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# UNDERSTANDING THE FACTORS CONTRIBUTING TO THE ADOPTION OF SUSTAINABILITY IN SUB-SAHARAN AFRICA – A SCOPING STUDY REVIEW

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**Keywords:** Sustainability, Sub-Saharan Africa, Methodology, Grounded Theory.

## ABSTRACT

*Sustainability in the built environment is a key topic of discussion due to the adverse impact buildings have on the environment. This has propelled many countries to put in place sustainable development measures. This has however, been met with challenges in developing countries, primarily in Sub-Saharan Africa (SSA). SSA has a history of endemic energy crisis, despite its abundance of renewable energy resources. Reflecting this is the heavy reliance on fossil fuels for power generation in SSA countries. The findings reported in this paper form part of a wider study on the perceived barriers to sustainability by built environment professionals in SSA, with specific focus on use of renewable energy source (RES) for power generation in buildings. This paper focuses on the identification of a suitable methodology, which takes into consideration the distinctive characteristics of the SSA context for enquiry through the adoption of a scoping study review. The study addresses the concerns of methodology selection and application by reviewing strategies and methods adopted by past and current enquiry in SSA, which have primarily been aligned with theories, frameworks and research in developed countries. This is of importance due to the impact contextual, subjective and other factors can have on the outcome of enquiry as evidenced by previous research in literature.*

*The purpose of this scoping study review was to provide a comprehensive overview of the available relevant research on barriers to sustainability in SSA, which focused on study designs with empirical evidence, which would aid in informing the selection of a methodology suited for studies specific to the context of SSA. The scoping review is underpinned by the five-stage framework of Arksey and O'Malley (2005). The results indicate that there is a need to view SSA as a distinctive case based on its context and other characteristics, which will influence its research outcomes. Based on the review, it is suggested that grounded theory method is a suitable approach because it will take into consideration the wider context.*

## INTRODUCTION

Sustainability in the built environment is a key topic of discussion due to the adverse impact buildings have on the environment (International Energy Agency (IEA), 2016; Intergovernmental Panel on Climate Change (IPCC), 2014; United Nations Environmental Programme (UNEP), 2009), caused by high energy consumption, overreliance on fossil-fuels and subsequent greenhouse gas emissions (GHG). This has propelled many countries to put in place sustainable development measures. This has however, been met with challenges in developing countries, primarily in SSA (Kebede and Mitsufuji, 2014). SSA has a history of endemic energy crisis, despite its abundance of renewable energy resources (Ganda and Ngwakwe, 2014; Kebede and Mitsufuji, 2014). Reflecting this, is the heavy reliance on fossil fuels and the rise of self-power generation (Africa Progress Panel, 2015; IRENA, 2016).

A review of the literature provides an extensive bibliography on research on sustainability in the built environment, which has been described as multi-faceted and complex in nature (Amaratunga et al., 2002; Zuofa and Ochieng, 2016). This is due to the varied concepts and meanings associated with sustainability, and equally the varied disciplines and specialisms, which make up the built environment. In addition, this is due to the change in thinking and practices it recommends for implementation by stakeholders in the building industry. Also identified in the literature are the perceived barriers to the complex situation and the various methodological approaches employed in identifying the barriers. The barriers have been defined by geographical setting and predefined theoretical framework aligned with developed countries/Organisation for Economic Co-operation and Development (OECD) countries, which have been adopted by most research. In addition, much of the research has focused on technological and economic aspects of sustainability and much less on social, cultural and psychological aspects, with limited research in Africa (Murtagh et al., 2016; Ugulu, 2016). The above suggests that barriers are contextual and subject specific, and as such will be primarily applicable to the country under investigation. In the study by Long et al. (2004) on construction projects in developing countries, the need for comprehensive studies is identified, as problems are contextual and there is a need to focus on specifics as opposed to adoption of general and common problems. Thus, barriers identified in a country cannot simply be applied as a blanket to the rest of the world.

This is reflected in various comparative studies in natural and social science fields, including studies in the built environment (Biggs, 1991; Rupf et al., 2015). For example Rupf et al., (2015) identify geography, socio-culture, economy and governance/the political context as key considerations for SSA in comparison with Asia, which influences perception of users for biogas dissemination. In other studies such as Biggs's (1991) on education, which looks at student perception of success and their performance in schools between Asia and Australia (western world in general), and refers to the socio-cultural context as a key consideration in selection of teaching methods. This paper takes a similar approach to the aforementioned studies in literature and suggests the need to take into consideration the context and other factors, as they will have a role to play in influencing the view and perceptions on sustainability and ultimately the approach to it (adoption or lack of it). While there have been a number of studies on barriers in SSA, this study seeks to identify a suitable methodology for future enquiry that takes into consideration the unique contextual

characteristics of SSA as opposed to a blanket approach. It is important that the appropriate tool for enquiry is used to obtain the required outcome.

## **SUSTAINABILITY STUDIES IN SSA**

There is significant literature on barriers to sustainability and related aspects, which utilise various methodologies to identify barriers (Ahlborg and Hammar, 2014; Alsanad, 2015; Zhang et al., 2012). For example, in the study by Alsanad (2015), a quantitative research methodology was used, which employed questionnaires. A quantitative method was used due to the requirement for quantifiable data from a large population (648 questionnaires distributed). The approach allowed for a uniformity and quick data collection process. However, depth of study was limited due to its snapshot approach with the use of closed-ended questions. Thus, limiting the amount and level of detail of data collected as a result of the few options provided for the participant to select from (Likert scale), and the lack of allowance made for elaboration by participants.

In the study by Ahlborg and Hammar (2014), a qualitative research methodology was used, employing semi-structured interviews and a site visit. A qualitative methodology was used due to the nature of the study, which required direct interaction with stakeholders. The interviews fostered rapport and trust between the researcher and participants, which was vital for data collection as it was dependent on the openness and honesty of the participants. The use of open-ended questions enabled the participants to reflect and elaborate on their answers and provide additional information. The site visits enabled discussion with involved actors, providing validation and corroboration. However, this presented the opportunity for possible misunderstanding and researcher bias. In the study by Zhang et al. (2012), a mixed method research methodology was used, which employed questionnaire, interview and case study methods. A mixed-method methodology was used due to the dual nature of the study, requiring both generalised (large sample) and detailed (in-depth) information for broader study perspective. The approach provided a variety of data collection methods and diverse ways for presenting the data collected. Due to its amalgamation of qualitative and quantitative elements, it mitigated the weaknesses and enhanced the strengths of each approach.

As illustrated by the studies, all methodologies are chosen for a specific purpose and have advantages and disadvantages. A mixed-method methodology however, offers the complimentary use of quantitative and qualitative methodologies, allowing for a broader perspective; robust approach to data collection; flexibility in approaches used to obtain data and representation; it counteracts negatives and enhances strengths; tests and resolves issues; and allows for corroboration and validation of any findings. In addition, Amaratunga et al. (2002) refer to built environment research as consisting of natural, social and applied sciences due to its different disciplines. As such, a mixed-method methodology would provide the rationale, framework and support required for theory testing and generation (Fielding, 2012). The findings above are important for this study, as it seeks to identify a research methodology suitable to investigate and understand the perceived barrier to sustainability in SSA, using a grass roots approach for future studies, specific to the context and aspects intrinsic to SSA. The choice of research methodology cannot be an arbitrary decision or simply based on preference, as there is no perfect situation (Silverman, 2013).

