	Gabon	Public Office	Yes	FI, TC	February & March 2016
S1	South Africa	Public Infrastructure	Yes	FI	December 2015
T1	Tanzania	Remote Village Off-Grid	Yes	II, GD	January 2016
T2	Tanzania	Public Infrastructure	Yes	FI, GD	January 2016
M1	Mozambique	Public Infrastructure	Yes	II, FI, TC	March & April 2016
M2	Mozambique	Street Light	Yes	TC, GD	April 2016
E1	Ethiopia	Public Infrastructure	Yes	II, FI	February–April 2016
E2	Ethiopia	Public Infrastructure	Yes	II, GD, TC	February–April 2016
E3	Ethiopia	Street Light	Yes	TC, GD	February–April 2016
MA1	Malawi	Street Light	Yes	TC, GD	March 2016
MA2	Malawi	Remote Village Off-Grid	Yes	II, TC	March 2016

Key

Public Infrastructure	Methods	Code
Borehole	Informal Interviews	II
Water Heater	Formal Interviews	FI
Minor Connections	Telephone Conversation	TC
Group	Dialogue	GD

**Fig. 1.** Issues and interconnection affecting the Sustainable Management of RE Projects in SSA.

countries. Political influence is pervasive in projects and usually translates into authority and decision making power embodied in public sector officials [20]. Conflicts of interest are common in RE projects where political interests are not synchronous with project goals. We deduced political agenda to have both constructive and destructive effects on potential projects. Constructive political agenda prompted attempts to establish efficient management systems, mobilize and allocate resources for successful implementation of projects. Nonetheless, some politicians exploit public RE projects to attain or further their political goals which, in most cases, are divergent and contradict project goals [5,14]. Obviously, this modus operandi negatively affects the sustainable implementation of RE projects in SSA.

Some project managers we interviewed expressed that “to some politicians, RE projects are nothing more than symbols of their efforts

to ‘bring development to the doorstep of the people’”. This expression underscores the symbolic importance of RE projects. Most politicians in SSA bear the perception that RE projects must demonstrate their party’s fulfillment of campaign promises or support their pleas to beneficiaries for re-election. For this reason, the significance of a public RE project transcends its basic functions such as lighting streets, powering homes, hospitals and schools. Because RE projects possess more symbolic importance than functional importance to politicians in SSA, less importance is given to proper implementation. The projects are only as good as they help them to convince voters and win elections.

Majority of the project managers agree that politicians are a major distraction to their professional practice. “They pointed out the existence of substantial political wrangling and cynicism in most RE projects”. Analogous to the proverb “when two elephants fight, it is the grass that suffers”, different political parties (elephants) with opposing interests, openly (or clandestinely) use public projects (grass) to get at their opponents. According to some managers – “it is not always the success of the project which matters to politicians. Instead, they seek conditions of projects (successful or failed) which corroborate their own competence and/or the incompetence of their opponents”. These responses from dialogues inform us that the combination of political agenda with RE projects may initially suggest a win-win situation which leads to mutual benefits between politicians and the public, but such is not the case because of the difference in strategic outlook between public interests and political interests. Whilst the public is interested in projects that solve their energy and energy-related problems in a long-term manner, politicians are interested in enticing the public to elect

them. Thus, the influential but short-term, exploitative and divergent political agenda in public RE projects contributes to their failure. In most SSA countries, public projects are implemented not entirely on rational strategic reasons for the so-called greater public good [13]. Most of the RE projects found in the midst of many political innuendos, fail.

3.2. Process of awarding projects

The process of awarding contracts for RE projects links with the influence of politics in public RE projects as discussed above. In some SSA countries, legal procedures have been established to ensure that the awarding of contracts is objective, transparent and free of nepotism or favoritism. For example, Ghana has a functioning Public Procurement Process where legal tenders for government projects are advertised through mass media. The public procurement practices are expected to be anonymous and contracts awarded meritoriously. Despite the existence of a compressive procurement process, corruption still occurs [26].

