ISSN: 2524-1354 (Online), ISSN: 2519-7851 (Print)
Africa Habitat Review Journal
Volume 14 Issue 3 (December 2020)
http://uonjournals.uonbi.ac.ke/ojs/index.php/ahr

Sustainable Construction Transition:

A Kenyan Interior Design Market Segment Perspective

Samuel Kamau Joseph* and Anthony Oduor Ralwala

Received on 9th July, 2019; Received in revised form 7th October, 2020; Accepted on 21st October, 2020.

Abstract

Construction industry has been identified as key to the sustainability agenda. Efforts towards improved sustainability compliance in the construction industry involve a socio-technical transformation. Such transitions are said to be purposive, of a wider perspective, multi-dimensional in nature and are influenced by numerous factors. This paper focused on establishing sustainable construction (SC) uptake levels, including identification of key SC drivers and barriers with specific reference to the interior design market segment of the Kenyan construction industry. The study employed a quantitative research approach. For quantitative attributes, the study employed structured questionnaires to collect data from actively practicing architects/interior designers, electrical engineers, mechanical engineers, quantity surveyors and contractors drawn from the interior design market segment of Kenyan construction industry in Nairobi City County. Data analysis employed the descriptive statistics of distribution (frequencies), proportions (percentages), central tendency (mean) and dispersion (standard deviation). Generally, the respondents ranked the overall uptake of the three dimensions of sustainability (economic, environmental and social) as average- ranking as social, environment and economic in a decreasing order of uptake levels. The study findings ranked sustainability driver categories as organization related drivers, stakeholder related drivers, economic related drivers and management related drivers; in order of decreasing influence. Lastly, barrier categories were ranked as economic related barriers, professional/capacity related barriers, technology related barriers and societal/cultural related barriers, in order of decreasing influence. With the average sustainable construction practices uptake in the Kenyan construction industry, there is an implied call to action to leverage known sustainability drivers, while at the same time suppressing the known barriers. This implies significant room for improvement and an appropriate starting point for key construction project stakeholders as above identified.

Keywords: Interior design, Kenya, Sustainability, Sustainable construction, Sustainability transition/ uptake.

INTRODUCTION

Efforts towards improved sustainability compliance and sustainability transitions in the construction industry involve a socio-technical transformation. European Environment Information and Observation Network (EIONET) (2016), defines socio-technical systems as complex inter-linkages and co-evolution of societal systems and technology. It is these inter-linkages that define the way in which a given society meets its needs. EIONET (2016), further postulates that socio-economic and environmental challenges facing the world have been identified as complex matters to manage and solve. This has led to calls for action towards improved sustainability compliance, which have been termed as sustainability transition. Economic, environmental and social dimensions of sustainability have complex inter-linkages. As such, changes in any one dimension will result in gains and/or loses in one or more dimensions. This further complicates efforts geared towards improved sustainability. The change required is usually at multiple scales ranging from sustainability compliant products to global sustainability agendas.

Markard et al. (2012), define sustainability transition as multi-faceted, long term change of established social-technical set-ups to comparatively sustainable consumption and production modalities. According to Kemp &

**Corresponding author:*
***Samuel Kamau Joseph**, Department of Construction Management and Quantity Surveying, University of Nairobi, Kenya.*
Email: skksamwel@uonbi.ac.ke

Lente (2011), such transitions have a dual nature. They involve a change in socio-technical systems, and the same time changing the criteria with which the various stakeholders judge products, services and systems. Any successful transition, including that of sustainability, should aim at achieving the dual objective. Linstone (1999), argues that such initiatives take time for successful implementation and face a fundamental challenge. Typically, the general population, including firms, have their main focus on short term goals complicating efforts by policymakers in rolling out long term sustainability initiatives. Farla et al. (2012), note that a review of past literature on sustainability transitions points towards a system approach. According to EIONET (2016), such transitions-being unprecedented as to their execution-are consequently complicated and uncertain processes.