Silverman (2013) explains it would be silly to reject an approach because it seemed too qualitative or quantitative, when it actually meets the needs of the research. It should also be noted that a significant amount of studies in literature adopt existing theoretical frameworks recommended for developed countries and barriers identified in literature as the basis for research. In addition, studies are primarily driven by technical and economic factors and there is a limited amount of studies with empirical research and available information on SSA.

Ugulu (2016), notes that barriers vary from country to country and most barriers are associated with more advanced/industrialised countries. Thus, the barriers will be specific to the countries under investigation. This provides a rationale for empirical studies to be conducted in SSA based on theory generation, as opposed to the adoption of pre-formed theories and generalised application of barriers identified in other studies and countries. Soon and Ahmad (2015) advocate the use of grounded theory because of the limited availability of empirical research and literature in Africa. In addition, defining issues and concepts associated/representative of the majority of SSA countries such as, the lack of access to electricity, self-power generation, these cultural influences are not experienced by developed/OECD countries (Ugulu, 2016). Thus, these are not taken cognisance of in research, which further provides justification for empirical enquiry in SSA, informed by its peculiarities and norms for output of information, which would be beneficial in providing insight and knowledge to fill gaps in literature and also aid in promoting development.

As previously discussed in the preceding paragraphs, sustainability is multi-faceted and complex in nature particularly when put within the context of SSA, which is equally complex. This presents a special case and the need for a review of the status quo. Sustainability in SSA cannot simply be treated as any other case or ordinary situation in comparison to developed countries. Developed countries do not lack the infrastructure and services required to meet the basic needs of its population (Ugulu, 2016), such as access to stable and reliable electricity, access to clean water, sanitation, health care, security etc. Developing countries however, do not share this privilege. Thus, it is only wise that any research, conducted within the context of SSA, takes into consideration its peculiarities to ensure accurate and valid empirical findings and knowledge.

## **RESEARCH METHOD**

### **Introduction**

Considerable emphasis is placed on the choice of research methodology in a study to enable collection of relevant data. Thus, methodology selection should be driven by the research topic (field of research) and research question (Amaratunga et al., 2002). To achieve the aim of the study, a critical review of the literature, as advocated by Mathews and Ross (2010), was required to examine the situation in the field of interest, allowing for comparison of different sources and expert opinions. Literature reviews are widely used in research to identify research gaps; advancing knowledge or creating new knowledge on specific subject areas and/or fields (Darko et al., 2017). The research is based on a scoping study review of past and current relevant studies on sustainability in SSA, with focus on study designs with empirical evidence. It will compare and contrast the methodology adopted for different studies based on limitations and strengths to aid in informing the appropriate selection of methodology suited for future studies specific to the context of SSA. The scoping review is

underpinned by the five-stage framework of Arksey and O'Malley (2005), which has been widely used in different fields (Davis et al., 2009; Forsman and Vinnerljung, 2012; Kajewski et al., 2003; O'Flaherty and Phillips, 2015). In addition to being regarded as providing a comprehensive, in-depth and rigorous approach to literature review, enabling transparency, replication and validity of finding (Abraham et al., 2010; Johnston et al., 2010)

### **Scoping Study Review**

The five stages of Arksey and O'Malley (2005); (1) identifying the research question, (2) identifying relevant studies, (3) study selection, (4) charting the data collating, and (5) summarising and reporting the results, were utilised in the review.

#### Identifying research question

The focus of the review was the exploration of literature to identify the methodology and methods used in providing empirical evidence to the perceived barriers to sustainability in SSA. To ensure a comprehensive review, capturing a substantial range of literature relating to the area and topic of interest, the following questions was used to guide the research:

- What methodologies and methods are being used to identify the perceived barriers to sustainability in SSA?
- What considerations are taken pertaining to the type of information required?
- What are the strengths and limitations of the research designs used?

#### Identifying relevant studies

According to Arksey and O'Malley (2005), there is a need for the adoption of a comprehensive search strategy for a literature review from varied sources to identify and review studies to be found. Key search terms were developed as shown in Table 1, to capture literature related to sustainability in SSA. The search terms are not intended to be exhaustive but to limit the search to mitigate against a very large size of literature due to the broad field of sustainability. As noted by Darko and Chan (2016) only so many search terms can be employed in a study. It should be noted, that although a comprehensive strategy was conducted, it is impractical to search all databases and more so all literature identified taking into consideration time and resources constraints, etc. Therefore, there was a need for a search criterion to be developed. Due to the rapidly evolving nature of sustainability (Margolis and Zuboy, 2006), the search was based on the last 10 years, with a start date of 2000. Studies conducted outside SSA were excluded, as they were not within the study focus.

For the study, electronic databases and a reference list (from relevant identified studies) were used. Leeds Beckett University electronic database; 'discover' was utilised to identify peer-reviewed literature. Discover houses all the university's databases (journals, books, etc.) in the same place on a single platform, allowing for a broad range search of a topic/subject at the same time. The British Library thesis search engine, e-theses online service (EThOS) was also utilised to search for doctoral research. In addition, a hand-search of reference lists from literature identified and Google Scholar was used to identify other sources of literature. The search using the key search terms/descriptors generated a significant amount of studies. This further emphasised the need and importance of search criteria to define the coverage of literature to be reviewed, eliminating studies not relevant to address the study focus and research question. A search criteria based on an inclusion and exclusion criterion was developed (Badger et al., 2000), as detailed in Table 2.

**Table 1. Search Strategy – Key search terms**

<b>Search Strategy – Key search terms</b>	
<b>1</b>	(Sustainability or renewable energy) AND (sub Saharan Africa or Africa) AND barriers
<b>2</b>	(Sustainability or renewable energy) AND (sustainable construction or sustainable buildings) AND (sub- Saharan Africa or Africa) AND barriers
<b>3</b>	(Sustainable construction or sustainable buildings) AND (construction practitioners or design professionals or stakeholders) AND (sub-Saharan Africa or Africa) AND (perception or perspectives) AND barriers

### Study selection

An initial search using the key search terms/descriptors in Discover, EThOS and Google Scholar generated 134,468 articles. Due to the significant amount of studies generated and the fact that it was impractical to review all studies based on time and resource constraints, a two-phase inclusion and exclusion criteria was employed. The first phase used the following criterion: time-period, language, type of article, geography and literature focus, which significantly reduced the number of studies. Additional studies were removed because of duplication. A review of the abstracts revealed that albeit the restrictions of the search criteria, there were still a large number of the studies not within the geographical focus, in addition to studies relating to medical. These studies were deemed irrelevant and excluded. Guided by the second and final phase of the inclusion and exclusion criteria, 12 studies were identified as been relevant to the research. For a detailed review, full text versions were obtained and confirmed as suitable. Figure 1, outlines the process followed for article selection.

**Table 2. Inclusion and Exclusion Criteria**

<b>Inclusion and Exclusion Criteria</b>		
<b>Criterion</b>	<b>Inclusion</b>	<b>Exclusion</b>
<b>Time period</b>	2007 – 2017 – due to the evolving nature and development of the field	Studies before 2007
<b>Language</b>	English	Non-English (Foreign language studies)
<b>Type of article</b>	Published peer-reviewed (scholarly) journal and Doctorial research	Articles that are not academic journals or Doctorial research
<b>Geographic focus</b>	Studies carried out on sub-Saharan African countries or which include sub-Saharan African countries	Studies related to other countries outside this group (e.g. developed/OECD group)
<b>Literature focus</b>	Studies with overwhelming themes that relate to perceived barriers to sustainability in sub-Saharan Africa	Studies which make a passing reference to barriers to sustainability
<b>Study focus</b>	Studies which provide empirical arguments/evidence of perceived barriers by stakeholders	Studies on list of barriers based on literature review or on country accounts

### Charting the data collating

This stage required the recording of key facts/aspects of information obtained from the studies reviewed. Arksey and O'Malley (2005) note that this stage is about 'synthesizing and interpreting qualitative data by sifting, charting and sorting material according to key issues and themes' (p.26). For this purpose, each study was analysed and interpreted according to the results of the study using similar heading/aspects such as, author's details, methodology choice, theoretical framework, identification of barriers, strengths and limitations as detailed in Table 3, to allow for standard charting framework/table. It is important to note that whilst conducting the charting exercise, information required was not always presented in an easily accessible format.