Several project developers indicated that “the awarding of contracts is not meritorious or based on competence and ability to carry out the project. Instead, it is based on personal ties”. We further analyzed the process of awarding contracts and outlined the authority structure involved in project disbursement. The diagram below (Fig. 2) illustrates the flow among parties in the contract awarding process in most of our research areas. The figure has been constructed by the authors on the basis of reported fraudulently awarded projects as well as on private communication with project developers [18,21,24,27,31].

As shown in Fig. 2, the government body releases a gazette for organizations to participate in potential RE projects. Projects that are awarded to organization “A” involve direct nepotism, whereby projects are awarded directly to organizations that have personal relationships to the government or the awarding personnel. In the case of projects awarded indirectly to organization “B”, this occurs when projects awarded to organization “A” are not implementable by “A” which therefore outsources them to “B”. A case of indirect nepotism occurs when projects awarded to organization “C” are

already known from the onset and as such the “genuine” procedure implemented to award a project is executed to divert any unwanted attention of corrupt practices. Finally, a project awarded to organization “D” results from the process whereby the project proposals undergo genuine scrutiny and the organization with exceptional experience is fairly awarded the project.

The rationale for the above explanation is to understand from a general perspective how projects are awarded and to be able to retrace and distinguish the responsibility of each player within the projects. The management of projects should be the responsibility of a participating stakeholder. In Nigeria for example, so many small solar projects have been implemented around the country ranging from solar boreholes to thousands of street lights. Despite the potential of these projects, most of them have been left to deteriorate [17,25]. This situation has created a negative attitude towards the acceptance of sustainable and clean energy usage within the minds of the masses making it difficult for developing governments to adopt the technology and contributing to the slow implementation of projects.

3.3. Stakeholder co-operation

We identified three major stakeholders in public RE projects in SSA: government, project developers and the public herewith known as the beneficiaries. The amount of political wrangling, nepotism, and opacity in the awarding of public contracts affects the level of trust that the stakeholders involved in RE projects share among one another [22]. Research has shown that the management of public sector projects falls short of efficiency which links with inefficient project governance methods [3,14,22,23,28].

Stakeholder participation is considered an important part of implementing and governing projects. Hence, Public-Private Partnership (PPP) implementation strategies are often preferred, especially in developed countries [1]. Further dialogues show that most public projects in SSA are neither jointly owned nor under the management of properly co-opted PPP management bodies. Rather, ownership is contested among stakeholders in some projects, and outright denied by stakeholders in others. For example, in some

