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MITIGATING THE TRIPLE CHALLENGE THROUGH THE INFLUENCE OF GREEN BUILDING LITERACY ON PRO-ENVIRONMENTAL BEHAVIORS IN JOHANNESBURG, SOUTH AFRICA

By

MUSUNDIRE SUWISAI

A DISSERTATION

Submitted in fulfillment of the requirements for the degree

MAGISTER TECHNOLOGIAE

In

Construction Management

In the

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

At the

UNIVERSITY OF JOHANNESBURG

SUPERVISOR: PROF C.O. AIGBAVBOA
CO-SUPERVISOR: PROF W.D. TWALA

2019
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CO-SUPERVISOR: PROFESSOR W.D. TWALA

A DISSERTATION submitted in fulfillment of the requirements for the award of the degree Magister Technologiae in Construction Management in the Faculty of Engineering and the Built Environment, Department of Construction Management and Quantity Surveying at the University of Johannesburg

JOHANNESBURG, MARCH 2019
DECLARATION

I, MUSUNDIRE SUWISAI, do hereby declare that this thesis is the result of my own investigation and research, except to the extent indicated in the references and by comments included in the body of the report and that it not been presented elsewhere for a similar purpose. It was submitted to the University of Johannesburg (Department of Quantity Surveying and Construction Management), as a requirement to obtain a Magister Technologiae degree in Construction Management.

__________________________________________
Signature

__________________________________________
Date

The University of Johannesburg,
Doornfontein Campus
ACKNOWLEDGMENTS

I would like to extend my gratitude and heartfelt appreciation to different individuals who inspired, guided and contributed to the success of this study. In light of the foregoing, my special mention goes to the following people:

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- My supervisor, Professor. Clinton Aigbavboa, for his assistance, encouragement, prayers wisdom and the ability to run with me, guiding me to fulfill my dreams. You did not give up on me.
- My Pastor and mentor, Rev Dr. John Ringson for his support and re-inspiration to have a passion for research and the fulfillment that comes from writing. It has been a long and tough journey with a lot of untellable tales and twists and turns that has refined both of us to be where we are today. I will forever be grateful; I will do the Doctorate.
- I would like also to thank the Co-Supervisor Professor Wellington Didibhuku Twala for the continued guidance and support during the crucial times where I was in dire need.
- All the respondents for their time in going through the interviews.
- My beloved family for the support, encouragement and believing in my capabilities
- Finally, I would like to acknowledge the Department of Construction Management and Quantity Surveying, University of Johannesburg, South Africa for giving me the opportunity to study there.
DEDICATION
This Dissertation is dedicated to my son Revival Andrea Takunda Shumba (Vavie) and my daughter, Celine Perpetual Blessings Shumba (Perbles). You gave me a new name and a new reason to succeed. May the Lord grant me the years to see you do better than me.
ABSTRACT

This dissertation was motivated by the desire to examine the effect of Green Building Literacy on pro-environmental behaviour and how it can be utilised to mitigate the triple challenge in South Africa. The study deploys Albert Bandura’s social learning theory as lenses in unmasking the complexities associated with processes of the effect of green building literacy on pro-environmental behaviour and how it can be utilised to mitigate the triple challenge in South Africa. This research was a qualitative phenomenological study that employed phenomenological interpretivism as its methodological epistemology to critique the perceptions and views of the subjects on the impact of green building literacy on pro-environmental based behaviours and its potential to mitigate the triple challenge in South Africa. In-depth interviews were utilised to gain in-depth understanding from the university students, Green Building professionals, and stakeholders on how practical the green literacy pro-environmental behaviours can be utilized to mitigate the triple challenge in South Africa. The documentary review such as the journal articles and reports on green building literacy pro-environmental behaviours and the triple challenge were also used as secondary data sources to triangulate the data from in-depth interviews. The results of the study overwhelmingly established that the green building literacy pro-environmental behaviours in South Africa are being under-utilized to mitigating the triple challenge due to the following reasons: fragmentation of green building literacy on the basis of the differences in the socio-economic lives and locations of people; inadequacy of green building literacy pro-environmental behaviour information because of the lack of community mobilization, stakeholders engagement and participation. Despite the foregoing challenges, the study established that the impact of green building literacy on pro-environmental behaviour program if strategically implemented in South Africa can immensely contribute in mitigating poverty and unemployment through the reduction of the costs of living and creation of employment. In light of the aforementioned findings, the study recommended that the government should invest in green building pro-environmental behaviours education and it must embrace a multidisciplinary stakeholders approach to enhance green building literacy in South Africa.

Keywords: Green Building Literacy, Pro-environmental behaviours, Social Learning Theory, Triple Challenge, Republic of South Africa
TABLE OF CONTENTS

DECLARATION.................................................................i
ACKNOWLEDGMENTS .......................................................... ii
DEDICATION ......................................................................... iii
ABSTRACT ......................................................................... iv
TABLE OF CONTENTS ............................................................ v
LIST OF FIGURES ................................................................. ix
LIST OF TABLES ................................................................. x
LIST OF ABBREVIATIONS ...................................................... xi
CHAPTER 1 ........................................................................... 12
RESEARCH OVERVIEW .......................................................... 12
  1.0 INTRODUCTION............................................................ 12
  1.1 BACKGROUND OF THE STUDY ...................................... 12
    1.1.1 Socio-economic and political situation in South Africa .............. 14
  1.2. STATEMENT OF THE PROBLEM ........................................ 16
  1.3 JUSTIFICATION OF THE STUDY ........................................ 17
  1.4 RESEARCH QUESTIONS .................................................... 18
  1.5 RESEARCH OBJECTIVES .................................................. 18
  1.6 DELIMITATIONS OF THE STUDY ....................................... 19
  1.7 LIMITATIONS OF STUDY ................................................ 19
  1.8 ORGANISATION OF THE STUDY ....................................... 20
  1.9 CONCLUSION .................................................................. 21
CHAPTER 2 ........................................................................... 22
LITERATURE REVIEW AND THEORETICAL FRAMEWORK OF GREEN BUILDING LITERACY AND
PRO-ENVIRONMENTAL BEHAVIORS ................................................ 22
  2.0 INTRODUCTION............................................................ 22
  2.1 CONCEPTUALIZING GREEN BUILDING LITERACY ...................... 23
    2.1.1 Relevance of Green Building Literacy .................................. 24
    2.1.2 Pro-Environmental behaviour in South Africa ....................... 25
    2.1.3 Impact-Oriented and Intent-Oriented behaviors ....................... 27
    2.1.4 Habits and pro-environmental behavior ................................ 28
  2.2 NEXUS BETWEEN GREEN BUILDING LITERACY AND PRO-ENVIRONMENTAL BEHAVIOR 28
  2.3 SOCIAL LEARNING THEORY ............................................. 30
    2.3.1 Critical Evaluation of Social Learning Theory .......................... 33
<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>2.4 BARRIERS INFLUENCING GREEN BUILDING LITERACY ON PRO-ENVIRONMENTAL</td>
</tr>
<tr>
<td></td>
<td>BEHAVIOR</td>
</tr>
<tr>
<td></td>
<td>2.4.1 Technical gaps and the engineering approach</td>
</tr>
<tr>
<td></td>
<td>2.4.2 Financial stimulus and the economics approach</td>
</tr>
<tr>
<td></td>
<td>2.4.3 Visibility</td>
</tr>
<tr>
<td></td>
<td>2.4.4 Habits and Routines</td>
</tr>
<tr>
<td>38</td>
<td>2.8 CONCLUSION</td>
</tr>
<tr>
<td>43</td>
<td>CHAPTER 3</td>
</tr>
<tr>
<td>44</td>
<td>GLOBAL TRENDS OF GREEN-BUILDING LITERACY AND TRIPLE CHALLENGES IN SOUTH</td>
</tr>
<tr>
<td></td>
<td>AFRICA</td>
</tr>
<tr>
<td>44</td>
<td>3.0 INTRODUCTION</td>
</tr>
<tr>
<td>44</td>
<td>3.1 GLOBAL TRENDS IN GREEN BUILDING: FROM ENERGY-EFFICIENT BUILDING TO</td>
</tr>
<tr>
<td></td>
<td>GREEN BUILDING</td>
</tr>
<tr>
<td>46</td>
<td>3.2 GREEN GROWTH IN DEVELOPING COUNTRIES</td>
</tr>
<tr>
<td>48</td>
<td>3.3 DEVELOPING COUNTRIES CONCERNS IN GREEN GROWTH</td>
</tr>
<tr>
<td>50</td>
<td>3.4 NATURE OF THE TRIPLE CHALLENGES IN SOUTH AFRICA</td>
</tr>
<tr>
<td></td>
<td>3.4.1 The nature and trends of Poverty in South Africa</td>
</tr>
<tr>
<td>52</td>
<td>3.4.2 The nature and trends of unemployment in South Africa</td>
</tr>
<tr>
<td>54</td>
<td>3.5 PRO-ENVIRONMENTAL BEHAVIOR AND THE TRIPLE CHALLENGE</td>
</tr>
<tr>
<td>55</td>
<td>3.6 CONCLUSION</td>
</tr>
<tr>
<td>56</td>
<td>CHAPTER 4</td>
</tr>
<tr>
<td>56</td>
<td>RESEARCH METHODOLOGY</td>
</tr>
<tr>
<td>56</td>
<td>4.0 INTRODUCTION</td>
</tr>
<tr>
<td>56</td>
<td>4.1 RESEARCH PHILOSOPHY: INTERPRETIVISM</td>
</tr>
<tr>
<td>57</td>
<td>4.2 RESEARCH PARADIGM: QUALITATIVE APPROACH</td>
</tr>
<tr>
<td>58</td>
<td>4.3 CASE STUDY APPROACH</td>
</tr>
<tr>
<td></td>
<td>4.3.1 Phenomenological Case Study Design</td>
</tr>
<tr>
<td>60</td>
<td>4.4 TARGET POPULATION AND STUDY AREA</td>
</tr>
<tr>
<td>60</td>
<td>4.5 PURPOSES SAMPLING METHODS</td>
</tr>
<tr>
<td>62</td>
<td>4.6 DATA COLLECTION METHODS</td>
</tr>
<tr>
<td></td>
<td>4.6.1 In-depth Interviews</td>
</tr>
<tr>
<td></td>
<td>4.6.2 Documentary Analysis</td>
</tr>
<tr>
<td>68</td>
<td>4.7 DATA ANALYSIS METHODS</td>
</tr>
<tr>
<td>68</td>
<td>4.8 ETHICAL CONSIDERATIONS</td>
</tr>
<tr>
<td>69</td>
<td>4.9 CONCLUSION</td>
</tr>
<tr>
<td>70</td>
<td>CHAPTER 5</td>
</tr>
<tr>
<td>70</td>
<td>PRESENTATION OF FINDINGS</td>
</tr>
<tr>
<td>70</td>
<td>5.0 INTRODUCTION</td>
</tr>
<tr>
<td>71</td>
<td>PRESENTATION OF RESEARCH FINDINGS FROM IN-DEPTH INTERVIEWS: PART I</td>
</tr>
</tbody>
</table>
7.0 INTRODUCTION ........................................................................................................126
7.1 CONCLUSIONS AND SUMMARY OF THE STUDY ......................................................126
  7.2 Objective 1: Green building understanding by the students, professionals & stakeholders ..........126
  7.2 Objective 2: Factors that influence the green building literacy on pro-environment behaviours ......127
  7.3 Objective 3: Solutions to the challenges faced in enhancing green building literacy ............128
  7.4 Objective 4: Pro-environmental behaviours in mitigating South Africa’s triple challenge ........129
7.2 CONCLUSION ........................................................................................................130
7.3 RECOMMENDATION OF THE STUDY ......................................................................133
7.4 SUGGESTION FOR FURTHER STUDIES ................................................................133
REFERENCES .............................................................................................................134
APPENDICES .............................................................................................................139
  Appendix 1: Information Leaflet ..................................................................................139
  Appendix 2: Informed Consent Form for participants ..................................................142
  Appendix 3: Interview Guide .......................................................................................143
LIST OF FIGURES