### Collating, summarising and reporting the results

The fifth and final stage of the methodological framework is intended to present an account of the findings.

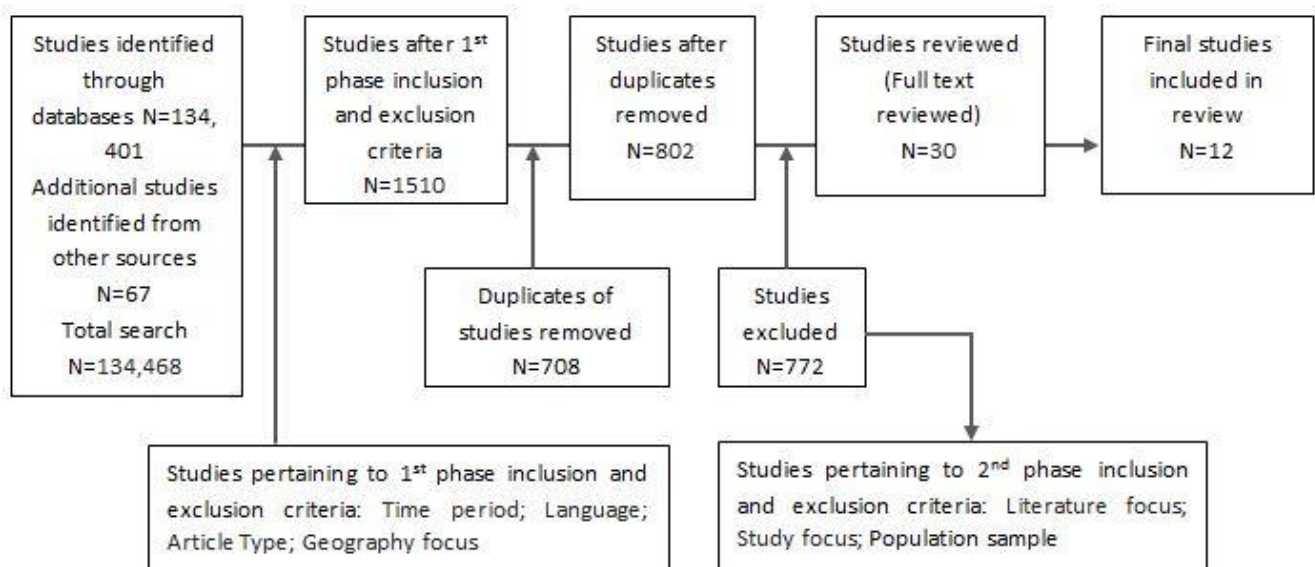


Figure 1. Flowchart of scoping review process

## RESEARCH FINDINGS

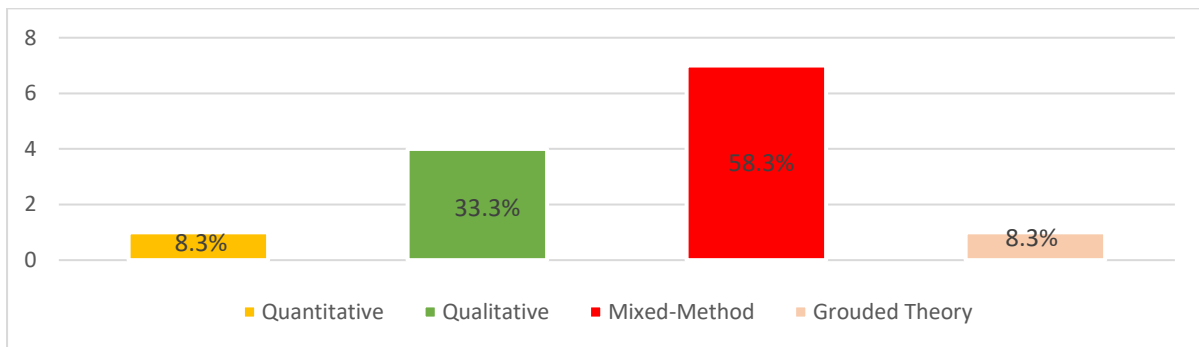
The scoping study review produced 12 articles on studies conducted in SSA.

### What methodologies and methods are being used to identify the perceived barriers to sustainability in sub-Saharan Africa?

Only one article adopted a quantitative mono-method, using a survey research strategy with a questionnaire. It was descriptive in nature and utilised a self-completed structured questionnaire, employing closed-ended questions (1). Two articles adopted a qualitative mono-method, using semi-structured interviews (2, 3), whilst two articles adopted a multi-method design using a combination of interview and site visit, and focus group and participant observation (4, 5). The majority (over half) of the articles adopted a mixed method approach, using both qualitative and quantitative research designs, which were primarily a combination of questionnaires and interviews (6-12). Additional methods used



as a combination in articles included; observation (9, 10), focus group discussions (11) and a case study (12). Only one study adopted a grounded theory strategy for the qualitative research (12).



**Figure 2. Types of methodologies and methods**

### **What considerations are taken or not pertaining to the type of information required?**

Most articles in the scoping study review adopted existing frameworks and barriers identified in literature and did not appear to consider country specifics. For example, one of the articles chose to use the barriers identified in literature as the basis for the study, which had the effect of predefining the questionnaires and directing data collection along specific categories. Thus, this had the effect of limiting the identification of barriers based on existing categories and equally the potential to identify perceived barriers specific to the study due to the use of closed-ended questions (6). Existing theoretical frameworks and barriers were also used in other articles (2, 4, 6 - 11).

Only one article (12) appeared to take into consideration social, cultural, institutional and other elements inherent to the country under investigation, as this would have an impact on the type of information collected. It used a grounded theory strategy, which was useful in ensuring data generation was a true representation of the situation, and not predetermined by existing barriers or theoretical frameworks, thus allowing for a natural process for enquiry, driven and shaped by participants within their context.

### **What are the strengths and limitations and characteristics of the research designs used?**

#### **Quantitative Research Method**

This method was aimed at obtaining a true representation of perceived barriers. It allowed a structured collection of data from a large pool, which could be measured. It however limited the understanding of situations, especially as it related to human perceptions, as it did not delve into detail and provided a snapshot overview of perceptions. In addition, the use of closed-ended questions, limited the scope and level of detail of the information collected. It also presented somewhat of a detached approach to data collection because of the researchers limited, and in some ways lack of, involvement in the process. However, this provided the opportunity to limit researcher's bias and ensure validity of findings.