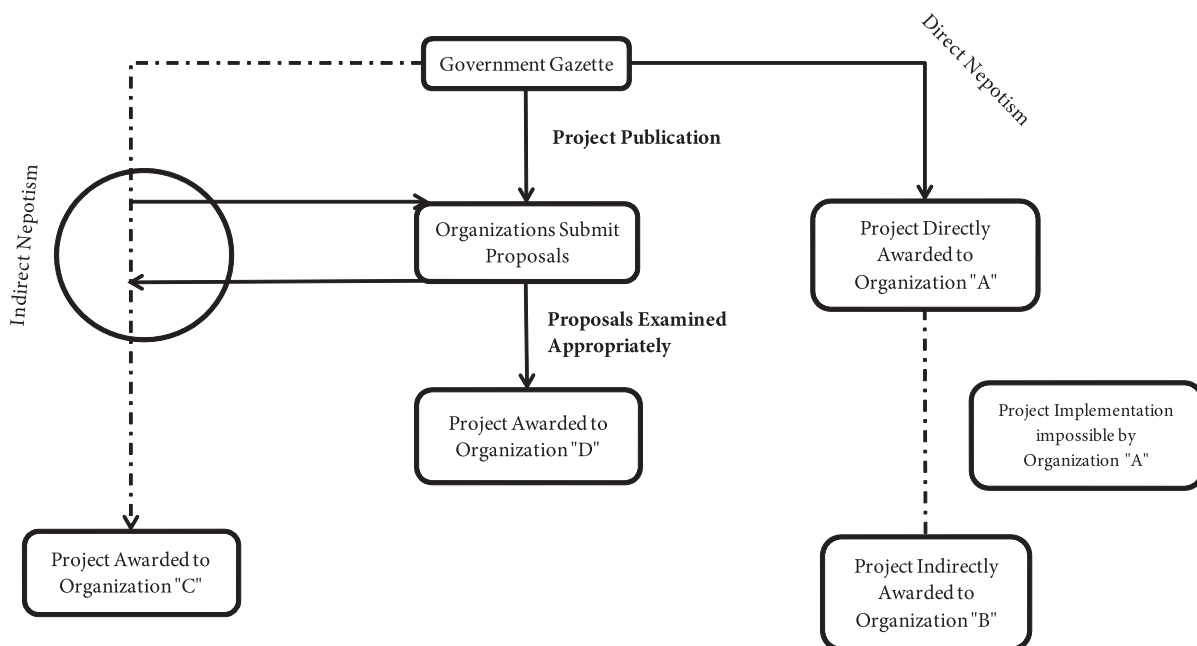


Fig. 2. An outline of project disbursement based on the analysis of fraudulent projects (source: Author's construct).

projects we ethnographically observed, it was not clear which stakeholder(s) owned and had direct responsibility over the projects. Some project developers attributed this occurrence to the application of generic implementation models from the top government level which pays little or no attention to peculiarities in the project implementation areas. Furthermore, some project managers stated – “*We see a lot of potential in stakeholder cooperation. At best, cooperation makes everyone responsible and brings all hands on board which can facilitate project performance. However, cooperation exists in principle but not in practice*”. The shadiness in distribution of responsibility among stakeholders makes it difficult to determine whether they consider their engagement a privilege or burden. We observed that success or failure of a project is the simple yardstick for determining the competence or incompetence of project managers. This is problematic because it excludes other stakeholders. Consequently, most stakeholders are insulated from any direct responsibility for failure. This is unlike private RE projects where all stakeholders have much to lose or gain.

3.4. Planning/implementation

Amongst other reasons for the failure of RE projects in Sub-Saharan Africa is the planning of the project and its implementation. It is difficult to measure the actual time the implementing organizations spend on creating an effective plan, but based on the nature of the failed projects and private discussions with project implementers, it is effortless to assume that an ineffective and an inadequate plan was executed as also indicated in the paper by Ikejamba et al. [17].

Burke et al. [7] investigate the success and failures of implementing new systems based on human behavior. They indicate that the success of any implementation project has little to no attribution to technology. Thus, this indicates that the failures of RE projects are more attributed to the inability of all stakeholders. It is important to make sure that approval is received from all participating stakeholders, distinctively defining the roles of all parties involved, knowing how resolutions will be reached in the project and comprehending how expected outcomes will affect the success of the project. Whilst the potential definition of project success is based on, for example, patronage, economic spin-off, public acceptance and appreciation, most literature bases large projects' successfulness on time and cost aspects [33]. This differs when the focus is on RE projects in Sub-Saharan Africa, because the success of a project is based on its ability to deliver the expected outcome. If this is not achieved, it simultaneously affects the maintenance of the projects and further deteriorates which causes a negative surge within the public perception of accepting the technology and projects associated with it.

An example of implementation failure can be drawn from the project implemented in Lagos, Nigeria [25] also taken into account in our study. Its failure is attributed to the planning and implementation and follow-up maintenance on the system. Thus, we propose that projects that are being implemented should possess a clear definition of ownership of the project and the entity responsible for the project maintenance. Solutions towards the issue analyzed are presented under proposed solutions in Section 4.

3.5. Maintenance

One other determined reason for the failures of renewable energy projects in Sub-Saharan Africa is the maintenance of the projects after their implementation [1,17]. This is a problem that is attributed to the overall planning and implementation of the project. A compelling correlation must exist between the physical maintenance and the stakeholder implementing the maintenance.

However, in the projects analyzed in this study neither was a maintenance plan available nor was maintenance carried out on most of the implemented projects, making it effortless for the projects to deteriorate. Maintaining renewable energy projects entails mainly the inspection, the cleaning and the performance monitoring of the whole system. Of all the projects inspected no monitoring systems were installed. This includes the recently implemented projects. Thus, stipulating the fact that even the new projects may be doomed to fail in the near future. Nevertheless, this is just one of the reasons under the aspect of maintenance that results in failure of renewable energy projects in Sub-Saharan Africa.