FIGURE 2.1: SOCIAL LEARNING PROCESSES ................................................................. 31
FIGURE 2.2 TEACHING GREEN BUILDING MODEL FOR LEARNING IN SCHOOLS ................................................ 34
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 3.1</td>
<td>The anticipated green growth outcomes</td>
<td>47</td>
</tr>
<tr>
<td>Table 3.2</td>
<td>Poverty rate as of 1994-2011</td>
<td>51</td>
</tr>
<tr>
<td>Table 3.3</td>
<td>Trends of unemployment in South Africa: 2011-2016</td>
<td>53</td>
</tr>
<tr>
<td>Table 4.1</td>
<td>Chart linking research questions and methods</td>
<td>64</td>
</tr>
<tr>
<td>Table 5.1</td>
<td>Matrix of respondents to in-depth interviews</td>
<td>71</td>
</tr>
<tr>
<td>Table 5.2</td>
<td>Categories of the views of the students on green building</td>
<td>73</td>
</tr>
<tr>
<td>Table 5.3</td>
<td>Categories of the views of the professionals on green building</td>
<td>75</td>
</tr>
<tr>
<td>Table 5.4</td>
<td>Categories of the views of the stakeholders on green building</td>
<td>77</td>
</tr>
<tr>
<td>Table 5.5</td>
<td>Categories of the views of the students on pro-environmental</td>
<td>79</td>
</tr>
<tr>
<td>Table 5.6</td>
<td>Categories of the views of the professionals on pro-environmental</td>
<td>81</td>
</tr>
<tr>
<td>Table 5.7</td>
<td>Categories of the views of the stakeholders on pro-environmental</td>
<td>83</td>
</tr>
<tr>
<td>Table 5.8</td>
<td>Categories of the views of the factors of green building on pro-environmental</td>
<td>86</td>
</tr>
<tr>
<td>Table 5.9</td>
<td>Categories of the views of the factors of green building on pro-environmental</td>
<td>88</td>
</tr>
<tr>
<td>Table 5.10</td>
<td>The views of the stakeholder’s factors of green building on pro-environmental</td>
<td>90</td>
</tr>
<tr>
<td>Table 5.11</td>
<td>Views of the students on solutions to enhance green building literacy</td>
<td>92</td>
</tr>
<tr>
<td>Table 5.12</td>
<td>Views of the professionals on solutions to enhance green building literacy</td>
<td>94</td>
</tr>
<tr>
<td>Table 5.13</td>
<td>Views of the stakeholders on solutions to enhance green building literacy</td>
<td>96</td>
</tr>
<tr>
<td>Table 5.14</td>
<td>Views of the students on mitigating the triple challenges through pro-environmental behaviors</td>
<td>99</td>
</tr>
<tr>
<td>Table 5.15</td>
<td>Views of the professionals on mitigating the triple challenges through pro-environmental behaviors</td>
<td>101</td>
</tr>
<tr>
<td>Table 5.16</td>
<td>Views of the stakeholders on mitigating the triple challenges through pro-environmental behaviors</td>
<td>104</td>
</tr>
<tr>
<td>Table 5.17</td>
<td>Documentary views on mitigating the triple challenges through pro-environmental behaviors</td>
<td>108</td>
</tr>
</tbody>
</table>
## LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANC</td>
<td>African National Congress</td>
</tr>
<tr>
<td>ATOB</td>
<td>Assessment Tool for Office Buildings</td>
</tr>
<tr>
<td>ATOI</td>
<td>Assessment Tool for Interiors</td>
</tr>
<tr>
<td>BER</td>
<td>Building Energy Rating</td>
</tr>
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<td>BREEAM</td>
<td>Building Research Establishment Environmental Assessment Method</td>
</tr>
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<td>EE</td>
<td>Energy Efficiency</td>
</tr>
<tr>
<td>EMSD</td>
<td>Electrical and Mechanical Services Department</td>
</tr>
<tr>
<td>GBC</td>
<td>Green Building Curriculum</td>
</tr>
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<td>GBL</td>
<td>Green building Literacy</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GFC</td>
<td>Global financial crisis</td>
</tr>
<tr>
<td>GHG</td>
<td>Green House Gases</td>
</tr>
<tr>
<td>HEI</td>
<td>Higher Education Institution</td>
</tr>
<tr>
<td>HKSAR</td>
<td>Hong-Kong Special Administrative Region</td>
</tr>
<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climatic Change</td>
</tr>
<tr>
<td>MUR</td>
<td>Multi-Unit Residential</td>
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<tr>
<td>PEB</td>
<td>Pro-Environmental Behavior</td>
</tr>
<tr>
<td>RAU</td>
<td>Rand Afrikaans University</td>
</tr>
<tr>
<td>RDP</td>
<td>Redistribution and Development Programme</td>
</tr>
<tr>
<td>RTEBP</td>
<td>Rating Tool for Existing Building Performance</td>
</tr>
<tr>
<td>SEC</td>
<td>Socio-Economic Category</td>
</tr>
<tr>
<td>StatsSA</td>
<td>Statistics of South Africa</td>
</tr>
<tr>
<td>US</td>
<td>United States</td>
</tr>
</tbody>
</table>
CHAPTER 1

RESEARCH OVERVIEW

1.0 INTRODUCTION
The green building literacy on pro-environmental behaviors is a relatively new area. Arny (2011:7) revealed that it relates to the global concern. The concern led to the birthing of the two historical world-wide documents namely; The Tbilisi Declaration of 1977 and the Belgrade Charter of 1976, which upholds the need for environmental education as an instrument of creating change as well as developing a population that is knowledgeable to the environmental crisis. This goes with the duty to be able to act on a personal and collective approach in bringing a sustainable solution to environmental problems and preventing its recurrence in the future.

The environmental oriented education such as the green building education initiative was introduced in an effort to promote sustainable development and environmental citizenry (Green Building Council of South Africa, 2015:4). In fact, the green building environmental education aims at producing a responsible and knowledgeable citizenry regarding the biophysical setting and its related difficulties. The intellectual argument of this study is that the biophysical environment is not static but ever-changing and requires people to be pro-environmentally active so as to curb the challenges associated with its dynamism. In light of above, this study examined how the influence of green building literacy (GBL) on pro-environmental behaviors can be translated into mitigating the Republic of South Africa’s triple challenge (poverty, unemployment, and inequality). The GBL and pro-environmental behaviours were examined with an intention to see how it can be utilized to mitigate the perennial triple challenge in South Africa. These triple challenges have been declared a national emergency by the Centre for Development and Enterprise (2018: 13). Thus, the South African government has mobilized for the multi-stakeholders’ engagement in fighting the ripple challenges in South Africa.

The organization of this dissertation entails the study context, problem statement, significance of the study, research questions, literature review, and research methodology.

1.1 BACKGROUND OF THE STUDY
The analysis provided by the Intergovernmental Panel on Climatic Change (IPCC) indicated that the energy efficiency in buildings is the least expensive sector to address, and can achieve significant discounts (Barker et al. 2007:24). Evidently, the majority of the regions in the world
shows that buildings can achieve significant savings to greenhouse gas emissions, up to about 25%, at a net negative cost (Levine et al. 2007:34). From the perspective of economic decisions for a national economy, improving the energy efficiency of residences is one of the first actions a government might select to promote. The Pembina Institute and The David Suzuki Foundation (2009:12) indicated that for Canada to achieve recommendations for industrialized countries made by the IPCC to avoid the increase in temperature, she targeted a decline in greenhouse gas emissions of 50 percent from 1990 levels by the year 2020. Canadian residences account for 17 percent of consumed energy in Canada (Natural Resources Canada 2010:13). In 2008, Canadian residences accounted for 10 percent of Canada’s total greenhouse gas emissions (Office of Energy Efficiency, 2010:23), having emitted 74.2 megatonnes (Mt) of carbon dioxide equivalent3 (CO2-eq) (Office of Energy Efficiency 2010:16). There is clear evidence both of rising energy consumption globally changed the structure of demand for energy services. For example, energy consumption rose in every sector in every region of the world (except Russia) between 1990 and 2005 (IEA 2008:12).

Across the world, approximately 50 percent of the total carbon emissions released into the atmosphere comes from the buildings which ultimately damage the atmosphere. Global Green Building Council (2009:13); Yudelson, (2008:5) showed that the buildings use approximately 70 percent of all electricity produced in the world. It is therefore in light of the above problem that managing the flow of resources and materials through green buildings has become an indispensable option of moving towards an ecologically well-balanced future. However, due to the technical challenges in training professionals in green building literacy and pro-environmental in South Africa, an ecologically well-balanced future continues to be an illusion. This ultimately leads to the Green buildings development integration into existing social systems. The main idea of integrating them with the social systems was to encourage novelty and final accomplishment of each new green building. Despite all these efforts, the current green building project, construction, and projects often fail to involve the general populace. Yudelson (2008:12); Orr, (2004:34) argue that the public is not often involved in the design process which causes them not recognise the difference between a green building and conventional building.