### Qualitative Research Method

Articles which adopted a qualitative research methodology sought for meaning and a deeper understanding of the rationale behind the barriers. A qualitative research method presented an interactive approach to data collection through a natural approach. Thus, it allowed for building of rapport and trust between the researcher and the participants, which was critical to access information and facilitated openness and engagement, encouraging the participant to speak freely and elaborate on their views/answers. However, due to the use of existing theoretical frameworks by most of the studies, this had the effect of imposing restrictions on the type of data generated and counteracting the natural process. This led to data which was not specific to the study focus, as it was based on predefined categories and foreign barriers identified in other studies. Thus, the studies did not take into consideration the contextual and subjective elements, such as the socio-cultural factors of the country under study, which would have generated data inherently specific to the study and provided the opportunity for additional insight. By adopting this approach, there is the possibility of misunderstanding and researcher bias, which could question the validity of the findings. This was mitigated against by gaining expert advice and utilising additional qualitative methods, such as site visits and observations by some of the studies for verification.

### Mixed-Method Research Method

Articles which adopted a mixed-method were aimed at providing a broader perspective of findings. However, all articles apart from one (12) adopted existing theoretical frameworks either in their quantitative or qualitative aspects. This however, limited the potential for detailed and specific insight, which could be generated due to pre-formed ideas and thus hampered understanding of the situation in context. Despite this, the approach was in corroboration and validation of findings.

### Grounded Theory

The article that adopted this strategy was aimed at providing in-depth insight to uncover detailed and relevant information to enable better understanding of the situation in context. Grounded theory is identified in literature as method, grounded by data, which leads to theory formation as opposed to use of pre-defined theories (Charmaz, 2014). This approach was effective, due to the limited information and empirical data available on the study. Grounded theory method provided a platform for robust theory generation, driven and informed by participants' understanding and perceptions within the study context. In addition, it provided the opportunity to gain insight into other areas due to direct access to participants, which may have otherwise been lost. However, this approach is similar to other qualitative approaches and as such poses the possibility of researcher bias.

## **DISCUSSION**

Twelve studies were incorporated in the scoping study review, covering all three methodological approaches (quantitative, qualitative and mixed-method), and utilised a range of methods, which suggests that there is no ideal methodological approach (Mcgrath, 1981). Indeed, there are a range of compromises, which are required to be made, which may make a methodology less suitable than the other, depending on the study. However, what is evident from the studies in the scoping review and as reiterated by Yin (2009), is

that the choice of a research design is simply to function as a tool when needed and not intended to control the situation. However, the limitations of the mono-method as discussed in preceding chapters must be taken into consideration. Three studies used mono-methods and two studies used multi-methods, with the latter aiding in the validation of the findings (1, 2, 3).

The quantitative mono-method approach provided a generalised overview of perceived barriers taken from a large sample, which by all intents and purposes could be said to be representative of the population. However, this was mainly superficial, resulting in only a surface representation with no deep insight to provide understanding of the situation. Conversely, the qualitative mono-method approach provided insight and deep understanding of meanings, participants and situations. However, it was limited in scope due to its process. However, a combined approach, as described by Tashakkori and Teddlie (2003) 'enables the researcher to simultaneously answer confirmatory and exploratory questions and therefore verify and generate theory in the same study' (p.15). This viewpoint is supported by Malina et al. (2010) who place emphasis on the strength of the outcome of the data from the combined approach as opposed to a mono-method. Through a mixed-method approach, the study achieves rigour and neutralises researcher bias, both of which are associated with qualitative methodology, a snapshot generalisation is expanded and in-depth, which is associated with quantitative methodology, and multiple questions can be answered in different ways (Firestone, 1987; Malina et al., 2010). Consequently, rather than use a mono-method methodology, it may be prudent to see qualitative and quantitative methodologies as complimentary, particularly in studies which aim to provide empirical data and evidence (covering and catering to all aspects) to enhance understanding.

Eight out of twelve studies used predefined theoretical frameworks and/or barriers identified in literature as the basis for the studies (2, 4, 6 - 11). This imposed pre-formed criteria on the studies and had the effect of directing data collection along specific categories, as opposed to a systematic methodological process to obtain relevant data directed naturally by the study. In addition, the use of pre-formed theoretical frameworks restricted the opportunity to gain detailed insight and information specific to the context and study focus for understanding, which is beneficial for study developments and filling the gaps in literature. A mixed-method study in the scoping study review employed a grounded theory strategy, which adopted a grass roots approach for the purpose of generating theory from the data, as opposed to using a predefined approach. As stated by Hussein et al. (2014), the emphasis of grounded theory is the generation of data that is grounded in a particular context, which Hussein et al. further identify, is naturally suited to research in the built environment. Grounded theory allowed data to be participant focused and driven based on perceptions, providing insight and knowledge in gaps in literature. It allowed for generation of rich, relevant and specific data, taking into consideration context, cultural, social, economic and individual beliefs which are specific to a population and/or area, which would otherwise not have been generated and missed out. Thus, it is only wise that any research, conducted within the context of the countries needs to take the countries specifics into consideration, to ensure valid and accurate empirical findings and knowledge, which grounded theory method provides.

As is evident in literature, grounded theory has been in existence for a long time (Charmaz, 2008; Glaser and Strauss, 1967). Engward (2013) describes grounded theory as a method to 'explore conceptually how people make sense of social phenomena and importantly, how people work best to resolve their dilemma' (p.38), which it does through theory generation driven by data as opposed to testing of theory with data. Grounded theory is a widely used where little or no information/knowledge exists in a subject matter or field of study (Engward, 2013) It has successfully be used in natural and social sciences studies in addition to studies in the built environment (Graham and Thomas, 2008; Trevarthen, 2011).

**Table 3. Summary of studies included in scoping study review**

Summary of studies included in scoping study review					
(Study No.) Arthur details	Methodology	Theoretical Framework	Identification of barriers	Strengths	Limitations
(1) Abolore, A.A. (2012)	Quantitative	No	Questionnaire	Quick & structured process Factual & precise data Allows large sample size Reflection of sample population Limits researcher's bias	Predefined question set Limited amount and detail of information collected Potential participant assumption due to limited question options
(2) Kebede, K. et al., (2014)	Qualitative	Yes	Literature review Interview	Depth of study Naturalistic approach to enquiry	Use of pre-formed process imposed restrictions Limited data specific to study
(3) Zuofa, T. & Ochieng, E. (2016)	Qualitative	No	Interview	Depth of study Naturalistic approach to enquiry Data specific to the study	Collection of non-standard data Potential for researcher bias
(4) Ahlborg, H. & Hammer, L. (2014)	Qualitative	Yes	Literature review Interview Site visit	Depth of study Naturalistic approach to enquiry Validation of findings through multi-method approach	Pre-formed process imposed restrictions Limited data specific to study
(5) Katikoro, R. (2016)	Qualitative	No	Focus Group Discussion Participant observation	Depth of study Naturalistic approach to enquiry Rich data collection Validation of findings through multi-method approach	Potential for researcher bias Collection of non-standard data
(6) Djokoto, S. et al., (2014)	Mixed-method	Yes	Literature review Interview Questionnaire	Broader study perspective Corroboration and validation of findings Flexibility and diversity Complementary approach	Pre-formed process imposed restrictions Limited data specific to study Time consuming and laborious
(7) Dahiru, D. et al., (2014)	Mixed-method	Yes	Literature review Interview Questionnaire	Broader study perspective Corroboration and validation of findings Flexibility and diversity Complementary approach	Pre-formed process imposed restrictions Limited data specific to study Time consuming and laborious
(8) Ametepey, O. et al, (2015)	Mixed-method	Yes	Literature review Interview Questionnaire	Broader study perspective Corroboration and validation of findings Flexibility and diversity Complementary approach	Pre-formed process imposed restrictions Limited data collection specific to study focus Time consuming and laborious
(9) Ndau, L. (2016)	Mixed-method	Yes	Literature review Interview Questionnaire Observation	Broader study perspective Corroboration and validation of findings Flexibility and diversity Complementary approach	Pre-formed process imposed restrictions Limited data specific to study Time consuming and laborious
(10) Bawakyillenuo, S. (2007)	Mixed-method	Yes	Literature review Interview Questionnaire Observation	Broader study perspective Corroboration and validation of findings Flexibility and diversity Complementary approach	Pre-formed process imposed restrictions Limited data specific to study Time consuming and laborious
(11) Nwokoro, I. & Onukwube (2011)	Mixed-method	Yes	Literature review Questionnaire Focus group discussion	Broader study perspective Corroboration and validation of findings Flexibility and diversity Complementary approach	Pre-formed process imposed restrictions Limited data specific to study Time consuming and laborious
(12) Ugulu, A. (2016)	Grounded Theory	No	Interview Questionnaire Case study	Detailed insight and uncovering of relevant specific to study Data generation driven by participant Robust platform for theory generation Consideration of unique contextual characteristics of country Broader study perspective	Time consuming and laborious