Sustainability transitions have been identified to possess some unique characteristics differentiating them from other transitions. To begin with, these socio-technical transitions are purposeful endeavours geared towards a common good of sustainability (Smith et al., 2005). Sustainability efforts are aimed at finding a lasting and beneficial solution to economic, environmental and social problems facing the society. Secondly, sustainability transitions are associated with a greater collective good, sustainability, as opposed to largely individual stakeholder benefits (Geels, 2011). As such, resistance is almost expected when effecting the transitions given the tendency of stakeholders to focus more on individual benefits as opposed to collective gain. Lastly, sustainability transitions are multi-dimensional involving complex interactions of public opinion, economics, power and technology (Geels, 2011; Unruh, 2000). According to EIONET (2016), their success requires a combination of learning (formal, informal and/or non-formal), experimentation and collaboration in a bid to share improvement ideas.

According to Farla et al. (2012), there are many stakeholders in successful sustainability transitions. One group of the key stakeholders are policymakers and public authorities. These actors have been identified to sponsor innovations, sustainable technologies and create supporting institutional framework for sustainability endeavours in a nation (Musiolik et al., 2012; Quitzau et al., 2012; Bakker et al., 2012). The second group of key stakeholders in sustainability transitions consist of firms/companies. Their role involves engaging in innovation and creating a sustainable supportive environment. Lastly, according to Farla et al. (2012), the other key stakeholders are social movements, civil society, consumers, experts, research organizations and individual stakeholders.

THEORY

The uptake of sustainable construction practices is propelled by many factors. Elmualim et al. (2012), assert that there is need to simplify them to a small set as advocated for by some construction industry stakeholders. Basu & Palazzo (2008), categorize drivers into three different groups: performance, stakeholder and motivation drivers (all the other internal and external enablers, apart from the ones covered in the performance, and stakeholder drivers). Motivation drivers support both performance and stakeholder divers (Fairfield et al., 2011).

Wirtenberg et al. (2007), in a study of most sustainable companies globally, outline seven key enablers towards achieving the three-pronged sustainability agenda (environmental, economic and social). These are commitment by top management, centrality of efforts, values consistent sustainability, metrics/measurements, aligning formal and informal organization systems towards sustainability, stakeholder engagement and holistic integration across functions.

Elmualim et al. (2012), add legislation, corporate image, organizational ethos, senior management guidance, pressure from clients, life cycle cost reduction, pressure from employees and pressure from shareholders, to the list of sustainable construction enablers. Manoliadis & Tsolas (2006), add energy and waste management, desire for enhanced indoor environment, environment considerate technologies, appropriate resource use, incentives, standards, regulations and policies, training, re-configuration of the design process, sustainability conscious construction materials,

new cost metrics, innovative partnerships, stakeholders, innovative products and enhancing productivity of building assets.

The categorization of the identified drivers, as advanced by this study- including their sources- is as outlined in **Table 1**.

On the other hand, sustainability pursuits in the construction industry face numerous barriers. Du Plessis (2002), outlines lack of capacity, uncertain economic environment, poverty and low urban development, lack of accurate data, lack of interest, unavailability of new technologies and uncoordinated research, as the inhibitors to sustainable construction in developing countries. More barriers according to Zhou & Lowe (2003); Williams & Dair (2007) include failure to understand associated benefits, perceived cost implications, lack of interest, lack of stakeholders' commitment to sustainability, inadequate sustainability expertise, unavailability of information on sustainability and unavailability of sustainable construction materials.