Promoting green building policy through imparting knowledge to citizens has been considered one of the most operative ways of carbon lessening assurance. Thus, contributing largely to sustainable socio-economic development and growth courtesy of creating a healthier environment (Taylor, 1993:24). Pursuant to this, it has been found necessary to upsurge green
building literacy among citizens in order to save energy and carbon reduction. Thus, creating a liveable and healthier society through embarking on environmentally friendly behaviors. In South Africa, it has been the priority of the government to make sure that young professionals are sensitized about the importance of green building literacy issues during their times at school. This has been because of serious challenges and problems being faced by professionals in their day to day tasks to effectively and efficiently formulate and implement policies, projects, programs and plans that are environmentally friendly. Therefore, this prompted the need to impart knowledge relating to green building to those responsible for driving socio-economic development and growth of the nation (Nair & Fielding, 2005:33; Taylor, 1993:22) under the theme popularly known as “teaching green building” meanings buildings designed to encourage environmental education and Green building literacy curricula. The theme underlines the philosophical story buildings express about how we treat each other and the ecosystems that sustain us (Orr, 2004:14). Teaching Green Building developments pushes the understanding of green buildings outside a viewpoint that is based on green machinery, which is of the suggestion that green buildings as a vehicle for sustainable livelihood (Orr, 2002:17). Orr further argues that Green building teaching aid in drafting new behavioral norms as well as proposals in progressively reflective conducts of utilising the earth’s resources in everyday lives. To this end, this study has been precipitated by the need to examine the impact of green building literacy on pro-environmental behaviors in Johannesburg, South Africa on the socio-economic progress and growth of the nation at large. The influence of green building literacy on pro-environmental behaviors was examined on its potentialities to mitigate the triple challenge in South Africa. The scope of the triple challenge to be put to the context on the basis of the developmental state model with its objectives of poverty eradication, the creation of employment and equitable opportunities to all in the post-Apartheid in the Republic of South Africa.

1.1.1 Socio-economic and political situation in South Africa
The predominant successes of the post-apartheid revolution in South Africa rest on the ability of the state to deliver elementary roles and effective systems and socio-economic programs in response to poverty, unemployment, and inequality (Hemson, Carter and Katuri-Sebina, 2008: 151). The post-apartheid government pledged to fight the aforementioned triple challenge as its developmental objectives crux in 1994 (National Development Plan, 2012: 3). Adesina (2007:23) argued that the thrust of the socio-economic policy in colonial Africa was elitist, discriminatory and exclusive. In the context of the South African post-apartheid government
led by the African National Congress (ANC), after the decades of mistreatment and authoritarianism as well as two decades of abject poverty and increasing unemployment, the poorer section of the population living in poverty and hardship (Terreblanche, 2008:107). Terreblanche (2008:107) further argued that the enormous duty to get the South African economy to reestablish its universal position and change from the apartheid regime towards a democratic dispensation was inevitably necessary.

From the aforementioned, it is apparent that the South African economy was not only in a state of hopelessness but it was entrenched in structural crisis after several decades of segregation and apartheid. According to the Reconstruction and Development Programme (RDP) of 1994 in South Africa, it was therefore crucial to bring about an essential changes of the economy in order to eradicate the pro-white and pro-rich orientation, and to reform it in such a way that its orientation could become pro-black and pro-poor (Hemson, Carter and Katuri-Sebina, 2008:151). This culminated to the promulgation of the socio-economic policies that are pro-blacks such as the Black Economic Empowerment, Affirmative Action and the Grant Assistance Programme as a way of fighting poverty, inequality, and unemployment. Whilst these programs have remarkably improved and shaped the socio-economic structure of South Africa, Noyoo (1999:13) argued that it rather created the black elitist and poverty, unemployment and inequality continued to affect the marginalized black people. As such, the National Development Plan (1994:12) in its vision 2030 proposed that a new approach of eliminating poverty in South Africa that is different to the one executed in the aftermath of the colonial rule in 1994. This new approach comprises the following strategies:

- The active participation and efforts of the general populace or South African citizens.
- Effectively remedying the injustices of the past experiences of the general populace.
- Foster economic growth coupled with higher investment along with employment.
- Rising standards of education, a healthy population and operative social protection including security.
- Consolidation the ties between social changes and economic strategies.
- A capable and operative government.
- Public and Private sector collaboration.

Entrenched in the foregoing, this study from a multi-sectoral and disciplinary point of view critically examines the contribution that can be made by the influence of the green building on
pro-environmental behavior in mitigating the triple challenge in Johannesburg, South Africa. It can be argued that green building literacy and pro-environmental based behavior is a form of empowerment and capacity building that can be used to eliminate poverty, unemployment and inequality Republic of South Africa. In countries like Canada, China, Malaysia and India, it was attested by the studies carried out by Arny (2011:7) Nair & Fielding (2005:33); Taylor, (1993:22); United States Green Building Council (2008:10) that green building literacy and pro-environmental behavior and be maximized towards poverty alleviation and creation of employment.

1.2. STATEMENT OF THE PROBLEM

Environmental issues became global concerns in recent times (Taylor, 1993:33; Green Education Foundation, 2012:8; Stenberg, 2005:5). This is large since the impact of climate changes is enormous to the extent of being one of the top-ranking threats against humanity. Unprecedented climatic changes are posing serious threats to the lives of many across the globe with some people dying because of extremely high temperatures (heatwaves), low temperatures (el-Nino) and floods of monumental proportions ever to be experienced or recorded in our times. However, most, if not all, of these serious challenges are attributed to human actions which disturb the proper functioning of the environment at large. Against this background, the green building literacy on pro-environmental behaviors will go a long way in constructing capable professionals in South Africa who will be knowledgeable about environmentally friendly behaviors (Green Education Foundation, 2012:2). This is mainly since improper building practices are impacting negatively on the concepts of sustainable development simply because such kind of building practices are not teaching students environmental issues with which the concept of sustainable socio-economic development and growth is grounded upon. The public in South Africa has not yet acquired sufficient knowledge in developing good habits of green living yet in the same societies there are professionals who are purported to be environmentally literate and expected to behave and influence the society towards pro-environmental behavior hence the need to conduct a study to find out if knowledge really matters with regards to sustainable construction. Whilst several studies were conducted by scholars such as Taylor, (1993:33); Xie; Lu and Gou (2017:1); and Arny (2011:7), these studies were predominantly quantitative and carried out in the developed countries where green building literacy is seemingly advanced. Little research so far in examining green building pro-environmental behaviors has predominantly used qualitative tools largely in developing countries like South Africa where this study is being undertaken. To that extent, this qualitative
study seeks to examine the green building pro-environmental literacy in Johannesburg, South Africa. Therefore, this study is premised on examining how the idea of green building literacy on pro-environmental behaviors in Johannesburg, South Africa can foster and construct capable, responsible and ethical professionals in the country knowledgeable about environmental friendly behaviors so as for them to be the vanguards of the sustainable socio-economic development and growth. Thus, the understanding of the influence of green building literacy to pro-environmental behavior would help in mitigating poverty, inequality and unemployment. It is also imperative to note that there is a deficiency of the studies conducted in South Africa on the effect of green building literacy on pro-environmental based behavior and its contribution to the mitigation of the triple challenge.

In light of the above, this study’s purpose is to examine the green building pro-environmental literacy among the students in a Higher Education Institute (HEI) in Johannesburg, South Africa. This purpose was developed on the pretext that the examination of green building literacy on pro-environmental behaviors among the South African students would foster and construct capable and ethical professional citizenry in the country. Thus, these purported professionals, responsible and ethical citizenry in green building pro-environmental behaviors will be able to foster sustainable socio-economic development by creating a biophysical user-friendly environment.

1.3 JUSTIFICATION OF THE STUDY

There is no systematic academic research on examining the impact that green building literacy has on pro-environmental concerns as well as constructing a responsible, capable and professional in South Africa that has been conducted. This means that no formal research was carried out in trying to scrutinize how relevant is the knowledge of green building among South African professionals in building a sustainable socio-economic environment. Many types of research carried out on this phenomenon under investigation were mainly anchored on either the examination of the feasibility of the green building literacy in the country, it’s essential attributes or environmental issues relating to impacts of climate changes on agriculture. In this respect, this research seeks to fill the gap of knowledge existing between philosophy and practice in relation to how the knowledge of green building on pro-environmental based behavior impact the construction of the responsible and capable South African professional. This is against the background that in South Africa there is a general lack of thoughtful reflection on the positive impacts of the knowledge of green building on pro-environmental based behaviors on the construction of a capable, responsible and ethical professional. To this
end, this study is of paramount significance in achieving sustainable socio-economic development and growth in the country in the sense that it will help in establishing knowledge about the relevance of green building literacy on pro-environmental issues as key to constructing an industrially relevant and competitive professional. Therefore, the study will be of much use to policy makers and implementers in the areas of environmental issues and green building literacy. In the final analysis, however, this study will enrich the existing body of literature on the nexus between green building literacy on pro-environmental behaviors and the construction of capable, responsible and ethical professionals who are industrially relevant and globally competitive. Thus, the understanding of the influence of green building literacy on pro-environmental behavior can be translated into poverty eradication, the creation of employment and fighting inequality in South Africa. This can be attested by the studies carried out in the developed countries on green building literacy pro-environmental behaviors that it is an empowerment to the people to fight against poverty that is entrenched in the effect of pollution, energy loss and blockage of the ozone layer through emissions of gasses.

1.4 RESEARCH QUESTIONS
Ensuring the study context, problem statement, justification of the study and purpose of the study the primary research question to be answered in this study is, therefore: How can the influence of green building literacy on pro-environmental behaviors be utilized to mitigate the perennial problem of the triple challenge in Johannesburg of the Republic of South Africa?

The research questions of this study are:
1. What is the level of understanding of students, professionals and stakeholders with regards to the concept of green building literacy in Johannesburg, South Africa?

2. What are the critical success factors enhancing the influence of the green building literacy on pro-environmental behaviors in Johannesburg, South Africa?

3. How can the challenges currently being faced in facilitating the influence of green building literacy on pro-environmental behaviors in Johannesburg, South Africa be resolved?

4. How can pro-environmental behaviors be utilized to influence the mitigation of South Africa’s triple challenge?

1.5 RESEARCH OBJECTIVES
The research objectives of this study include;
1. To determine the level of understanding of students, professionals, and stakeholders of the concept of green building literacy in Johannesburg of the Republic of South Africa.

2. To examine the critical success factors enhancing the influence of the green building literacy on pro-environmental behaviors in Johannesburg of the Republic of South Africa.

3. To determine the solution to the challenges currently faced in facilitating the positive influence of green building literacy on pro-environmental behaviors in Johannesburg of the Republic of South Africa.

4. To determine how pro-environmental behaviors can be used to influence the mitigation of the perennial problem of the triple challenge in Johannesburg of the Republic of South Africa.