### **Implications of findings**

It is evident from the review that barriers associated in developed/OECD countries are viewed as blanket barriers, automatically applied to enquiries in SSA countries. The methodological approaches adopted tend to be reliant on pre-formed theories and paradigms instead of systematic approaches used to pursue data generation specific to the context. Although barriers identified in different countries may indirectly benefit another country, it is understood that as more research is conducted on a particular topic in a particular country; it will be able to uncover specific issues and problems and have more influence in improving situations, due to the difference in country characteristics (both intrinsic and incidental). Sustainability offers the opportunity to influence varied sectors in SSA, which include energy access, climate change mitigation, social and economic development, etc. Thus, outputs of research carried out on perceived sustainability barriers in countries in SSA would have an influence on the level of development and/or change in that country. In addition, the diverse concepts associated with sustainability were evident from the scoping study review and as such, its diverse meanings and understanding by people influenced its level of adoption. This further supports the need for research to be contextual (country specific) and further informs the need to consider the use of grounded theory in research, which is useful for empirical enquiry for understanding of complex situations.

The scoping study review has identified a number of gaps in the available literature; the most pertinent is the dearth of empirical research and literature on barriers to sustainability specific to SSA. Others include, lack of research on social and cultural factors, as research appears to be primarily driven by technical and economic factors; lack of consideration of the psychological factors of architectural designers (professionals involved in designing for construction) and the building operators who influence the building outcome as a key to achieving sustainability. The findings from the scoping study provided useful information for further study of the barriers. However, it should be noted that due to the difference in country characteristics, the findings associated with studies in a country cannot simply be applied to a study in another country.

### **CONCLUSION**

The purpose of the study was to provide a review of the available methodologies that have been used to investigate the barriers to sustainability in SSA, to inform the selection of a suitable methodology for empirical enquiry on the perceived barriers to adoption of RES in buildings as part of an ongoing study. Based on the scoping study, it is evident that the methodology required would need to be able to handle the complex and multi-faceted nature of sustainability, the built environment and psychology features of human beings as the stakeholders. It would need to take into consideration the context and other factors to ensure the generation of valid and accurate empirical data and knowledge in an area of study with limited information and enhanced understanding. Given this, a mixed-method approach employing a grounded theory method is seen to be a suitable methodological approach for this.

As discussed in preceding paragraphs and as shown in literature, SSA has a unique context and grounded theory method which is based on empirical inquiry grounded by data; representative of the research context (situation), can aid in research in SSA. In addition, a

benefit of grounded theory is the opportunity for lessons to be learned through its empirically rooted, robust and comprehensive approach, which would otherwise have been lost and this is very significant to the context of SSA.

## REFERENCES

- Abolore, A. A. (2012) Comparative Study of Environmental Sustainability in Building Construction in Nigeria and Malaysia. *Journal of Emerging Trends in Economics and Management Sciences* [Online], 3 (6), pp. 951–961. Available from: <[http://jetems.scholarlinkresearch.com/articles/Comparative Study of Environmental Sustainability in Building Construction in Nigeria and Malaysia.pdf](http://jetems.scholarlinkresearch.com/articles/Comparative%20Study%20of%20Environmental%20Sustainability%20in%20Building%20Construction%20in%20Nigeria%20and%20Malaysia.pdf)> [Accessed 19 April 2017].
- Abraham, A., Sommerhalder, K. & Abel, T. (2010) Landscape and Well-Being: A Scoping Study on the Health-Promoting Impact of Outdoor Environments. *International Journal of Public Health* [Online], 55 (1), pp. 59–69. Available from: <[http://www.hiddencorner.us/html/PDFs/Landscape\\_Wellbeing.pdf](http://www.hiddencorner.us/html/PDFs/Landscape_Wellbeing.pdf)> [Accessed 8 March 2017].
- Africa Progress Panel (2015) *Power People Planet: Seizing Africa's Energy and Climate Opportunities* [Online]. Geneva. Available from: <[http://www.africaprogresspanel.org/wp-content/uploads/2015/06/APP\\_REPORT\\_2015\\_FINAL\\_low1.pdf](http://www.africaprogresspanel.org/wp-content/uploads/2015/06/APP_REPORT_2015_FINAL_low1.pdf)> [Accessed 15 November 2016].
- Ahlborg, H. & Hammar, L. (2014) Drivers and Barriers to Rural Electrification in Tanzania and Mozambique Grid-Extension, off-Grid, and Renewable Energy Technologies. *Renewable Energy* [Online], 61, pp. 117–124. Available from: <[http://s3.amazonaws.com/academia.edu.documents/43609556/Drivers\\_and\\_barriers\\_to\\_rural\\_electrific20160310-8201-7vwrza.pdf?AWSAccessKeyId=AKIAIWOWYYGZ2Y53UL3A&Expires=1490429837&Signature=w1PK6d7P2YzVeme%252BdW4UkaJYT7I%253D&response-content-disposition=inline%25](http://s3.amazonaws.com/academia.edu.documents/43609556/Drivers_and_barriers_to_rural_electrific20160310-8201-7vwrza.pdf?AWSAccessKeyId=AKIAIWOWYYGZ2Y53UL3A&Expires=1490429837&Signature=w1PK6d7P2YzVeme%252BdW4UkaJYT7I%253D&response-content-disposition=inline%25)> [Accessed 25 March 2017].
- Alsanad, S. (2015) Awareness, Drivers, Actions, and Barriers of Sustainable Construction in Kuwait. *Procedia Engineering* [Online], 118, pp. 969–983. Available from: <[www.sciencedirect.com](http://www.sciencedirect.com)> [Accessed 28 April 2017].
- Amaratunga, D., Baldry, D., Sarshar, M. & Newton, R. (2002) Quantitative and Qualitative Research in the Built Environment: Application of 'mixed' Research Approach. *Work Study* [Online], 51 (3), pp. 17–31. Available from: <<http://dx.doi.org/10.1108/00438020210415488>>.
- Ametepey, O., Aigbavboa, C. and Ansah, K., 2015. Barriers to successful implementation of sustainable construction in the Ghanaian construction industry. *Procedia Manufacturing*, 3, pp.1682-1689.
- Arksey, H. & O'Malley, L. (2005) Scoping Studies: Towards a Methodological Framework. *International Journal of Social Research Methodology* [Online], 8 (1), pp. 1364–5579. Available from: <<http://www.tandfonline.com/action/journalInformation?journalCode=tsrm20>> [Accessed 5 December 2016].
- Arthur, D., Pang, S., Wong, T., Alexander, M. F., Drury, J., Eastwood, H., Johansson, I., Jooste, K., Naude, M., Noh, C. H., O'Brien, A., Sohng, K. Y., Stevenson, G. R., Sy-Sinda, M. T., Thorne, S., Wal, D. Van Der & Xiao, S. (1999) Caring Attributes, Professional Self Concept and Technological Influences in a Sample of Registered Nurses in Eleven Countries. *International Journal of Nursing Studies* [Online], 36 (5), pp. 387–396. Available from: <[www.elsevier.com/locate/ijurstu](http://www.elsevier.com/locate/ijurstu)> [Accessed 7 June 2017].