TABLE 1: Sustainable construction drivers categorization

Driver Categories		Sources
A.	**Stakeholder Related Drivers**	
1.	Pressure from clients	Basu & Palazzo (2008); Fairfield et al. (2011); Elmualim et al. (2012); Manoliadis & Tsolas (2006)
2.	Pressure from employees	Basu & Palazzo (2008); Fairfield et al. (2011); Elmualim et al. (2012); Manoliadis & Tsolas (2006)
3.	Pressure from other stakeholders	Basu & Palazzo (2008); Fairfield et al. (2011); Elmualim et al. (2012); Manoliadis & Tsolas (2006)
4.	Legislation	Elmualim et al. (2012); Manoliadis & Tsolas (2006)
5.	Enhanced indoor environment	Manoliadis & Tsolas (2006)
B.	**Organizational Related Drivers**	
1.	Corporate image	Wirtenberg et al. (2007); Elmualim et al. (2012)
2.	Organization ethos	Wirtenberg et al. (2007); Elmualim et al. (2012)
3.	Alignment of organization (formal and informal) towards sustainability	Wirtenberg et al. (2007)
4.	Design process re-engineering	Manoliadis & Tsolas (2006)
C.	**Management Related Drivers**	
1.	Commitment of management	Wirtenberg et al. (2007); Elmualim et al. (2012)
2.	Centralization/integration of efforts towards sustainability	Wirtenberg et al. (2007)
3.	Training	Manoliadis & Tsolas (2006)
D.	**Economic Related Drivers**	
1.	Boosting business performance	Basu & Palazzo (2008); Fairfield et al. (2011)
2.	Lifecycle cost reduction	Elmualim et al. (2012); Manoliadis & Tsolas (2006)
3.	Avoiding sustainability related penalties	Fairfield et al. (2011)
4.	Enhancing productivity of built assets	Manoliadis & Tsolas (2006)
5.	Innovative products	Manoliadis & Tsolas (2006)
6.	Appropriate incentives	Manoliadis & Tsolas (2006)

Source: Authors 2018

Powmya & Abidin (2014), in a study of Oman, identified the following groups of challenges to sustainability: economic, professional, society and technology related challenges. Economic challenges cover extra cost and increased project time. Professional/capacity challenges cover lack of materials and technologies knowledge, limited availability of sustainable materials and information, lack of evaluation tools, lack of appropriate building codes and regulations and lack of capacity by involved professionals. Society challenges entail lack of incentives, resistance to change and limited awareness. Lastly, technology challenges consist of issues such as uncertainty of sustainability technology performance, failure to understand how sustainable technology works and inadequate technology specifications on sustainable approaches.

In a study of barriers to sustainable construction in Ghana, Djokoto et al. (2014), identified four categories of barriers namely: cultural, financial, capacity/professional and steering. Cultural barriers consisted of lack of public awareness, resistance to change and lack of demand. Financial barriers are postulated to entail lack of incentives and possible increased cost of investments. Capacity/professional barriers in this study covered lack of design team, lack of sustainability expertise, professional knowledge, information and technology, increased documentation, longer planning, lack of training and cooperation between design and construction teams. Lastly, steering concerns entailed lack of government support and evaluation tools. The categorization of the identified barriers, as advanced in this study, including their sources, is as outlined in **Table 2**.

RESEARCH METHODS

A quantitative research approach was used for this study. The researcher collected primary data from key project professionals using structured questionnaires with the help of research assistants.

TABLE 2: Sustainable construction barriers categorization

Barriers Categories		Sources
A.	**Economic Related Barriers**	
1.	Increased project cost	Zhou & Lowe (2003); Williams & Dair (2007); Powmya & Abidin (2014); Djokoto et al. (2014)
2.	Increased project duration	Powmya & Abidin (2014)
3.	Uncertain economic environment	Du Plessis (2002)
4.	Poverty and low urban development	Du Plessis (2002)
5.	Lack of government support	Djokoto et al., (2014)
B.	**Professional/Capacity Related Barriers**	
1.	Lack of appropriate knowledge/ information	Du Plessis (2002); Zhou & Lowe (2003); Williams & Dair (2007); Powmya & Abidin (2014); Djokoto et al. (2014)
2.	Lack of sustainable construction materials	Zhou & Lowe (2003); Williams & Dair (2007); Powmya & Abidin (2014)
3.	Lack of appropriate sustainability evaluation tools	Powmya & Abidin (2014); Djokoto et al. (2014)
4.	Lack of appropriate building codes and regulations	Powmya & Abidin (2014)
5.	Lack of appropriate professional expertise	Powmya & Abidin (2014); Zhou & Lowe (2003); Williams & Dair (2007); Djokoto et al. (2014)
6.	Inefficient coordination between design and construction teams and lack of design team	Djokoto et al. (2014)