“The principal reason for failure under maintenance is the selection of incompetent organizations to implement, manage and maintain renewable energy projects” – Participating project developer.

Findings from our physical interactions with the local community and implementing organizations indicate that there is no clear distinction as to whose responsibility it is to keep the system under maintenance. This whole situation traces back to the starting point on how organizations are selected and the projects awarded.

Further dialogues with project developers indicated that – “*the designation of responsibilities towards maintenance is said to stem from financial government as this is not discussed prior to the implementation of the project and is not included in budget for the project*”.

3.6. Public acceptance and inclusion

Another important finding from existing articles [17] and further analysis on the reasons why solar projects fail in Sub-Saharan Africa is the absence of public acceptance and the non-inclusion of the public as stakeholders within the overall project. The public acceptance of renewable energy technologies is convincingly correlated to the inclusion of the corresponding community in implementing renewable energy projects. Practical ideas exist on how local communities should be involved in the implementation of renewable energy projects [1]. However, it is arduous to comprehend why these recommendations have not been taken into consideration prior to the implementation of the projects analyzed in this study and other implemented projects. Engaging with the locals in one of the villages where a solar borehole water system was implemented indicated that, although the villagers were used as laborers towards the implementation of the project, immediately after the implementation of the project, no real dialogue was executed between the project developers and the local community.

Public acceptance of renewable energy projects in Sub-Saharan Africa is low compared to other parts of the world [12]. This can be attributed to multiple issues such as: (i) the financing government failing to firmly accept the technology and shortcoming in the aspect of awareness creation towards its adoption and implementation, (ii) the high level of ignorance amongst the people with respect to RE and finally (iii) the failure of the implementing organization to unerringly include the local community through a combination of training and resource provision [17]. If the local community does not accept the technology or is not included as stakeholder in the implemented projects, the sustainability of such projects is at towering risk. When projects experience problems or unplanned downtime, the locals aren't equipped with the necessary skills and thus unable to address the problems.

Now that we discussed the key causes for failure, we investigate in the next section how to achieve adequate sustainable management of renewable energy projects in SSA.

4. Proposed solutions

In line with Section 3, this section presents the subsequent potential solutions (Section 4.1–4.4) to assist in the sustainable management of RE projects in SSA. The proposed solutions are based upon our physical analysis, interviews with stakeholders, existing literature and practical experiences in SSA. They are focused on solving the issues raised above in such a way that they can be adopted by project managers, government agencies and private organizations involved in RE projects in SSA. We present and discuss the proposed solutions under these topics: Transparency; Ownership; Shared Responsibility and Community Involvement.

4.1. Transparency

Transparency is a critical aspect of projects in general [40], and renewable energy in particular. Transparency is not merely the absence of opacity, but also the active pursuit of clarity in how public projects are designed and implemented. In our recommendation, the requirements for attaining transparency in public projects are captured in the following points:

- Defragmenting administrative and bureaucratic procedures in public projects
- Implementing checks and balances in stakeholder relationships
- Prioritizing public interests over other interests

Defragmenting administrative and bureaucratic procedures in public projects is important to ensure that projects are planned and implemented sustainably. We identified the bias of current research on RE projects where researchers tend to focus on technical aspects of projects to the neglect of the administrative aspects [29]. We assimilate that most RE project managers have a blind side when it comes to the administrative processes that lead to the initiation of the projects they manage. Based on our dialogues, we find that in most SSA countries *project managers are outsiders to how public projects are assigned because they are involved mainly at the implementation stage rather than at the planning stage of projects*. In some countries, the process of awarding contracts is fragmented and involves the participation of different government bodies. The involvement of these different bodies is not particularly problematic because it offers the platform for applying checks and balances on one another. However, the overlap of the roles of bodies involved in the awarding of contracts inclines them towards compromising standard procedures. We recommend that relationships be streamlined and clearly delineated to avoid overlap and, thereby, promote transparency. In addition, it is important that checks and control should be conducted on these bodies or organizations participating in promoting transparency in awarding renewable energy projects in Sub-Saharan Africa, so as to avoid any sort of corruption or nepotism. This should however be done in a seamless manner to avoid any unwanted bureaucratic situation, that could potentially lead to loss of time and unwarranted discussions that in turn lead to projects not being implemented or delayed unnecessarily.