- Badger, D., Nursten, J., Williams, P. & Woodward, M. (2000) Should All Literature Reviews Be Systematic?. *Evaluation & Research in Education* [Online], 14 (3–4), pp. 220–230. Available from: <<http://www.tandfonline.com/action/journalInformation?journalCode=revr20>> [Accessed 5 April 2017].
- Bawakyillenuo, S., 2012. Deconstructing the dichotomies of solar photovoltaic (PV) dissemination trajectories in Ghana, Kenya and Zimbabwe from the 1960s to 2007. *Energy Policy*, 49, pp.410-421.
- Becker, B. & Fischer, D. (2013) Promoting Renewable Electricity Generation in Emerging Economies. *Energy Policy* [Online], 56, pp. 446–455. Available from: <[https://www.researchgate.net/profile/Doris\\_Fischer/publication/236883812\\_Promoting\\_renewable\\_electricity\\_generation\\_in\\_emerging\\_economies/links/00b7d53732314f41b1000000.pdf](https://www.researchgate.net/profile/Doris_Fischer/publication/236883812_Promoting_renewable_electricity_generation_in_emerging_economies/links/00b7d53732314f41b1000000.pdf)> [Accessed 6 April 2017].
- Biggs, J. B. (1991) Approaches to Learning in Secondary and Tertiary Students in Ong Kong: Some Comparative Studies. *Educational Research Journal* [Online], 6, pp. 27–39. Available from: <[http://hkier.fed.cuhk.edu.hk/journal/wp-content/uploads/2010/06/erj\\_v6\\_27-39.pdf](http://hkier.fed.cuhk.edu.hk/journal/wp-content/uploads/2010/06/erj_v6_27-39.pdf)> [Accessed 7 June 2017].
- Burrows, M., Stafford, A. & Gorse, C. (2016) A Pilot Study into Understanding the Barriers to the Uptake of Energy Data Analytics in Large UK Manufacturers [Online]. In: *Sustainable Ecological Engineering Design for Society (SEEDS), 2016*. Leeds, pp. 186–197. Available from: <[http://usir.salford.ac.uk/41306/1/seeds2016\\_proceedings.pdf#page=187](http://usir.salford.ac.uk/41306/1/seeds2016_proceedings.pdf#page=187)> [Accessed 5 June 2017].
- Cao, L. & Hou, C. (2001) A Comparison of Confidence in the Police in China and in the United States. *Journal of Criminal Justice* [Online], 29 (2), pp. 87–99. Available from: <[https://www.researchgate.net/profile/Liqun\\_Cao/publication/222812312\\_A\\_Comparison\\_of\\_Confidence\\_in\\_the\\_Police\\_in\\_China\\_and\\_the\\_United\\_States/links/0a85e5359c44eb79b7000000.pdf](https://www.researchgate.net/profile/Liqun_Cao/publication/222812312_A_Comparison_of_Confidence_in_the_Police_in_China_and_the_United_States/links/0a85e5359c44eb79b7000000.pdf)> [Accessed 8 June 2017].
- Charmaz, K. (2008) Grounded Theory as an Emergent Method [Online]. In: Hesse-Biber, S. N. & Leavy, P. ed., *Handbook of Emergent Methods*. New York: The Guildford Press, pp. 155–170. Available from: <[http://www.sxf.uevora.pt/wp-content/uploads/2013/03/Charmaz\\_2008-b.pdf](http://www.sxf.uevora.pt/wp-content/uploads/2013/03/Charmaz_2008-b.pdf)> [Accessed 14 June 2017].
- Charmaz, K. (2014) *Constructing Grounded Theory*. 2nd ed. London: SAGE Publications Ltd.
- Dahiru, D., Dania, A.A. and Adejoh, A., (2014) An Investigation into the Prospects of Green Building Practice in Nigeria. *Journal of Sustainable Development* [Online], 7 (6), pp.158-167.
- Darko, A. & Chan, A. P. C. (2016) Critical Analysis of Green Building Research Trend in Construction Journals. *Habitat International* [Online], 57, pp. 53–63. Available from: <[https://www.researchgate.net/profile/Amos\\_Darko2/publication/305046192\\_Critical\\_analysis\\_of\\_green\\_building\\_research\\_trend\\_in\\_construction\\_journals/links/57802ee108ae01f736e4a334.pdf](https://www.researchgate.net/profile/Amos_Darko2/publication/305046192_Critical_analysis_of_green_building_research_trend_in_construction_journals/links/57802ee108ae01f736e4a334.pdf)> [Accessed 29 March 2017].
- Darko, A., Zhang, C. & Chan, A. P. C. (2017) Drivers for Green Building: A Review of Empirical Studies. *Habitat International* [Online], 60, pp. 34–49. Available from: <[https://www.researchgate.net/profile/Amos\\_Darko2/publication/311806741\\_Drivers\\_for\\_Green\\_Building\\_A\\_Review\\_of\\_Empirical\\_Studies/links/585d98d008ae6eb8719ffa29.pdf](https://www.researchgate.net/profile/Amos_Darko2/publication/311806741_Drivers_for_Green_Building_A_Review_of_Empirical_Studies/links/585d98d008ae6eb8719ffa29.pdf)> [Accessed 10 March 2017].
- Davis, K., Drey, N. & Gould, D. (2009) What Are Scoping Studies? A Review of the Nursing Literature. *International Journal of Nursing Studies* [Online], 46 (10), pp. 1386–1400.