C.	**Societal/Cultural Related Barriers**	
1.	Lack of interest	Du Plessis (2002); Zhou & Lowe (2003); Williams & Dair (2007)
2.	Lack of incentives	Powmya & Abidin (2014); Djokoto et al. (2014)
3.	Resistance to change	Powmya & Abidin (2014); Djokoto et al. (2014)
4.	Limited awareness	Powmya & Abidin (2014) Djokoto et al. (2014)
5.	Lack of demand	Djokoto et al. (2014)
D.	**Technology Related Barriers**	
1.	Uncertainty over sustainability technology performance	Powmya & Abidin (2014)
2.	Failure to understand sustainable technology work	Powmya & Abidin (2014)
3.	Inadequate technology specifications on sustainable approaches	Powmya & Abidin (2014)
4.	Unavailability of appropriate sustainable technologies	Du Plessis (2002); Djokoto et al. (2014)

Source: Authors 2018

For this study, key project professionals were identified to be interior designers/architects, electrical engineers, mechanical engineers, quantity surveyors and contractors. This categorization of key professionals was informed by the fact that they were the typical core interior design project team professionals in Kenya. This was with specific focus on professionally run interior design projects as opposed to ones run without requisite professional qualifications to assume the various project roles and responsibilities.

For this study, the population [Universe] from which the sample was drawn from was the pool of key project professionals from the Kenyan construction industry. For the specific components of the population [sampling units], these were identified as interior/architectural designers (interior designers/architects), building services engineers (electrical and mechanical engineers), quantity surveyors and contractors. The source list [sampling frame] for this study was defined as being the pool of interior/architectural designers (interior designers/architects), building services engineers (electrical and mechanical engineers), quantity surveyors and contractors from Nairobi City County. To ensure the respondents were actively practicing, and in light of limited time and other resources, they were drawn from completed and ongoing interior design projects between the years 2016 to 2018. Focus on interior design projects was mainly informed by limited scholarly work in this market segment. Lastly, Nairobi County- being the researchers' county of residence- was selected when conducting this study.

A formula approach, as postulated by Yamane (1967), to sample size computation was adopted for this study. The resulting sample size was adjusted for non-response as postulated by Israel (2012), to give a sample size of 60 respondents. This sample size was constituted of 12 interior/architectural designers (interior designers/architects), 24 building services engineers (12 electrical and 12 mechanical engineers), 12 quantity surveyors and 12 contractors. There were 46 valid responses constituted as 10 interior/architectural designers (interior designers/architects), 18 building services engineers (9 electrical and 9 mechanical engineers), 8 quantity surveyors and 10 contractors. These valid responses represented a response rate of 77%, which, as postulated by Mugenda and Mugenda (2008), is a very good response rate.

The structured questionnaires used for this study had four parts: definition of key terms used, respondents' profile, sustainable construction

uptake levels, sustainable construction uptake drivers and sustainable construction uptake barriers. For part 2, the questionnaire had fixed alternatives questions on respondent's roles in interior design projects, their experience in the construction industry market segment, number of projects they were handling as of when the questionnaires were being administered and their academic credentials. For parts 3 and 4, the questions requested for ranking of sustainable construction uptake levels, drivers and barriers on a 5-point Likert scale respectively. For uptake levels, this was for the three dimensions of sustainability (economic, environmental and social) dimensions individually. For sustainable construction uptake drivers and barriers, this was through indicating the individual influence attributed to them for the various categories as identified in **Tables 1** and **2**. This was ultimately geared towards computing the overall joint uptake levels for the three dimensions. Additionally, the study sought to compute the joint influence of identified sustainable construction drivers and barriers.