1.6 DELIMITATIONS OF THE STUDY

This study focuses on the examination of the influence of green building literacy on pro-environmental behaviors of students, construction professionals and various stakeholders in South Africa. That being the case, this study will examine how the processes and issues around the independent variable; (green building literacy) effects, influences or impacts as well as determines pro-environmental based behaviors specifically for the professionals, students, and stakeholders in South Africa. However, this research did not go beyond to other issues of green building literacy on other areas besides its influence on pro-environmental based behaviors in construction professionals. The study also examined how pro-environmental based behaviors mitigated the triple challenge in Johannesburg of the Republic of South Africa. The selected university students from the Higher Education Institutions (HEI), professionals in Johannesburg and the green building stakeholders and owners were the information-rich sources of this study. Also, the study did not cover other professionals except those residing in Johannesburg of Republic South Africa. The study was carried out in Johannesburg, South Africa using a purposively selected HEI, professionals and the green building stakeholders. The justification for the aforementioned delimitation is the geographical proximity and accessibility of the information-rich sources.

1.7 LIMITATIONS OF STUDY

The researcher may face the challenge of inaccessibility of some targeted respondents. However, this was circumvented by first acquiring the letter of authorization of entry from the HEI. The researcher also faced the challenge of resistance by some students who were reluctant to disclose the much-needed information citing that the research was not easy for them to
participate. However, the researcher partially counteracted this challenge by explaining to them that the research is purely for academic purposes without any connotation attached to it which is outside the bounds of academics. Moreover, the researcher also faced the challenge of unavailability of targeted respondents for interviews. This challenge was circumvented by e-mailing interview guides and they respond to them at their spare time. The researcher was also liable bias since she was once working as a quantity surveyor and to deal with the potential bias, the study made of the informants to air out their views and perceptions in the subject under study.

1.8 ORGANISATION OF THE STUDY
This study comprises of six chapters and has been organized in the following order;

Chapter 1: Introduction
This chapter presents information about the context of the study, problem statement, research objectives and research questions. The significance of the study, limitations and delimitations of the study was also presented.

Chapter 2: Literature Review and Theoretical Framework
This chapter focuses on reviewing the literature to be drawn from different scholars on the research topic under study. The theoretical framework of this study was also presented in this chapter. Among another important aspect of this literature review, the conceptualization of green building concept and the social theory were presented.

Chapter 3: The global and local trends of Green-Building Literacy
This chapter reviews the literature on the global trends of the green building literacy with special focus to the USA and China as global competitive economies.

Chapter 4: Research Methodology and Design
The methodology of the study was presented in this chapter. Different methodologies were used to sample, collect, present and analyze data in this study, for example, interviews and documentary analysis.

Chapter 5: Data Presentation
This chapter presents the data following the order of the research questions in the research overview chapter.

Chapter 6: Data Analysis and Discussion
This chapter interprets, analyses and discusses data in the same sequence/order as presented in the previous chapter. Thematic analysis was used in the analysis data in this study.

Chapter 7: Conclusion and Recommendations

This chapter presented the conclusions, summaries, and recommendations of the study.

1.9 CONCLUSION

This chapter introduced the research study which is on examining the impact of green building literacy on pro-environmental based behaviors has on constructing a relevant professional in South Africa. This was done through the presentation of the context of the problem, the problem statement, the research objectives, the significance of the study, the limitations and delimitations of the study. The context of the study problem indicated that unprecedented climatic changes are posing serious threats to the lives of many across the globe with some people dying because of extremely high temperatures (heatwaves), low temperatures (el-Nino) and floods of monumental proportions ever to be experienced or recorded in our times. However, most, if not all, of these serious challenges are attributed to human actions which disturb the proper functioning of the environment at large. Predicated in the foregoing the study examines the influence of green building in pro-environmental based behaviours and how it can be utilized to mitigate the triple challenges in Gauteng province of South Africa. The subsequent section focuses on the literature review and the theoretical framework.
CHAPTER 2

LITERATURE REVIEW AND THEORETICAL FRAMEWORK OF GREEN BUILDING LITERACY AND PRO-ENVIRONMENTAL BEHAVIORS

2.0 INTRODUCTION

This section reviews the pertinent literature of the research in order to establish a comprehensive theoretical framework for the study. The literature review section is separated into two major sections. The first section reviews the literature on the concepts of green building literacy, the relevance of green building literacy in this modern world and pro-environmental behaviors. Both the less costly and costly environmental behaviors were reviewed as critical literature in this section. The second section reviews the social learning theory as the main theory informing this study. Tuckman (1998) defined the literature review as an analysis of the existing studies related to the area under study. Furthermore, other scholars such as Neuman (2011:12) and Dey (1999:9) suggest that a literature review helps the researcher with orientation necessary to any study and enables one to eliminate unnecessary duplication of effort. Neuman (2011:6) further views a literature review as, “a collected body of prior work which uncovers ideas about variables that have been proven important in any field of study”.

A comprehensive literature study shows that the researcher has read widely in the area related to his/her study and thereby strengthening the arguments of his/her current study. Leedy (1989:8) posits that the body literature offers a considerably understanding into the scopes of addressing the problem. In light of the above understanding of literature review, it can be safely pointed out that a thorough an examination of the existing literature in one’s area of study helps to comprehensively summarize and the compare the ideas of different scholars in that area of study. Premised on that view, the current researcher, therefore, contends that a review of the literature helps to contextualize a study and minimize trial and error activities during the study. This study seeks to explore the green building literacy’s influence in pro-environmental behaviors among the students from the selected HEI in Johannesburg South Africa. This literature review section reviewed all the critical issues to do with each and every
research question. This was done following the order through which the research questions were presented in chapter 1 of this study.

2.1 CONCEPTUALIZING GREEN BUILDING LITERACY

Understanding Green-Building Literacy (GBL) as a concept justifies the success stories of teaching green building in any given environment. On the other hand, failure to understand the GBL concept is a clear indication that either the GBL education is not effective or not there at all. One of the most important aspects of understanding GBL is that it adds on to the decades’ studies and enhancing ecological literacy, which is can be defined as a different various dimensional set of goals for environmental-based education (Orr, 1992:20; UNESCO, 1976:12, 1977:15). GBL is more than factual knowledge just like the ecological literacy in the sense that it must be a lived experience by the people (Orr, 1992:20). Simply put, the GBL is not a mere theoretical understanding of green buildings and its implications in the human lives but it must be a practical and lived experience by the people in any given environment. UNESCO (1976:13) reported that GBL manifests itself through awareness, human behaviours, skills, and participation in the projects and activities in the implementation of its principles. Furthermore, UNESCO (1976:14) indicated that GBL entails a wide range of aspects that define an inhabitant who is ready to take positive action in eradicating the environmental lack of GBL understanding problems. In simple terms, according to UNESCO (1976:14), the core of GBL is not only centered on individual enhancement; GBL can also enhance one’s capacity to significantly subsidise to the performance of the green building itself. This means that occupant acquaintance yields outcomes of environmental significance not the peripheral view of simply abstract or the behaviors symbolic to knowledge.

According to Orr (1992:21, the basic levels of GBL may result in a person understanding other energy systems, they may be informed of the pedigrees of building materials. Furthermore, Orr (1992:22) posits these systems may also recognise how to operate windows in order to augment the building’s aeration system. The user considerate may even extend to the level of the whole city or region. This is resultant of the reality that building users will eventually increasingly comprehend how the building itself contributes to the home-grown ecology. As it may be, the final result of GBL is conversion transversely in the building structures. Ultimately, inhabitants become promoters for change in their own built environments. Combined, the notions of the “Teaching Green Building” and “Green-Building Literacy” identify interesting new guidelines for green-building practice and research. Predicated in the aforementioned, Jackson (2005:10)
argues that it is a movement that has legitimate beginnings in school architecture, where we have coercive real-world examples, for example, the Environmental Centre building at Oberlin College, can be identified.

2.1.1 Relevance of Green Building Literacy

The concept and practice of green building literacy have a lot of advantages, ranging from promoting good health and well-being, safeguarding water, preserving energy, connecting people across the globe to mention just a few (Orr, 1992:20). Green buildings promote the quality of health and wellbeing in the sense that they allow, through good ventilation, fresh air circulation in the building, thereby protecting people from harmful emissions of chemicals and materials that can cause serious diseases. To this end, they are environmentally sympathetic. Further to that, the structures of the green buildings are built in a manner that incorporates natural views and lights that allows people inside them to enjoy the comfort of their surroundings. These are buildings are aesthetic and magnificent in nature as they are designed to please the ears and eyes at the same time. Therefore, in the green building literacy, such things as proper sound insulation, health, and residential sectors and acoustics play a very big role in facilitating the concentration, peaceful enjoyment of property and recuperation (Orr, 1992:28). Moreover, Orr (1992: 29) argues that green buildings act as comfort zones or environments for people’s everyday lives in the sense that they create an apt indoor temperature since they are built in the way that responds and regulates favorably the environmental temperatures.

Further, the adoption and usage of the idea of the green building are regarded as an intelligent approach to energy use (Jackson, 2005:19). These buildings minimize greatly energy use in every stage of the building’s life cycle as compared to their counterparts. That being the case, this makes new and renovated buildings less expensive to run, more comfortable and helping the users of the building to be very much efficient. More importantly, green buildings tend to integrate low-carbon and renewable technologies in a manner that promote and maximize both the inbuilt and natural efficiencies of the building. Also, green buildings tend to minimize at all costs waste and maximize at all costs reuse of the waste (Mitchell 2008:13). This is achieved through the usage of very few, more durable and generating less waste building materials. This is also through accounting for the building’s end of life span thereby preparing for its demolition, waste recovery and reuse. Thus, Jackson (2005:20) points out that this helps to ensure building users to engage in reuse and recycling.
Moreover, the concept and practice of green building keep the landscape vegetated and in good condition. In view of the above, the urban areas are encouraged to come up with mechanisms to preserve nature and ensure that the quality of the land and wildlife are safeguarded. This can be done by developing possible mechanisms and building structures on polluted land together with forming green spaces. There have to be ways for people to make urban areas more productive, bringing Agricultural activities to cities.

2.1.2 Pro-Environmental behaviour in South Africa

Our understanding of pro-environmental behavior, the subsection of consumer behavior which is inclined towards plummeting environmental effect compared to other options, has evolved over time in response to an accumulation of knowledge about the barriers it faces (Mitchel, 2008: 14). Currently, a wide variety of disciplines analyze how to influence pro-environmental consumption decisions. Mitchel (2008:15) conceptualised pro-environmental behavior as actions taken by people to reduce energy consumption through investment in energy efficiency. Green building literacy and education have the potential to influence significant change in personal and institutional energy consumption. Simply put, Jackson (2005:19) posits that the actions taken by people as a result of green building literacy could significantly reduce greenhouse gas emissions and energy wastage. Thus, according to Jackson (2005:20), the nexus between green building literacy, pro-environmental behavior, and the energy consumption is one of the few interactions people had with energy expert regarding their house so that its effect may be discovered. The green building literacy and energy consumption can be considered significant both in terms of learning and identifying large reductions to personal energy use. It is, therefore, an important site of investigation of pro-environmental decisions concerning energy.