- Available from: <[http://ac.els-cdn.com/S0020748909000698/1-s2.0-S0020748909000698-main.pdf?\\_tid=7a2ad9cc-0427-11e7-8bf2-00000aab0f26&acdnat=1488995505\\_9116df6cae143e2c5d5f1a72a79cc393](http://ac.els-cdn.com/S0020748909000698/1-s2.0-S0020748909000698-main.pdf?_tid=7a2ad9cc-0427-11e7-8bf2-00000aab0f26&acdnat=1488995505_9116df6cae143e2c5d5f1a72a79cc393)> [Accessed 8 March 2017].
- Djokoto, S.D., Dadzie, J. and Ohemeng-Ababio, E., 2014. Barriers to sustainable construction in the Ghanaian construction industry: consultants perspectives. *Journal of Sustainable Development*, 7(1), p.134.
- Engward, H. (2013) Understanding Grounded Theory. *Nursing Standard* [Online], 28 (7), pp. 37–41. Available from: <<http://journals.rcni.com/doi/pdfplus/10.7748/ns2013.10.28.7.37.e7806>> [Accessed 31 March 2017].
- Fielding, N. G. (2012) Triangulation and Mixed Methods Designs: Data Integration With New Research Technologies. *Journal of Mixed Methods Research* [Online], 6 (2), pp. 124–136. Available from: <<http://www.>> [Accessed 3 May 2017].
- Firestone, W. A. (1987) Meaning in Method : The Rhetoric of Quantitative and Qualitative Research. *Educational researcher*, 16 (7), pp. 16–21.
- Forsman, H. & Vinnerljung, B. (2012) Interventions Aiming to Improve School Achievements of Children in out-of-Home Care: A Scoping Review. *Children and Youth Services Review*, 34 (6), pp. 1084–1091.
- Ganda, F. & Ngwakwe, C. C. (2014) Problems of Sustainable Energy in Sub-Saharan Africa and Possible Solutions. *Mediterranean Journal of Social Sciences* , 5 (6), pp. 453–463.
- Gjølborg, M. (2009) Measuring the Immeasurable?: Constructing an Index of CSR Practices and CSR Performance in 20 Countries. *Scandinavian Journal of Management* [Online], 25 (1), p. 10–22. Available from: <[http://ac.els-cdn.com/S0956522108000821/1-s2.0-S0956522108000821-main.pdf?\\_tid=844d6852-4b94-11e7-90fd-00000aacb35e&acdnat=1496848870\\_cbf2f3f4bd99b8ae7a91e089556e1735](http://ac.els-cdn.com/S0956522108000821/1-s2.0-S0956522108000821-main.pdf?_tid=844d6852-4b94-11e7-90fd-00000aacb35e&acdnat=1496848870_cbf2f3f4bd99b8ae7a91e089556e1735)> [Accessed 7 June 2017].
- Glaser, B. G. & Strauss, A. L. (1967) *The Discovery of Grounded Theory*. Chicago: Aldine.
- Graham, B. & Thomas, K. (2008) Building Knowledge – Developing a Grounded Theory of Knowledge Management for Construction. *The Electronic Journal of Business Research Methods* [Online], 6 (2), pp. 115–122. Available from: <[www.ejbrm.com](http://www.ejbrm.com)> [Accessed 11 March 2017].
- Haar, G. T. & Ellis, S. (2006) The Role of Religion in Development: Towards a New Relationship between the European Union and Africa. *The European Journal of Development Research* [Online], 18 (3), pp. 351–367. Available from: <[https://www.researchgate.net/profile/Stephen\\_Ellis7/publication/28649887\\_The\\_Role\\_of\\_Religion\\_in\\_Development\\_Towards\\_a\\_New\\_Relationship\\_between\\_the\\_European\\_Union\\_and\\_Africa/links/54e761d70cf2cd2e0293ee4c/The-Role-of-Religion-in-Development-Towards-a-New-](https://www.researchgate.net/profile/Stephen_Ellis7/publication/28649887_The_Role_of_Religion_in_Development_Towards_a_New_Relationship_between_the_European_Union_and_Africa/links/54e761d70cf2cd2e0293ee4c/The-Role-of-Religion-in-Development-Towards-a-New-)> [Accessed 8 June 2017].
- IEA (2016) *Key CO2 Emissions Trends - Excerpt from CO2 Emissions from Fuel Combustion* [Online]. Available from: <<http://www.iea.org/statistics/topics/CO2emissions/>> [Accessed 3 November 2016].
- IPCC (2014) *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva: IPCC.
- IRENA (2016) *REMap: Roadmap for a Renewable Energy Future. 2016 Edition* [Online]. Abu Dhabi. Available from:

- <[http://www.irena.org/DocumentDownloads/Publications/IRENA\\_REmap\\_2016\\_editio  
n\\_report.pdf](http://www.irena.org/DocumentDownloads/Publications/IRENA_REmap_2016_editio<br/>n_report.pdf)> [Accessed 11 November 2016].
- Johnston, R., Crooks, V. A., Snyder, J. & Kingsbury, P. (2010) What Is Known about the Effects of Medical Tourism in Destination and Departure Countries? A Scoping Review. *International Journal for Equity in Health*, 9 (1), p. 24.
- Kajewski, S. L., Chen, S. E., Brewer, G., Gameson, R., Gajendran, T., Kolomy, R., Lenard, D., MacKee, J., Martins, R., Sher, W. & McCabe, K. (2003) *Project Team Integration: Communication, Co-Ordination and Decision Support. Part A: Scoping Studies*. [Online]. Available from: <<http://eprints.qut.edu.au/7997/1/7997.pdf>> [Accessed 4 May 2017].
- Kebede, K. Y. & Mitsufuji, T. (2014) Diffusion of Solar Innovations in Ethiopia: Exploring Systemic Problems. *TMSD Intellect Limited International Journal of Technology Management & Sustainable Development*, 13 (1), pp. 53–72.
- Long, N. D., Ogunlana, S., Quang, T. & Lam, K. C. (2004) Large Construction Projects in Developing Countries: A Case Study from Vietnam. *International Journal of project management* [Online], 22 (7), pp. 553–561. Available from: <[http://ac.els-cdn.com/S0263786304000298/1-s2.0-S0263786304000298-main.pdf?\\_tid=573f9ae2-4c34-11e7-8fc6-00000aacb360&acdnat=1496917514\\_1389029e1a4c02b24c886d4aa61e5132](http://ac.els-cdn.com/S0263786304000298/1-s2.0-S0263786304000298-main.pdf?_tid=573f9ae2-4c34-11e7-8fc6-00000aacb360&acdnat=1496917514_1389029e1a4c02b24c886d4aa61e5132)> [Accessed 8 June 2017].
- Mahachi, D., Mokgalo, L. L. & Pansiri, J. (2015) Exploitation of Renewable Energy in the Hospitality Sector: Case Studies of Gaborone Sun and the Cumberland Hotel in Botswana. *International Journal of Hospitality & Tourism Administration* [Online], 16 (4), pp. 331–354. Available from: <[https://www.researchgate.net/profile/Jaloni\\_Pansiri/publication/283567416\\_Exploitation\\_of\\_Renewable\\_Energy\\_in\\_the\\_Hospitality\\_Sector\\_Case\\_Studies\\_of\\_Gaborone\\_Sun\\_and\\_the\\_Cumberland\\_Hotel\\_in\\_Botswana/links/5652c00708aeafc2aabac37f.pdf](https://www.researchgate.net/profile/Jaloni_Pansiri/publication/283567416_Exploitation_of_Renewable_Energy_in_the_Hospitality_Sector_Case_Studies_of_Gaborone_Sun_and_the_Cumberland_Hotel_in_Botswana/links/5652c00708aeafc2aabac37f.pdf)> [Accessed 13 April 2017].
- Malhotra, N. K., Ulgado, F. M., Agarwal, J. & Baalbaki, I. B. (1994) International Services Marketing A Comparative Evaluation of the Dimensions of Service Quality between Developed and Developing Countries. *International Marketing Review* [Online], 11 (2), pp. 5–15. Available from: <[https://www.researchgate.net/profile/Imad\\_Baalbaki/publication/247613165\\_International\\_Services\\_Marketing\\_A\\_Comparative\\_Evaluation\\_of\\_the\\_Dimensions\\_of\\_Service\\_Quality\\_between\\_Developed\\_and\\_Developing\\_Countries/links/0deec521e159b33238000000.pdf](https://www.researchgate.net/profile/Imad_Baalbaki/publication/247613165_International_Services_Marketing_A_Comparative_Evaluation_of_the_Dimensions_of_Service_Quality_between_Developed_and_Developing_Countries/links/0deec521e159b33238000000.pdf)> [Accessed 8 June 2017].
- Malina, M. A., Nørreklit, H. & Selto, F. H. (2010) Lessons Learned : Advantages and Disadvantages of Mixed Method Research. *Qualitative Research in Accounting & Management* [Online], 8 (1), pp. 59–71. Available from: <[https://www.researchgate.net/profile/Frank\\_Selto/publication/227430195\\_Lessons\\_Learned\\_Advantages\\_and\\_disadvantages\\_of\\_mixed\\_method\\_research/links/55ca257208aea2d9bdcbf8f8.pdf](https://www.researchgate.net/profile/Frank_Selto/publication/227430195_Lessons_Learned_Advantages_and_disadvantages_of_mixed_method_research/links/55ca257208aea2d9bdcbf8f8.pdf)> [Accessed 28 April 2017].
- Margolis, R. & Zuboy, J. (2006) *Nontechnical Barriers to Solar Energy Use: Review of Recent Literature*. Golden.
- Mathews, B. & Ross, L. (2010) *Research Methods – A Practical Guide for the Social Sciences*. Essex: Longman.
- Mcgrath, J. E. (1981) Dilemmatics: The Study of Research Choices and Dilemmas. *Scientist* [Online], 25 (2), pp. 179–210. Available from: <<https://www.cebma.org/wp->