On validity of the research instruments, the study sought to enhance internal and external validity as postulated by Kothari (2004). Internal validity was enhanced through critical review of the draft questionnaire by 6 professionals – 2 interior/architectural designer (1 interior designer and 1 architect), 2 building services engineers (1 electrical and 1 mechanical engineer), 1 quantity surveyor and 1 contractor – drawn from the Kenyan construction industry to ensure its adequacy in addressing the research questions. On the other hand, to enhance external validity, the resulting findings of this study were defined to be generalizable to key project professionals– interior/ architectural designers (interior designers/ architects), building services engineers (electrical and mechanical engineers), quantity surveyors and contractors– in the Kenyan construction industry on sustainable construction uptake/transition as a key factor to sustainable construction compliance.

Additionally, the study sought to enhance reliability of research instruments – specifically the stability and equivalence aspects as postulated by Kothari (2004). The stability aspect of reliability was enhanced ensuring data was collected in a standard time span, specifically before noon, to minimize influence of factors such as fatigue and boredom. The equivalence aspect was ensured through standard questionnaire administration procedure. Lastly, the research assistants were trained on assuring the respondents of their anonymity and confidentiality on the information provided. All this was aimed at ensuring that the respondents were clear of the nature of this study and aimed at ensuring they were objective when responding to the questionnaire.

The analysis of the resulting data took a descriptive approach. This was aimed at summarizing, classifying and explaining the collected data. To this effect, descriptive statistics of distribution (frequencies), proportions (percentages), central tendency (mean) and dispersion (standard deviation) were employed. The resulting data was presented in form of tables, charts and graphs. The next section presents the findings and a discussion based on the analysis of data from the respondents to this study.

RESULTS AND DISCUSSION

Respondents' Profile

Respondents role in interior design projects

Figure 1 shows the categorisation of the respondents based on their typical role in interior design projects.

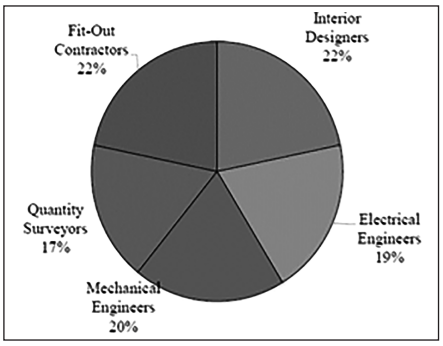

FIGURE 1
Respondents' role in interior design projects
Source: Field survey 2019

From **Figure 1**, all the respondents were from the pre-identified categories of key professionals in interior design projects. Additionally, all categories were represented.

Respondents' experience in interior design projects

Table 3 shows the respondents' experience in interior design projects. An overwhelming majority of the respondents had over 5 years' experience. This implies that they understand interior design projects and are in a position to ensure that sustainability approaches are context specific.

Number of interior design projects handled

Figure 2 shows that an overwhelming majority of the respondents were actively involved in 4-5 interior design projects. This implies that they had ample opportunities to ensure uptake of sustainable construction practices in their projects.

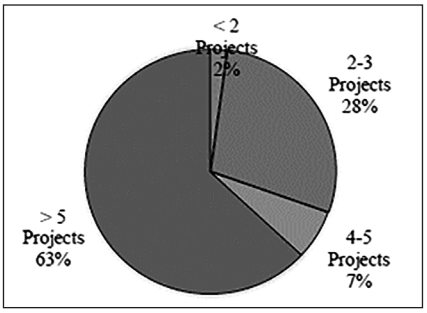

FIGURE 2
Number of interior design projects handled currently
Source: Field survey 2019

Respondents' academic credentials

An overwhelming majority of the respondents had their highest education level as university (**Table 4**). This implies that they are in a position to articulate and comprehend sustainable construction practices.

TABLE 3: Respondents' experience in interior design projects

Categories of Experience	Frequency	Percentage
< 1 Year	1	2%
1-2 Years	3	7%
3-4 Years	5	11%
> Over 5 Years	37	80%
Total number of respondents	**46**	**100%**

Source: Field survey 2019

TABLE 4: Respondents' academic credentials

Highest Education Level	Frequency	Percentage
Primary Level and Below	0	0%
Secondary Level	0	0%
College Level	2	4%
University Level	44	96%
Total number of respondents	**46**	**100%**

Source: Field survey 2019

Sustainability Construction Uptake Levels

Respondents rated the overall uptake of sustainable construction practices (economic, environmental and social) in interior design projects as average [Mean item score (MIS) =3.3551]). This implies that the three dimensions of sustainability are receiving average uptake levels in the interior design market segment of the Kenyan construction industry. This is illustrated in **Table 5**.