Researchers understand consumer behavior as a variety of decisions or behaviors that can be influenced by many different factors. Jackson (2005:19) points out that consumption is part of the pursuit of personal and cultural meaning. Therefore, a particular consumptive behavior might be influenced by the recognition of a want or a need, personal and group norms, price, availability, product attributes, as well as a variety of other factors. In this study, pro-environmental behavior is the subset of consumer behavior that is oriented towards environmental sustainability, and more specifically, towards dropping environmental effect
related to other possibilities. There is a consensus of views that due to a diversity of influencers, pro-environmental behavior lends itself to examination by means of a unified approach that allows the inclusion of diverse disciplinary findings or perspectives.

The influence of green building literacy in pro-environmental behavior means to there must be a positive outcome in energy conservation and possible interventions to curb against wastage of energy (Mitchell 2008). Jackson (2005:134) describes the basis of pro-environmental behavior as informed by structuration theory through the recognition that it is influenced both by internal (psychological) and contextual (situational) factors. The foregoing elements structuration theory as the basis of pro-environmental behavior is the basis of a holistic understanding of the influence of green building literacy. For example, Wilson and Dowlatabadi (2007:23) appeal for integration as decision models that are nested within each other, ordered by timeframes of decisions. Resource consumption and the implications of more sustainable consumption are embedded in systems of production and consumption (Peattie 2010:105). Thus it is also widely agreed that the factors that influence and hinder pro-environmental behavior operate at multiple scales that can be internal (Jackson 2005:1), spatial (Owens 1986:19; Jaccard et al. 1997:18), social (Lutzenhiser 1992:45), political (Parker and Rowlands 2007:33) and economic (Geels and Schot 2010:78).

It is for the above-mentioned reasons, Peattie (2010:105) attests that the understanding of pro-environmental behavior is informed by multiple disciplines. These typically include engineering, ecological economics and industrial ecology, behavioral economics, environmental economics, planning, social psychology, marketing, geography, sociology, and history. So far, most research can be considered multidisciplinary as findings from various disciplines are considered complementary, but studies are typically informed by a singular discipline and compared to findings from studies informed by other singular disciplines (Peattie 2010:26). The engineering and economic traditions are considered to be the dominant tradition of studies about energy consumption behavior (Wilson and Dowlatabadi 2007:19). Finally, it can be therefore safe to note that environmental problems exist in part due to resource use and that pro-environmental behavior may lessen the damage inflicted on the environment.
There are four key concepts related to pro-environmental behavior that both influence and appear throughout this literature review. These are whether the behavior is an impact or intent-oriented, the notion that habits govern all types of behavior and decisions, the argument that the influence of learning through social learning is more important than creating the conditions for change through incentives and disincentives, and the rebound effect. These are explained prior to the main discussion of the literature review.

2.1.3 Impact-Oriented and Intent-Oriented behaviors.

Critical to understanding pro-environmental decisions is the material aspect of the decision itself, that is, whether it is pro-environmental or detrimental in impact. Stern (2000:14) carefully distinguishes between impact- and intent-oriented behavior. Intent-oriented behaviors stem from the intention of environmental significance, usually to reduce environmental harm. Impact-oriented behaviors are environmentally significant in that they have an impact on environmental outcomes. One example of an impact-oriented decision is a reduction of fossil-fuel use. The associated environmental benefit is the lessening of greenhouse gas emissions that affect climate change is realised to the GBL and the behaviours related to environmental issues.

The critical insight made by Stern (2000:33) is that intent-oriented decisions may not have an environmental impact or the intended environmental impact. Stern (2000:19) illustrates this with an example of consumers who reported avoiding the use of spray cans because they believed that spray cans emit ozone-depleting substances. However, these ozone-depleting substances had already been banned for several decades. Meanwhile, Wilson and Dowlatabadi (2007:19) argue that the impact-oriented decisions may have no associated intent of environmental impact. For example, individuals may cut their consumption with an intention to save money and the resources in their disposal. However, this decision may benefit the environment. The potential for the asymmetry between intent and impact suggests a barrier of visibility or knowledge between the decision and the environmental (or lack of) impact.

The impact-oriented decision which has no associated intent reveals asymmetry between attitudes or motivations and impact. In some cases, this may be an effect of a deficiency of visibility or information by the decision maker about the associated environmental benefit. The intent-oriented decision, which does not benefit the environment, similarly points to an
asymmetry in knowledge about the cause-and-effect of the action. Peattie (2010:101) uses the distinction between intent and impact-oriented behaviors as a way to distinguish between empirical studies. Peattie (2010:100) observes that marketing studies usually focus on intent whilst industrial ecology and ecological economics studies usually to focus on impact. Whitmarsh (2009:24) studied climate change behaviors and attitudes in the United Kingdom and found that price was a stronger determinant of an impact than of intent. For instance, Whitmarsh’s (2009:17) findings were based on the results that the actions that participants reported having taken to address climate change diverged from those prescribed by policymakers. Meanwhile, the participants’ motivations to save money led to behaviors that had an environmental impact.

2.1.4 Habits and pro-environmental behavior

Researchers have learned that influencing all types of decisions and behaviors involves the influence of habits. It has been discussed in the first chapter that Peattie’s (2010:117) definition of a six-stage process illustrates that the process of consumption can be influenced at each stage. An influence at each stage requires the influence of habits, whether they are habits of the activity or of how information is processed in making a decision. Maréchal and Lazaric (2010:105) describe habits as the path dependency of behavior; habits are the well-practiced actions that are triggered by contextual cues with the purpose of reducing the mental load. Habits may develop to avoid trade-off decisions and the typically associated negative emotions (Schwartz 2005:123). Maréchal and Lazaric (2010:17) explain that habits must accord with the socio-technical context. This explains in part how the path dependency of consumption relates to both technology and the user. According to behavioral economists and psychologists, habits affect decision making and have been studied for their effect on purchase decisions (Wilson and Dowlatabadi 2007:102). The role of habits as they affect purchase decisions and technological use is discussed throughout this literature review.

2.2 NEXUS BETWEEN GREEN BUILDING LITERACY AND PRO-ENVIRONMENTAL BEHAVIOR

The green-building sector represents opportunities for emissions reduction since it embraces a large percentage of greenhouse gas emissions (Xie, Lu and Gou, 2017:1). In the premises of the foregoing, the green building revolution and the driving designs are constructed towards the sustainability of the resources. For the achievement of the sustainability of emissions reductions, the 1st world countries have established standards, green building evaluation
systems, guidelines and certifications for example the US-LEED (Leadership in Energy and Environmental Design), UK-BREEAM (Building Research Establishment Environmental Assessment Method) and in China -GBL (Green-Building Label) (Xie et.al, 2017:2). According to the Council of Green Building in the Republic of South Africa (GBCSA) (2012:15), there are three established green building environmental tools which include:

- The Retail Tool (RT). The RT in GBL focuses on the development of new commercial entities which include the important and overhauls of existing retail center facilities.
- The Public & Education Tool (PEBT). The PEDT in GBL focuses on the development of public constructions and educational buildings.
- The Multi-Unit Residential Tool (MURT). The MURT in GBL focuses on the development of the dwelling units with common infrastructures and other shared services.
- Assessment Tool for Office Buildings (ATOB). The ATOB focusses on assessing the quality of the buildings and other pertinent services of the GBL.
- Rating Tool for Existing Building Performance (RTEBP). The RTEBP focusses on rating the quality and performance of the buildings and thereby showing the levels of GBL.
- The Socio-Economic Category Assessment Tool of the Building (SECATB). The SECATB is used to measure and assess the value addition of the building to the inhabitants.
- Assessment Tool for Interiors of the Building (ATIB). The ATIB is used to measure the effectiveness of GBL in the inside of the building which ultimately shows the level of GBL to the inhabitants.

The US. Green Building Council (2009:12) posits that the green building knowledge is founded on a life cycle viewpoint during a construction’s project and procedure. This is mainly done to curb against the buildings’ undesirable influence on the expected setting and human health is abated. Thus, the green building requires special thoughts in terms of the choices such as public transit connection, facility accessibility, interior air quality, natural aeration, lighting during the day and substantial selection. Gou and Xie (2014:5) argued that notwithstanding the prevalence of the environmental undertaking, green building is facing substantial challenges which are entrenched in habits that are not pro-environmental and this requires a shift in behavioral approach. It is therefore based on the aforementioned argument where the need for pro-
environmental behaviors in both students, professionals and stakeholders comes in. However, in order for the pro-environmental behavior to be achieved and sustained, the green building plays a pivotal role. This because without the green building literacy, green building can take more energy than the non-green building users because of the users’ practices. A typical example of such practices include but not limited to; some users would still prefer using artificial lighting instead of natural lighting, leaving the doors open and leaving the lights on. The way people behave is the source, as well as the answer for addressing environmental issues and encouraging the pro-environmental behaviors in the design of energy and climate policies (Xie et.al, 2017:2). Among other thematic research areas, pro-environmental based behavior has recently become a research most widely sought area in research. Pro-environmental based behaviors are defined by Gou (2014:5) as a variety of behaviors that profit the environment, improve the quality of the environment and the livelihood of the general populace living in that environment. He further argued that environmental based behaviors often encompass antagonism among the different goals a person pursues. Thus, there is a need to understand the value credence norm model to aid comprehend a person’s environmental based behaviors.

2.3 SOCIAL LEARNING THEORY

Social learning theory is used to examine the influence of information in its various forms but is very different from the “behaviourist” perspective. The behaviorist perspective is that behavior will change based on reward and penalties. Social learning theory stipulates that people learn from the trial and error of life (Darby 2006:103), whether through imitation of attractive or influential models or learning by a counterexample (Jackson 2005:19). These two different approaches form the basis of one debate among scholars who argue for a clear differentiation between what Peattie (2010:109) considers the marketing approach and a learning approach. According to Takahashi (2009:142), for a certain behaviour to be achieved in the people there is a need for the incentives and disincentives. Similarly, a suitable environment that entices the encouraged behavior is also critical in inculcating a certain behaviour. Darby (2006:120) criticizes the behaviorist approach and argues that social learning, of which acquiring tacit, or procedural knowledge is a component, serves a critical function in a society moving towards a sustainable energy future.

According to Darby (2006:120), the various processes involved in knowledge production, learning based on identification is given a fundamental role in social learning and cognitive development of the people. This is regardless of whether descriptive theories favor
psychological and sociological dimensions. Social learning theory centers on the learning that takes place within a societal framework. Social learning theory takes into a reflection that people learn from each other through socialization and interaction at diverse levels of life. In the premises of the foregoing, social learning includes concepts such as imitation, observational learning and modeling. Albert Bandura is regarded as one of the most outstanding proponents of the social learning theory. Bandura (1967:28) pointed out that the overall values of the social learning theory include: People can just study by witnessing the behavior of others and the results of those behaviors and learning can occur without a final change in behavior. Furthermore, behaviorists say that learning has been represented by a permanent change in behavior. In contrast, societal learning logicians say that people can learn through observation alone. Their learning may not necessarily be shown in their performance. Learning may or may not necessarily result in a change in behavior.