- content/uploads/McGrath-1981-ABS-Dilemmatics-1.pdf> [Accessed 29 April 2017].
- Murtagh, N., Roberts, A. & Hind, R. (2016) The Relationship between Motivations of Architectural Designers and Environmentally Sustainable Construction Design. *Construction Management and Economics*, 34 (1), p. 61–75.
- Ndau, L.W., 2016. Building Designers' Perceptions and the Effect on Sustainability in Malawi (Doctoral dissertation, Walden University).
- Nwokoro, I. and Onukwube, H.N., 2011. Sustainable or green construction in Lagos, Nigeria: Principles, attributes and framework. *Journal of Sustainable Development*, 4(4), p.166.
- O'Flaherty, J. & Phillips, C. (2015) The Use of Flipped Classrooms in Higher Education: A Scoping Review. *Internet and Higher Education* [Online], 25, pp. 85–95. Available from: <[https://www.researchgate.net/profile/Craig\\_Phillips4/publication/272753099\\_The\\_use\\_of\\_flipped\\_classrooms\\_in\\_higher\\_education\\_A\\_scoping\\_review/links/574c1db708aed1a8cf297134.pdf](https://www.researchgate.net/profile/Craig_Phillips4/publication/272753099_The_use_of_flipped_classrooms_in_higher_education_A_scoping_review/links/574c1db708aed1a8cf297134.pdf)> [Accessed 8 March 2017].
- Pegels, A. (2010) Renewable Energy in South Africa - Potentials Barriers and Options for Support. *Energy Policy* [Online], 38, pp. 4945–4954. Available from: <<https://www.mendeley.com/viewer/?fileId=06bda72f-8d24-a713-45a1-b659fda20a0b&documentId=571f7b30-333f-3f84-ab34-33bf5ed4c83a>>.
- Rupf, G. V, Bahri, P. A., Boer, K. De & Mchenry, M. P. (2015) Barriers and Opportunities of Biogas Dissemination in Sub-Saharan Africa and Lessons Learned from Rwanda, Tanzania, China, India, and Nepal. *Renewable and Sustainable Energy Reviews* [Online], 52, pp. 468–476. Available from: <[https://www.researchgate.net/profile/Gloria\\_Rupf/publication/282150472\\_Barriers\\_and\\_opportunities\\_of\\_biogas\\_dissemination\\_in\\_Sub-Saharan\\_Africa\\_and\\_lessons\\_learned\\_from\\_Rwanda\\_Tanzania\\_China\\_India\\_and\\_Nepal/links/56051a3b08aea25fce321506.pdf](https://www.researchgate.net/profile/Gloria_Rupf/publication/282150472_Barriers_and_opportunities_of_biogas_dissemination_in_Sub-Saharan_Africa_and_lessons_learned_from_Rwanda_Tanzania_China_India_and_Nepal/links/56051a3b08aea25fce321506.pdf)> [Accessed 30 March 2017].
- Silverman, D. (2013) *Doing Qualitative Research*. [Online]. 4th ed. London: Sage Publications. Available from: <<https://books.google.co.uk/books?hl=en&lr=&id=LySjM0tY-tEC&oi=fnd&pg=PP2&dq=Silverman,+D.+{2013&ots=kE86tGNExW&sig=KCJDiTARRgKnElvec0hAJu39Tkg#v=onepage&q=Silverman%2C%20D.+{2013&f=false>> [Accessed 3 January 2017].
- Soon, J.-J. & Ahmad, S.-A. (2015) Willingly or Grudgingly? A Meta-Analysis on the Willingness-to-Pay for Renewable Energy Use. *Renewable and Sustainable Energy Reviews* [Online], 44, pp. 877–887. Available from: <<http://www.sciencedirect.com/science/article/pii/S1364032115000519>> [Accessed 29 April 2017].
- Tashakkori, A. & Teddlie, C. (2003) Handbook of Mixed Methods in Social and Behavioral Research. In: Tashakkori, A. & Teddlie, C. ed., *Handbook of mixed methods in social and behavioral research*. London: SAGE Publications, pp. 3–50.
- Trevarthen, M. (2011) *Stakeholder Perceived Barriers to the Use of Solar Energy in Thailand's Buildings: A Thesis Presented in Partial Fulfilment of the Requirements for the Degree of Master of Environmental Management at Massey University, Palmerston North, New Zealand*.
- Ugulu, A. I. (2016) *The Determinants of Decentralised Photovoltaic (PV) Adoption in Urban Nigeria and a Verified Model for Rapid Diffusion*. Harriot-Watt.
- UNEP (2009) *Buildings and Climate Change - A Summary for Decision Makers* [Online]. Available from: <<http://www.unep.org/sbci/pdfs/SBCI-BCCSummary.pdf>> [Accessed 3

November 2016].

Yin, Robert, K. (2009) *Case Study Research: Design and Methods*. 4th ed. California: Sage Publications.

Zhang, X., Shen, L. & Chan, S. Y. (2012) The Diffusion of Solar Energy Use in HK: What Are the Barriers? *Energy Policy* [Online], 41, pp. 241–249. Available from: <[http://ac.els-cdn.com/S0301421511008275/1-s2.0-S0301421511008275-main.pdf?\\_tid=73e1f962-113b-11e7-88eb-00000aab0f01&acdnat=1490433450\\_6fd011620ec021a7e410c6569452c11c](http://ac.els-cdn.com/S0301421511008275/1-s2.0-S0301421511008275-main.pdf?_tid=73e1f962-113b-11e7-88eb-00000aab0f01&acdnat=1490433450_6fd011620ec021a7e410c6569452c11c)> [Accessed 25 March 2017].

Zuofa, T. & Ochieng, E. (2016) Sustainability in Construction Project Delivery: A Study of Experienced Project Managers in Nigeria. *Project Management Journal* [Online], 47 (6), pp. 44–55. Available from: <[https://www.researchgate.net/profile/Dr\\_Edward\\_Ochieng/publication/312094024\\_Sustainability\\_in\\_construction\\_project\\_delivery\\_a\\_study\\_of\\_experienced\\_project\\_managers\\_in\\_Nigeria/links/587bcf8608ae9a860fe9bc61/Sustainability-in-construction-project-delivery->](https://www.researchgate.net/profile/Dr_Edward_Ochieng/publication/312094024_Sustainability_in_construction_project_delivery_a_study_of_experienced_project_managers_in_Nigeria/links/587bcf8608ae9a860fe9bc61/Sustainability-in-construction-project-delivery->) [Accessed 11 March 2017].