Sustainability Construction Drivers

The overall effect of stakeholder related, organizational related, management related and economic related drivers on uptake of sustainable construction practices in the Kenyan construction industry scored average (MIS=3.8043; **Table 6**).

With all scores above average, the findings imply that the four categories of drivers are key influencers of uptake of sustainable construction practices. As such, this validates the sustainable construction drivers within the sample geographical confines as postulated by Basu & Palazzo (2008); Fairfield et al. (2011); Elmualim et al. (2012); Manoliadis & Tsolas (2006); Wirtenberg et al. (2007).

Sustainability Construction Barriers

The overall joint effect of economic related, professional/capacity related, society/cultural related and technology related barriers on uptake of sustainable construction practices in the Kenyan construction industry had an average score (MIS=3.8098; **Table 7**).

TABLE 5: Sustainability construction uptake levels

Sustainability Dimension	Mean Item Scores (MIS)	Standard Deviation (SD)	Rank
Social related practices such as ensuring fair labour practices and access by the physically challenged	3.5000	0.9129	1
Environmental related practices such as ensuring reduction of project related emissions and minimizing waste	3.3261	0.7319	2
Economic related practices such as ensuring lifecycle cost efficiency	3.2391	0.9472	3
Grand Mean	**3.3551**		

Source: Field survey 2019

TABLE 6: Sustainable construction drivers

Sustainable Construction Driver Category	Mean Item Scores (MIS)	Standard Deviation (SD)	Rank
Organizational Related Drivers	4.1304	0.5815	1
Stakeholder Related Drivers	3.9783	0.9773	2
Economic Related Drivers	3.6957	0.8659	3
Management Related Drivers	3.4130	0.9793	4
Grand Mean	**3.8043**		

Source: Field survey 2019

TABLE 7: Sustainable construction barriers

Sustainable Construction Barriers Category	Mean Item Scores (MIS)	Standard Deviation (SD)	Rank
Economic Related Barriers	4.4565	0.7213	1
Professional/ Capacity Related Barriers	3.6304	1.0824	2
Technology Related Barriers	3.5870	1.0017	3
Societal/ Cultural Related Barriers	3.5652	1.0467	4
Grand Mean	**3.8098**		

Source: Field survey 2019

With all scores above average, the findings imply that the four categories of barriers are key influencers of uptake of sustainable construction practices. As such, this validates the sustainable construction barriers, within the sample geographical confines, postulated by Du Plessis (2002); Zhou & Lowe (2003); Williams & Dair (2007); Powmya & Abidin (2014); Djokoto et al. (2014).

CONCLUSION AND RECOMMENDATIONS

Firstly, the study sought to establish the extent of sustainability transition/uptake in the Kenyan construction industry. Generally, the respondents ranked the overall uptake of the three dimensions of sustainability (economic, environmental and social) as average. For the individual dimensions of sustainable construction, the findings showed that the respondents ranked the uptake levels as social, environment and economic in a decreasing order of uptake levels.

Additionally, the study further sought to establish the key drivers attributed to the established transition/uptake levels. These were ranked as organization related drivers, stakeholder related drivers, economic related drivers and management related drivers in order of decreasing influence. Lastly, the study also set out to establish the barriers that were impeding improved uptake of sustainable construction practices in the Kenyan construction industry. The respondents ranked these as economic related barriers, professional/ capacity related barriers, technology related barriers and societal/cultural related barriers in order of decreasing influence.

From the findings, it was established that sustainable construction uptake levels for the Kenyan construction industry were average. This implies significant room for improvement. Consequently, this study recommends the need to leverage sustainable construction uptake drivers while at the same time suppressing the identified barriers in a bid to improve the uptake levels.