![Social Learning Processes](image)

**Figure 2.1: Social Learning Processes**

**Source:** Bandura (1977:23)

As illustrated in figure 2.1, the social learning theory is usually defined as the ‘bridge’ that exists between traditional learning theory (i.e. behaviorism) and the mental method. This idea follows the social learning concentrations on how the mental (cognitive) aspects are included
in the learning procedure. Bandura (1977:23) believed that human beings are lively information workstations who think about the connection among their behaviors together with their values. Observational knowledge is bound not to occur unless intellectual developments are at work. The aforementioned mental features facilitate (i.e. intervene) in the entire learning process to regulate whether a new response is needed. In that light, individuals do not have the ability to detect the behavior of a model and ultimately reproduce it. There are some thought processes prior to reproduction. This reflection is called mediational processes. These processes occur between observing the behavior (stimulus) then emulating it or not (response).

Accordingly, Bandura (1977:23) explained the following four mediational processes in social learning theory and these processes resonate well with what is theoretically and empirically lacking to foster green building literacy in the developing countries. Furthermore, Bandura (1977:24) postulates the following mediational processes in social learning theory:

(i) **Attention:** This is the degree to which we are showing a certain behavior. This rides on the notion that for a conduct to be copied it must take a person’s consideration. There are several behaviors we observe day-to-day and these behaviors are not remarkable. Attention is considered as enormously significant in whether a particular behavior has an impact on other people reproducing it.

(ii) **Retention:** This mediational process points to how well the particular behavior is remembered. It is possible for the behavior to be noticed, but it is not always given that it reminisces which automatically stops imitation. Therefore, it is imperative that a reminiscence of the behavior is fashioned to be performed later by the observer. A bigger part of social learning is not instantaneous therefore this process is quite vigorous in such cases. Even though the behavior is simulated shortly after observation, there needs to be a recollection for reference.

(iii) **Reproduction:** This refers to the capability to perform a certain type of behavior that the model would have just established. We may perceive copious behavior every day that we would desire to emulate but it is not always that conceivable. We have limits on our natural capacity, and because of that motive, even though we may sincerely wish to duplicate the behavior, we will do it in vain. This inability affects our decisions regarding whether to try and emulate the behavior or not. She may have an appreciation of what the skill and desire it, however, she will not attempt to imitate it because she will not have the physical ability.
Motivation: This is the intrinsic will to perform the behavior. The rewards together with the reprimand following behavior are often well-thought-out by the onlooker. If the seeming benefits supersede the perceived costs (if they are present) then the behavior is more likely to be copied by the onlooker. If the vicarious reinforcement does not motivate the observer enough, then they are not likely going to imitate the behavior.

2.3.1 Critical Evaluation of Social Learning Theory

Bandura (1967:27) pointed out that the social knowledge approach takes the critical thinking process in order to process the information and the behavior to reproduce. He further argued that it also recognizes the part that they play in determining if a behavior is to be copied or not. In that regard, the social learning theory offers a more all-encompassing description of human learning by distinguishing the part played by mediational procedures. However, it cannot appropriately interpret how we advance a whole variety of behavior counting views and feelings though it can describe some quite complex behavior (Bandura, 1977:36). This follows Cole (2013:19) who attests that human beings have a lot of mental control over their behavior and just because we may have had practices of viciousness does not essentially mean we must repeat such behavior.

It is the premises of the above explanation that Bandura changed the thrust of his philosophy in 1986 and retitled his Social Learning Theory as Social Cognitive Theory (Bandura, 1977:28). This was done because he wanted to explain better how we learn from our social involvements. The dark side of the social learning theory progress from their obligation to the environment as the major effect on behavior. It is therefore quite restraining to describe behavior exclusively in terms of either nature or nurture. Efforts in attempting to do this miscalculate the complication of human behavior. Bandura (1967;29) posits that it is more sensible that comportment or behaviour is a result of an interaction between nature and nurture. Thus, behavior is the sum total of the interactions of people within any given setting. Social learning concept is not a complete interpretation of all behavior. This is, in particular, the situation when there is no seeming part prototypical in a person’s life to reproduce for an assumed behavior. The discovery of the existence of mirror neurons has lent biological support to the theory of social learning. The other important discovery that helps us to understand and tap the best out of social learning theory is of the reflect neurons where the primates may constitute a neurological basis for information. These are neurons which become active in both
instances, if an animal does something itself, and also through observation of the action being done by another.

Thus, before exploring further on the social learning theory by Bandura (1967:28) as explained above, there is need to link the theory with Teaching Green Building Model for Learning in Figure 2:2 below. Cole (2013:18) argues that social learning process comprises of three valuable ranges that irradiate the landscape of student engagement and bear on learning outcomes, which include, the recognised to unceremonious engagement, the inactive to active engagement, and the specific to joint engagement. These categories of the learning processes if theoretically entrenched in Bandura’s (1967:28) social learning processes that encompass, the behavioral, cognitive and environmental aspect can motivate the Green Building Literacy in developing countries. Fig 2:2 below illustrates the green building model for teaching and knowledge

![Figure 2.2 Teaching the Green Building Model for Learning in Schools](image)

*Source*: Cole (2013:18)

Cole (2013:18) argued that the expansion of green school construction in the first world countries like the USA and Europe determines the number of schools, professionals and
students across fields that have theoretically grasped Green Building literacy and eventually transformed it into reality. The Teaching Green Building Model for Learning in Figure 2:1 mixes ideas from numerous persuasions woven with the social learning theory, which is the main theory that underpins this inquiry. The main focus of the approach is to get out the approaches by building practical support in teaching and learning. This helps people or students to enhance the assimilation of GBL in developing countries. The illustrative diagram uses the theory from gallery studies, environmental and construction to form the axes of the framework. The framework is then populated by design designs further supported by the theory behind upkeep mindset. The resultant model suggests an array of choices in a green school building project that can inspire learning around together with action regarding Green Building Literacy in schools. The diagram, thus, recognizes the groups of interventions that can be considered, erected, and experienced in inculcating Green Building literacy to students in schools. Engagement with the green school building is a multi-dimensional concept as considered in the framework and enlarged in the succeeding units. The transverse axis of the framework, lays out reflexive to active dimensions of engagement, from one-way instruction to experiential learning that occurs through active involvement with the construction. The horizontal axis employs the Contextual Model of Learning (Cole, 2013:20), and encompasses the nature of a student’s involvement with the school building’s construction. That engagement is on a spectrum from person-environment interaction (personal context) to person-person interaction (sociocultural context), all buttressed by the physical milieu (physical context). The result is a web of opportunities for student engagement with environmental matters in and about the school building. Linking this with the social learning theory Bandura (1967:28), it shows that knowledge accumulation is a process that starts from personal engagement, collective engagement and experimental engagements. This study takes this intellectual paucity of the unavailability of green buildings in developing countries to motivate the willingness of students to practically enhance green building literacy.

In the last 30 years, the social learning concept has increasingly developed additional mental in its understanding of human learning. Prospects and awareness of future reinforcements as well as punishments can have a major effect on the behaviors that people exhibit. Social learning theory can be considered a transition or bridge between behaviorist learning theories and cognitive learning theories. In the context of green building knowledge transmission in
developing countries, the emphasis on theoretical and non-experiential learning can be an impediment to its implementation and knowledge acquisition by students and professionals.

2.4 BARRIERS INFLUENCING GREEN BUILDING LITERACY ON PRO-ENVIRONMENTAL BEHAVIOR

Researchers now generally agree that decisions with environmental impacts are predisposed by the variability of factors operating at a diversity of social, spatial, and political scales. The following is a broad discussion of many of the approaches that inform our understanding of pro-environmental based behavior, followed by a section summarizing those more relevant to this research. The behaviors of people can be both a solution and the root cause for present-day environmental problems within the different environmental settings (Xie, Lu, & Gou, 2016: 9). The encouragement of pro-environmental based behaviors came through the design of climate and energy policies. Supporting and encouraging pro-environmental based behavior has recently become a thematic area in research and scholasticism in the globe. Xie, Lu, & Gou (2016:9) Defined pro-environmental based behaviors as the range of behaviors that enhance the quality of the environment and its people. Pro-environmental based behavior both benefits the natural environment when the embraces it and applies it appropriately and it harms the environment when the people deliberately choose not to apply it.

Lindenberg and Steg (2007:33) contended that the environmental-based behaviors of the people, in most of the cases involve in a crossroads scenario due to different goals individuals pursues. The only panacea to address the conflicts between the individuals on the basis of the environment based behaviors is through the suggestion and establishment of the values of principles of the pro-environmental based behaviors. Stern et al. (1999:5) recommended that people who accept a movement’s basic values have a belief that valued objects are threatened. Furthermore, they believe that their actions not only help restore those values but also they experience an obligation for pro-environmental based movement action that predisposes them to the provision of support. Quite a number of studies have applied the concept to predict various types of pro-environment behaviors, for example, acceptability of household energy conservation behaviors (Ibtissem, 2010:23), travel mode choices (Lind, Nordfjærn, Jørgensen, Rundmo, 2015: 7), and workplace energy use behaviors (Staddon, Cycil, Goulden, Leygue, &Spence, 2016:34). Further to this, ignorance is one of the critical barriers to green building literacy and pro-environmental based behaviors. Stern et al. (1999:5) postulated that deficiency
of resources and investment into green building literacy and pro-environmental based behavior community mobilization is one of the critical challenges of realizing the benefits of pro-environmental behaviors to its fullest.

2.4.1 Technical gaps and the engineering approach
The problem of energy efficiency is typically first understood as the efficiency gap: the difference between technology in use and the most efficient technology that could be a substitute (Parker et al. 2003:5). Policymakers and energy planners were encouraged to focus efforts on energy efficiency and managing the demand side in order to mitigate the lack of reliability of the supply side (Morrison and Lodwick 1981:10). The potential for the demand side to alleviate supply-side shortages was explored in energy forecasts and models that typically assessed the economic potential by analyzing and influencing private costs. Demand side management programs were based on the acknowledgment that available efficient technologies did not have a great enough market share compared to less efficient technologies and that implementing more efficient technologies was less expensive than securing new fuel supply.