Enforcing checks and balances is a crucial mechanism for promoting transparency in most democratic processes. Similarly, checks and balances in public RE projects are necessary to ensure transparency. In most SSA countries, checks and balances are uni-directional, occurring from top to bottom. This allows higher level officials to monitor and control the actions of their subordinates without the opportunity for subordinates to monitor and control the acts of superiors. Here, we propose that a bi-directional or multi-directional approach be adopted to allow persons from the

bottom to be able to hold top-level officials responsible. In this way, the interests of the public stakeholders are highly considered. Moreover, the interests of the locals are guaranteed to be considered since they are participating as stakeholders. The focus should be on the established goals of public projects and, accordingly, *prioritize public interests over private, political or financial interests*.

4.2. Ownership

We deem ownership a critically important component of factors which facilitate project success as several other researchers do [6,35,39]. However, our findings pointed to lack of clarity to which degree stakeholders have authorized ownership of most RE projects. For example, it is the case that for one particular project, views on its ownership range from shared ownership, to government ownership or public ownership. It is even more common for stakeholders to deny ownership in the event of a malfunctioning project in order to evade responsibility over maintenance. In recognition of this challenge, we make the following recommendation which will contribute to assigning ownership and, in effect, responsibility of public renewable energy projects:

- Disambiguate ownership of public renewable energy projects at the project design stage.

A common trend among the projects in Sub-Saharan African countries we assessed is ambiguity regarding the ownership of public projects. Consequently, we recommend that every public project should actively pursue the disambiguation of ownership of public projects. To this end, the question “who owns this public renewable energy project?” merits a clear answer. If ownership is established from the point a project is conceived, it will translate into a clear idea of designation of responsibilities during implementation and management.

Some researchers and practitioners advocate the importance of community ownership and the role of community engagement [1]. However, community ownership comes with limitations. In particular, projects locally owned cannot withstand the rigors of infighting and in some cases sabotage. This is evident in some of the cases we studied and also cited in some of the reports. As such, we recommend that the body responsible for implementing the project – which in most public projects is the government itself – should own the project. In the event that ownership is shared, the ownership should be clearly communicated to other stakeholders. For public RE projects in Sub-Saharan African countries, we recommend that the project developers take ownership of the projects and thereby secure the responsibility over the functioning of the project.

However, it is important that – next to the transparency discussed in 4.1 – also transparency in awarding projects is enforced. In that way government bodies can enforce rules that implementing organizations must adhere to and accept responsibility of any drawback that may arise towards the ownership and or failure of the project as the case may be. If transparency is negatively influenced, difficulty would arise in the enforcement of rules towards the sustainable management of the corresponding renewable energy projects. Therefore, clear project ownership functions only if transparency is taken into account.

4.3. Shared responsibility

In practice, all public projects involve multiple stakeholders [1,2,9]. Common interests unite these stakeholders. We mentioned the need to provide and improve the public services as a common reason for the implementation of most public RE projects in SSA.

The different stakeholders should therefore share the responsibility of promoting sustainable management of public projects for the public good. Here, we present three key factors to consider in ensuring that this shared responsibility be realized:

- Establish and maintain communication amongst stakeholders
- Collectively ensure that project infrastructure is safe and protected
- Bolster 'responsible project management'