CITED REFERENCES

Bakker, S., Lente, H.V. & Meeus, M.T. (2012). Credible expectations – The US Department of Energy's Hydrogen Programs enactor and selector of hydrogen technologies. *Technological Forecasting and Social Change.* 79(6), 1059 - 1071.

Basu, K. & Palazzo, G. (2008). Corporate social responsibility: A process model of sensemaking. *Academy of Management Review.* 33(1).

Djokoto, S., Dadzie, J. & Ababio, E. (2014). Barriers to sustainable construction in the Ghanian construction industry: Consultants perspectives. *Journal of Sustainable Development.* 7(1).

Du Plessis, C. (2002). *Agenda 21 for sustainable construction in developing countries.* Pretoria: CSIR Building and Construction Technology.

EIONET. (2016). *Sustainability Transitions.* Copenhagen: European Environment Agency.

Elmualim, A., Vallie, R. & Kwawu, W. (2012). Discerning policy and drivers for sustainable facilities management practice. *International Journal of Sustainable Built Environment.* 1(1), 16-25.

Fairfield, K., Harmon, J. & Behson, S. (2011). Influences on the organizational implimentation of sustainability: An integrative model. *Organizational Management Journal.* 8(1), 1541-6518.

Farla, J., Markard, J. & Coenen, L. (2012). Sustainability transitions in the making: A closer look at actors, strategies and resources. *Technological Forecasting & Social Change.* doi:10.1016/j.techfore.2012.02.001.

Geels, F.W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions.* 1, 24-40.

Israel, G.D. (2012). Determining sample size. *PEOD6.* Florida: IFAS, University of Florida.

Kemp, R. & Lente, H.V. (2011). The dual challenge of sustainability transitions. *Environmental Innovation and Societal Transitions.* 1(1), 121-124.

Kothari, C.R. (2004). *Research methodology: Methods and techniques.* New Delhi: New Age International.

Linstone, H.A. (1999). *Decision making for technology executives: Using multiple perspectives to improve performance.* Artech House Technology Professional Development Library.

Manoliadis, O., Tsolas, I. & Nakou, A. (2006). Sustainable construction and drivers of change in Greece: A Delphi study. *Construction Management and Economics.* 24(2), 113–120.

Markard, J., Raven, R. & Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. *Research Policy*. 41(6).

Mugenda, A.G. & Mugenda, O.M. (2008). *Research methods: Quantitative & qualitative approaches.* Nairobi: ACTS Press.

Musiolik, J., Markard, J. & Hekkert, M. (2012). Networks and network resources in technological innovation systems: Towards a conceptual framework for system building. *Technological Forecasting and Social Change.* 79(6), 1032-1048.

Powmya, A. & Abidin, N. Z. (2014). The challenges of green construction in Oman. *International Journal of Sustainable Construction Engineering.* 5(1), 33-41.

Quitzau, M., Hoffmann, B. & Elle, M. (2012). Local niche planning and its strategic implications for implementation of energy-efficient technology. *Technological Forecasting and Social Change.* 79(6), 1049-1058.

Smith, A., Stirling, A. & Berkhout, F. (2005). The governance of sustainable socio-technical transitions. *Research Policy.* 34(10), 1491–1510.

Unruh, G.C. (2000). Understanding carbon lock-in. *Energy Policy.* 28(12), 817–830.

Williams, K. & Dair, C. (2007). What is stopping sustainable building in England? Barriers experienced by stakeholders in delivering sustainable developments. *Sustainable Development.* 15, 135–147.

Wirtenberg, J., Harmon, J., Russell, W.G. & Fairfield, K. (2007). HR's role in building a sustainable enterprise. *Human Resource Planning.* 30(1), 10-20.

Yamane, T. (1967). *Statistics: An introductory analysis.* New York: Harper and Row.

Zhou, L. & Lowe, D.J. (2003). Economic challenges of sustainable construction. In D. Proverbs, (Ed.), *RICS Foundation Construction and Building Research Conference (COBRA 2003).* Wolverhampton: The RICS Foundation.