This form of analysis, called least cost utility programs or integrated resource planning, supported the development of programs that were designed to influence the uptake of more efficient technologies (Nadel 1992:9; Levine et al. 1995:15). However, at the same time that attention turned to the demand side in the 1970s, it was also found that technology selection alone is not predictive of patterns of resource use. Researchers and policymakers learned that technology type might not be a reliable predictor of pro-environmental behavior. The origins of behaviour research are grounded in observations of the spatial setting, stemming from a series of studies (Diamond 1984:17) that identified that physically identical buildings had ratios of energy consumption that varied from 2 to 1 (townhouses), up to 10 to 1 (apartments) due to the number of occupants and their behavior (Owens 1986:4). An understanding developed that built form and technology may define some parameter of energy demand, but that occupant behavior and situational factors, including a number of occupants, income, socio-economic factors, appliance usage patterns, temperature preferences and even window opening patterns also affect energy consumption (Owens 1986:7).
2.4.2 Financial stimulus and the economics approach

Many economists, particularly environmental and ecological economists, argue that resources are over-consumed in part due to the lack of appropriate price signals and knowledge. Environmental and ecological economists have argued that prices are too low and that externalities must be incorporated into the price (Turner 2000:10). Economists also consider price as an ideal instrument of intervention as it is decentralized (Lipsey and Lancaster 1956:1), and has the potential to affect both investment and behavior (Houthakker 1951:22). This tends to be the underlying rationale for programs that use financial incentives to alter payback periods and discount rates for the consumer (Levine et al. 1995:11). However, many studies have shown that consumers do not necessarily behave in an economically rational manner (Tonn and Berry 1985:13). Therefore, the price may not be sufficient to influence pro-environmental behavior. For example, Wilson and Dowlatabadi (2007:16) undertook an examination of consumers’ willingness to pay more upfront to save energy costs later. They found that discount rates of consumer energy purchases varied greatly (between 5 and 300%). This analysis demonstrates the difficulty in predicting discount rates selected by consumers, and that wider contextual factors beyond economic factors affect decisions.

The findings that consumers do not make decisions that are considered to be economically rational with respect to energy are replicated in other studies. It, therefore, appears to be a well-established fact that price is not sufficient to encourage pro-environmental behavior. However, many economists, such as Jaccard (2005:6), have argued that price has not been sufficiently high for long enough periods of time in order to influence pro-environmental behavior. Jaccard (2005:7) estimates that energy prices need to rise by 25 to 50% over the long run in order to achieve sustainable levels of energy consumption. It has been found that income is not necessarily found to be a barrier to retrofits (Tonn and Berry 1985:3). It has also been found that lower income groups are more likely to conserve energy (Herriges and King 1994:7). Lower income groups have also been associated with more energy efficiency changes than higher income groups (Parker et al. 2005:24; Ryan 2009:2).

However, the price is difficult to control as it is defined by landscape developments, such as markets that operate at an international scale, and by regulatory regimes (Geels 2004:1). Further, despite calls from many economists and the IPCC (Intergovernmental Panel on Climate Change) to raise prices, this has not proved broadly politically salient (Stern 1999:8). Even if the price were to rise sufficiently, other criticisms of the economics approach to
influencing consumption are that it does not account for heterogeneity in preferences (Wilson and Dowlabadi 2007:22), or how preferences are formed (Leach 1992:9). Further, other disciplines question the assumption of consumer sovereignty (Stern 1999:6). For example, consumers may be willing to purchase a product with particular attributes and discover that this is not possible if it is not available on the market as producers do not supply it (Stern 1999:14).

2.4.3 Visibility
Related to the issue of economic rationality of decisions is the observation that resource use can be invisible. The quantity of a resource or commodity consumed depends both on the type of technology and habitual behavior. In the case of energy, major residential energy using appliances are typically hidden from view (Hirst and Brown 1990:15). Researchers have found that consumers have little to no knowledge of the differences in energy use due to using different types of equipment or employing different habits of use. Consumers are therefore unable to influence their habits of energy use and energy bills due to lack of knowledge of cause and effect relationships (Attari et al. 2010:5). Kempton and Montgomery (1982:12) describe the inability of the energy user to understand cause-and-effect in energy use due to the lack of specific information.

In view of the aforementioned, Kempton and Montgomery (1982:12) argue that due to lack of visibility, homeowners focused on dollar savings rather than energy savings, and undertook what the researchers considered to be more obvious, but not necessarily effective, energy management activities. Kempton and Montgomery (1982:13) further attest that the energy management activities that homeowners commonly discussed included turning off the lights, television, or stove. However, few homeowners discussed the more hidden but more effective activities such as reducing hot water usage. The researchers such as Attari et al (2010:5) commented that the household energy saving experiments described by the study participants generally resulted in energy savings that were so small that differences in their energy bills would be difficult to observe. For example, some families reported that they turned off the stove before they finished cooking. Other families’ experiments confounded too many variables. For example, some reported trying to save money by reducing energy usage associated with hot water heating.
However, the researchers observed that it is affected by temperature setting, price, and water use; accordingly, it would be difficult for participants to isolate the effects of each variable. Their study noted that many families expressed frustration when they did not save money on their energy bills. Some of these conclusions are reflected in a study by Attari et al. (2010:9) that examined consumer’s perceptions of energy use and savings of various energy equipment and behaviors. Participants tended to focus on curtailment activities rather than energy efficiency investment decisions. They also demonstrated difficulty distinguishing the differences in energy use across devices. Frustration with a lack of knowledge about appliances’ use of energy was found to be a common motivation among electric power meter borrowers in a study done in Finland (Liikkanen 2009:11). which technologies diffuse along with social networks.

Hirst and Brown (1990:275) point out that the circulation effect works best when inventions are noticeable, as was true for microwave ovens. They also added that videocassette recorders, and personal computers, which infiltrated the market very rapidly. For this reason, solar technology might be more visible and therefore have more appeal than energy-efficient technologies (Archer et al. 1987 as cited in Wilson and Dowlatabadi 2007:7). With the exception of “choice editing” of available products, in which choices are omitted from the consumer, scholars agree that information influences pro-environmental decisions as it reduces invisibility of energy use. Regarding the energy consumption, it is thought that the provision of information about energy saving options may result in energy savings (Abrahamse et al. 2005:23).

One mechanism to improve visibility is energy information feedback. Feedback is a response to the “information deficit” model that has been expressed as: Augmented response helps in increasing the awareness or knowledge of the pro-environmental behaviour. In a similar note, changes in energy use behavior decrease in consumption (Hargreaves et al. 2010:15). Darby (2006:16) has carried out reviews of studies to describe types of energy information feedback and their effectiveness. Feedback is understood as a consequence based strategy (Abrahamse et al. 2005:12) and is classified by the frequency of feedback and the effects of tailoring of information for the user (Darby 2006:6). Feedback and information techniques have typically been studied in combination with other influences, and are understood as influencing change in energy consumption through varying mechanisms. It is for this reason that information feedback will be explored further in the chapter in relation to various theories.
2.4.4 Habits and Routines

Habits and personal routines are widely recognized as potential deterrents to pro-environmental action. The field of evolutionary economics focuses their research on the role of habits in decision making. Habits form because people have limited cognitive capabilities and rely on cognitive frameworks and rules to make sense of the world. According to Maréchal and Lazaric (2009:108), a habit is a behavioural tendency to recurrence that is put in an action that is generated by an appropriate prompt. These satisfactory strategies are ways to minimize cognitive elaboration. Maréchal and Lazaric (2009:109) describe that when habits take over decision making, this causes the decision-making process distorted and make the cognitive efforts ineffective and low in up taking the important life issues.

As habits become deeply ingrained, they may run counter to an individual’s intentions. Once formed, habits become a strong predictor of behavior, regardless of intentions. Maréchal and Lazaric (2010: 110) argue that for the people to vibrantly functional the habits must be well directed and guided by the purpose and principles within that environment. In this case, the pro-environmental behavioural and GBL principles should be developed into the habits of people through socialization and other learning processes. It is widely acknowledged that daily energy use patterns, whether at home, at work, or in travel, are primarily habitual. Electricity use habits have been observed to be counteracted or altered when groups and individuals devise a systemic plan (Winnett et al. 1978:76). Habits and cognitive routines play a role in purchasing patterns by affecting the selection of decision-making heuristics. These heuristics are satisficing, recognition, elimination and availability (Wilson and Dowlatabadi 2007:30). Accordingly, the aforementioned concepts were defined by Wilson and Dowlatabadi (2007:30) as follows: Satisficing is the sequential search for information until a threshold or target is reached. Recognition favors familiar or recognized elements, for instance, stopping on a previously selected choice. Elimination is a form of reducing the range of alternatives. The availability heuristic favors information that is readily available.

Predicated in the essence of the above-conceptualized concepts, Wilson and Dowlatabadi (2007:31) posit that this can induce anchoring, which is bias towards the first available information to compare alternatives. For example, the availability heuristic can cause a consumer to anchor on vivid (salient), but anecdotal evidence, such as a story of personal experience, and this can cancel out rationally-derived information (Kahneman and Tversky
cited in Schwartz 2005:18). Anchoring is typically used by stores that introduce a higher priced item or a sale in order to sell a lower priced item; the higher price is an anchor that indicates the consumer is getting a better deal (Schwartz 2005:17). Anchoring is related to framing, in which consumers respond differently to options depending on the reference used—whether it is a loss, again, or similar when compared to the reference (Kahneman and Tversky cited in Schwartz 2005:10). Emotion can also play a strong role in decision-making heuristics as (Lee and See (2004:64) asserted that the emotions of people is a form of energy in the execution and implementation of the decision made and also guides behaviour in the use of resources and making other important choices. Kahneman and Tversky’s prospect theory explains that negative feelings associated with loss typically are stronger and disproportionate to positive feelings associated with gain. Hence, people are typically loss averse in decision making (Schwartz 2005:123).

According to Schwartz’s (2005:45), some studies have projected that losses positive feelings have more than twice the psychological impact as equivalent gains”. Framing becomes important in understanding feelings of loss aversion, as for how the loss or gain is framed depends on the perceived neutral point. For example, although they might be for the same dollar value, people may give disproportionate weighting when faced with a decision to take a “discount” or a “surcharge”. Kempton and Montgomery (1982:19) give one example of the role habits have on a decision to purchase an efficiency upgrade. They demonstrate that consumers try to make rational economic decisions. However, their chosen methodology for payback calculations is based on past price, rather than energy units. This leads to an underestimation of dollar savings and biases payback periods to appear longer than they actually are. This is contrasted with an energy analyst’s model that would base its estimation on energy units and adjust for the rising price to show a shorter payback period.

Kempton and Montgomery (1982:143) call this “bounded rationality”, as the consumer adapts known, habitual, methods to a new problem, even if the method does not accurately reflect benefits. Decisions are also affected by the number of available choices, as made clear in Schwartz’s (2005:116) summary of decades of research from psychologists, economists and market researchers. More specifically, the summary suggests that when offered a few sampling choices (e.g., six choices), customers are more probable to be satisfied with the product and make a purchase, but when confronted with many choices they are less likely to make a
purchase. The number of available choices forces consumers to confront trade-offs between standards (e.g., price and quality). Forced trade-offs in decisions make people unhappy and indecisive. When options increase, so does internal conflict. If the conflict is not easily resolved through an internal standard (e.g., price or quality requirement), then people avoid the decision. Habits and routines are ways of minimizing decisions and avoidance of unhappiness.