It is essential that stakeholders share the responsibility for *establishing and maintaining good communication* in public renewable energy projects in Sub-Saharan Africa. This is in response to the observation in the cases of failed projects where communication was either entirely broken down or incoherent amongst stakeholders. In some projects, communication deteriorated with the progression of time whilst in other failed projects, the public beneficiaries were hit with obstacles in efforts to communicate problems to government representatives. We recommend that channels for communication should be constantly refreshed, which would result in an efficient problem-solving process. Maintaining a good communication line also contributes to hedging administrative and bureaucratic processes of bottlenecks. *Protecting project infrastructure* is a key recommendation in this paper. Public renewable energy projects are huge investment projects and it is appalling to learn about vandalism, intentional damage and sabotage of these projects in some Sub-Saharan African countries. This suggests negligence of the public in ensuring the physical safety and protection of renewable energy projects. When the public and other stakeholders do not actively ensure that the infrastructures are protected, all other efforts aimed at ensuring sustainability are pointless. It is imperative that the public should own the responsibility of protecting the infrastructures. A great sense of ownership must be felt by the benefitting recipients.

All of the recommendations discussed so far culminate into "responsible project management" (RPM). In this scenario, RPM requires that all stakeholders act in the interest of maintaining renewable energy projects instead of destroying them or allowing them to fail. It indicates that the active involvement of all project stakeholders is only but beneficial to sustaining projects. Hence, we

propose that stakeholders involved in public renewable energy projects be responsible towards the implemented or planned project and contribute to its management for sustainability. RPM integrates the essentials of sustainable project management and requires that all stakeholders act in the interest of maintaining RE projects instead of destroying them. It is important that the implementing organization accepts responsibility towards the management of shared responsibilities of the corresponding renewable energy project being implemented. In addition, the implementing government should endeavor to create awareness on the acceptance and dissemination of the technology to the local communities.

4.4. Community involvement

One of the potential solutions to the failures and unsustainable management of renewable energy projects in Sub-Saharan Africa is the involvement of the corresponding local community. Several studies [1,30,34,37,38] have discussed the importance of involving the local community as stakeholders in renewable energy projects. However, this has both benefits and drawbacks [32]. Several case studies were presented that indicated the success of community involvement. Nevertheless, in some cases the sharing of responsibilities resulted in operational inefficiencies and sometimes the community members were uncooperative. However, other projects were sustainable and success soared through the prioritization of planning, training and community-building from the commencement of the project.

Building trust between all stakeholders involved in the project is the most important aspect of involving the local community towards a potentially successful project. A study [38] has shown that trust is an important element when one aims to achieve change in the implementation of RE projects. Trust between the implementing organization and local beneficiaries is an element that can assist projects to meet their potential and for the corresponding local community to believe and participate fully as stakeholders in the process of project development. Alvia-Palavicino et al. [1] present a methodology that involves three different stages that include the building of trust with the local community, co-construction with the locals and finally, ensuring sustainability of

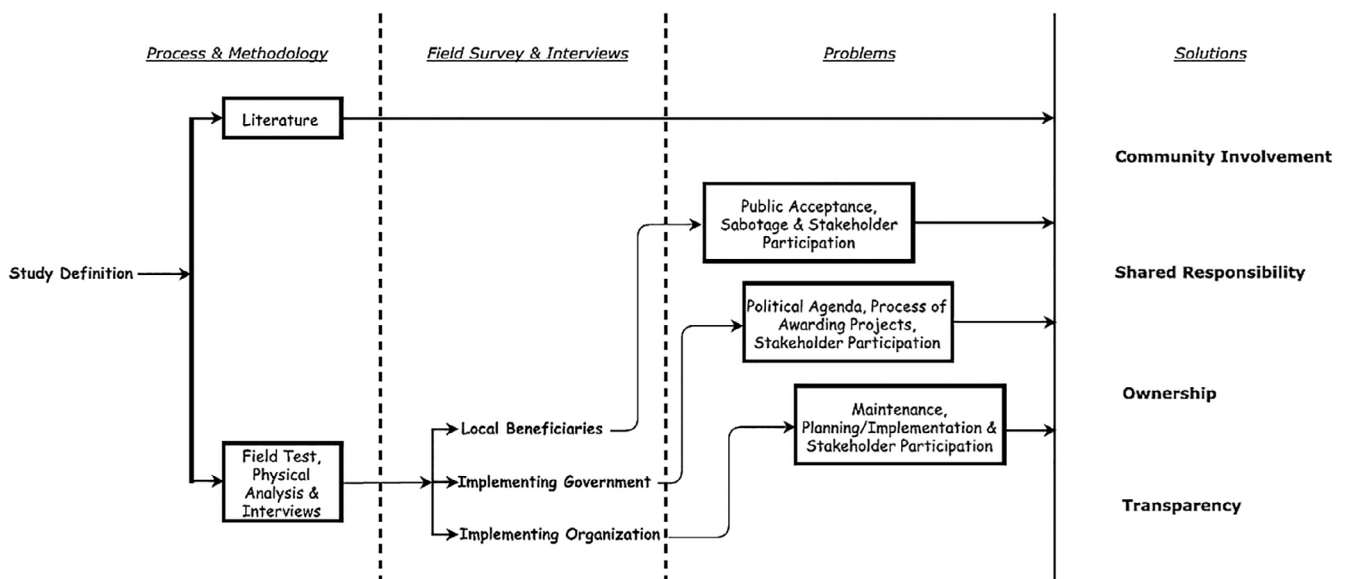


Fig. 3. Study overview.

the implemented projects via the engagement of the local community into renewable energy projects. The technique presented is expected to be applicable to rural communities in developing countries, where suppositions about technological relations differ from traditional ones in urban communities. However, a limitation in this is the time required to engage all participating stakeholders, an endeavor that may not be applicable for all types of RE projects and regions in SSA.

In addition, for community involvement to translate into implemented project success, trust isn't the only issue that must be handled. The implementing organization or financing government must endeavor to educate the local community stakeholders on the technology, its operation and the corresponding primary benefits. This is achieved through a combination of training and resource provision. As such, the local beneficiaries should not only be told what to do, but they should be provided with the tools to do it and gradually build their knowledge and understanding through that process. One other issue as discussed earlier that contributes to the failure of projects is the absence of maintenance, sabotage and the vandalism of infrastructures. If community involvement is unerringly executed and the recommendations provided are taken into account, the local community knowing the benefits of the project will be able to execute routine maintenance on breakdowns and participate in the protection of the implemented infrastructures in their community. This will in turn create multiple direct and indirect jobs through the enhancement of local economic activities.

5. Conclusions

The future of electrification of Africa's more than 600 million individuals without access to electricity is decentralized generation via renewable energy. Many of the households without access reside in rural areas. Although many small and large RE projects have started across the Sub-Sahara, little evidence may exist for their proper realization. This study engages ethnographically with all stakeholders. This was done to clearly and collectively understand the failures and mismanagement that may exist in 29 implemented projects across ten Sub-Saharan African countries and to present a sustainable management method that encompasses the entire process from awarding the project to its commission, continuous maintenance and management.

Findings of our study, based on our engagement with the participating stakeholders and physical examination of the projects, indicate multiple reasons for the failure of implemented RE development projects across these countries. Despite the differences in culture and understanding, the potential contributions to failure of the projects were similar across the different countries: (i) political agenda, (ii) process of awarding projects, (iii) stakeholder co-operation, (iv) planning & implementation, (v) maintenance and (vi) public acceptance & inclusion. Combining our findings with literature and practical experience with the implementation of RE projects in Sub-Saharan Africa, we propose the following solutions: (i) transparency, (ii) ownership, (iii) shared responsibility and (iv) community involvement (see Fig. 3: Study Overview). Our analysis shows that the failure of a project originates from how it is awarded, which creates a snowball effect that becomes difficult to deal with when the project derails. For example, a project that is awarded from the government to an organization based on personal relationship creates a difficult situation when the project fails. Based on this relationship, it is difficult for the government to speak out or enforce rules. As such, rule enforcement only works when transparency is the order of the day. For implemented RE projects to meet their goal, it is important that the propositions provided in this study be considered by all involving stakeholders in the corresponding project. The failed projects found during the course of

this study are below their expected goals based on the responses and physical examination of the projects. After identifying the causes for their failure, this study has been able to provide a sustainable management method to mend shortcomings of RE projects in Sub-Saharan Africa.

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