2.8 CONCLUSION

This chapter presented the pertinent literature on GBL and the theoretical framework of the study. The social learning theory by Bandura (1976) was used as a theoretical underpinning of the study to examine the influence of green building literacy on pro-environmental based behavior and how it can be utilized to mitigate the triple challenges in South Africa. The literature has established some notable gaps such as lack of adequate literature in the developing countries on green building literacy influence on pro-environmental based behaviors and how it was practically utilized to mitigate poverty and unemployment. However, from the theoretical point of view, the existing literature has concurred that the green building social learning processes in developing countries are not as rigorous as those in developed countries. People’s cognitive behaviors are influenced by those activities they are exposed to on a daily basis and hence, green building literacy must not only be in theory but in practice as well. However, literature has shown that the social learning theory can go a long way in instilling the green building literacy and influencing the citizen’s pro-environmental based behaviors as practically demonstrated in the developed countries such as China, United States of America and Malaysia.
CHAPTER 3

GLOBAL TRENDS OF GREEN-BUILDING LITERACY AND TRIPLE CHALLENGES IN SOUTH AFRICA

3.0 INTRODUCTION
To the Hong-Kong Special Administrative Region (HKSARG) (2013a) the concept of green-building means planned, constructed, reconditioned, functioned and recycled in an environmental and resource-efficient manner to meet certain objectives. The objectives of the green building include; the health of the occupants; productivity at the workplace; minimizing the costs of energy and using the resources more efficiently. This section, therefore, reviews the global trends of green-building literacy. This section of the study also focused on reviewing the literature on the nature and trends of poverty and unemployment in South Africa. The main reason for reviewing this was to establish the premises of the arguments for and against the possibilities of the utilization of the green building literacy and its pro-environmental behaviours to mitigate the challenges of the triple challenge in South Africa.

3.1 GLOBAL TRENDS IN GREEN BUILDING: FROM ENERGY-EFFICIENT BUILDING TO GREEN BUILDING
The initiation and growth of the concept of green structure emanated by the core aim of coming up with an energy-efficient building due to the energy challenges bedeviling the world and the alarm on environmental pollution. Green buildings were borne-out of the idea of sustainable development. Around the 1970s, Northern Europe countries and the US embraced the idea of workable progress and devoted much of their resources and attention to energy-efficient buildings (those to be known as green buildings). Pursuant to this, a plethora of the documents of the policy of energy was then formulated aiming at reducing oil usage (Mao et al., 2009; Retzlaff, 2010). In Hong Kong, for example, this idea of constructing energy-efficient buildings started around mid-1990s and this led to the establishment of the relevant institutional framework, namely the Energy Efficiency Office under the Electrical and Mechanical Services Department (EMSD) in 1994 (Fung et al., 2011).
In the early 1990s, people around the world, especially those championed the concept of sustainable development, had started to believe that energy-efficient buildings lags behind a lot in achieving the goals and objectives of livelihood development thereby reducing the adverse effects on the health of people and the environment they are living. Against this background, the green building activism across the globe was birthed (Chan et al., 2009). The authors argued that notion of green building is not only preferable as it encompasses all the characteristics of the energy-efficient building (i.e. measures to reduce both embodied and operating energy) but also stresses the influences on the environment throughout the building’s life-cycle. Some of these activities as highlighted by the EPA (2012:23); (NEP, 2010:34) include; stages of demolition, manufacturing, refurbishment, repair and maintenance among other things. The idea of the green building is about doing away with the associated threats posed global warming that can militate against achieving sustainable thereby compromising the lives and fortunes of the future generations. In this respect, countries such as The Netherlands and the US had issued action plans for sustainable development through sustainable construction covering of green buildings in the mid-1990s (Retzlaff, 2010). In buttressing this, at the turn of the millennium the US issued green building policy.

Further, green building development was further facilitated by the signing of some international protocols and treaties aimed at preserving the environment and sustainable development (Conway-Behan, 2009). Chief among them include the Kyoto Protocol, the Copenhagen Protocol and the Rio de Janeiro Protocol. The Kyoto Protocol treaty that was ratified in 2005 signed by different countries as member countries to lower their GHG emission (Kyoto Protocol, 2013). Thus, countries these countries were bound by their agreement in as far as their international protocol was concerned. In this respect, the idea green building undertaking was to be accelerated up and this led promulgation of green building policies and the establishment of green institutions as well as assessment tools in various countries.

However, on the global comparison, Europe is at the advanced stage of green building development (McGraw-Hill Construction, 2013:12). The European Union managed introduced the laws to regulate utilization of energy to certify that energy is expended efficiently in building (McGraw-Hill Construction, 2013:13). Among another important part of the legislation, the aforementioned is the Energy Performance of Buildings Directive (EPBD) which was promulgated in 2002. Regarding the green building notion the EPBD has the following requirements to the member-states: (a) necessitates all associate-nations to present
energy authorisation for constructions and advance their construction regulations (b) necessitates all new structures to afford a Building Energy Rating (BER) certificate for any forthcoming buyer or tenant (c) reorganize in 2010 needing new constructions to develop net-zero energy constructions by 2020 (Conway-Behan, 2009; EPBD, 2013; McGraw-Hill Construction, 2013:13).

As compared to other EU member-states the UK is the one with sturdy environmental guideline and obligation to green building movement (Conway-Behan, 2009). This evidence by her having 52 percent of her building movement has a green share in 2012. In 2006, there was a commitment made by the UK government to all their domestic buildings that there will be a zero carbon emission by 2016. It was further projected that by 2019 there would be no non-domestic buildings in the UK. Further, this country has announced appropriate codes and compulsory that all its new buildings are supposed to be appraised. In around the 1990s, the UK had already established a green building rating tool and had a local association to promote green building (McGraw-Hill Construction, 2013:23).

As compared to the UK’s environmental regulations, Germany’s is not very sturdy. However, firms in Germany are still participating in green building activities because they believe that green building can establish a beneficial corporate image. Cognizant to this, by 2012 Germany had 28 percent of building project activity has green. Also, the government in Germany has introduced green building facilitation since the 1980s and these include facilitating loans for energy efficient buildings and conducting pilot projects. Furthermore, Germany has its own GBC and green building rating tool (EU, 2009; McGraw-Hill Construction, 2013). Learning from the context and experiences of the UK and Germany in GBL, it is clear that green building literacy is achievable when the government establishes the policy and regulation to guide the people in executing it.

3.2 GREEN GROWTH IN DEVELOPING COUNTRIES

Green buildings that are currently developing are unified into prevailing social systems, and it is these organisations that debatably improves GBL in schools. However, green buildings literacy is low in developing countries because of the lack of practical engagement to students and professionals. Thus, for a learning process to be complete it must end in experimental and practical engagement, which was discovered from the theoretical framework section (chapter 2) as an intellectual paucity in this study. (Katz, 2012) argued that while the number of green constructions remains to rise worldwide, the GBL in developing countries remains very low.
Since the preceding chapter has reviewed the global trends of green building literacy, this chapter focuses on developing countries, mainly African countries.

Green growth has often been associated with positive socio-economic outcomes across the globe noting Cole (2015:14) and Anderson and Strecker (2012:56). Various green initiatives have so far been implemented, notably, in Nairobi, the local government developed housing and schooling systems that cater for informal settlements. Anderson and Strecker (2012:56) indicated that in Ghana Toyota manufactures and sells cookstoves which are 40 percent more efficient than the traditional models, to date supplying 35,000 households, offsetting 15,000 tons of carbon dioxide emissions and employing over 200 employees. Anderson and Strecker further revealed that Sri Lanka’s largest clothes manufacturer has been extensively known for its high social and environmental standards. The restructuring of its showcase Eco Centre factory brought a reduction of 80 percent in carbon emissions, 46 percent energy saving, 58 percent reduced water consumption. According to the OECD (2012:12), developing countries engagement in green growth initiatives is often motivated by the need for sustainable development through socio-economic growth. Enlisted in table 3.1 below are some of the anticipated green growth outcomes.

**Table 3.1: The anticipated green growth outcomes**

<table>
<thead>
<tr>
<th>Green growth aspect</th>
<th>Anticipated green growth outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Economic-Based Green Growth Aspect</strong></td>
<td>• There must be an improved and more impartially distributed GDP. The production of important goods and services must be equitably done.  &lt;br&gt;• There must be a bigger production of unpriced ecosystem services and their lessening must be prevented in recurrence.  &lt;br&gt;• It must bring about the economic diversification, and well-polished management of economic risks in any given environment.  &lt;br&gt;• It must also bring about the innovation, access and uptake of green technologies and upgraded market confidence in a particular environment.</td>
</tr>
<tr>
<td><strong>Environmental-Based Green Growth Aspect</strong></td>
<td>• Environmentally, there must be improved productivity and efficiency of natural resource use in any given environment.  &lt;br&gt;• They must be effective and efficient in expending and using the natural capital within ecological limits.</td>
</tr>
</tbody>
</table>
This aspect of green growth makes other types of capital enlarged through the use of non-renewable natural investment.

The environmental-based green growth aspect condenses the opposing ecological effect and enhances natural hazard administration.

| Social-Based Green Growth Aspect | • The socially-based green growth aspect enhances the enlarged livelihood chances, income and/or eminence of life, remarkably of the poor  
• Social-based green growth aspect avails the decent jobs that profit poor people fashioned and sustained within any given environment.  
• Social-based green growth aspect also enhances the social, human and knowledge capital in a particular environment.  
• Social-based green growth aspect fosters the reduced inequality in any given environment. |

Source: OECD (2012:13)

The table shows the various aspects of the anticipated outcomes of green growth literacy pro-environmental behaviours outcomes. It is anticipated that when pro-environmental behaviours are implemented, there is a possibility of them sustaining or benefiting the people both economically, socially and environmentally. Economically, people will be to make a living out of it by increasing the GDP of the country’s economy. Environmentally, engaging in pro-environmental behaviour actions help in increasing productivity and efficiency in using natural resource. Socially, there is a high possibility of increasing the living opportunities income and value of life for the general citizen, notably the poor.

3.3 DEVELOPING COUNTRIES CONCERNS IN GREEN GROWTH

It is important to understand the major concerns from 3rd world countries regarding the concept of green growth in order to establish the feasibility of its prospects in inculcating a better livelihood in the lives of their citizens. In this view, green growth has been conceptualized mainly as generating a diversity of the socio-economic and political positions of different people within their environment (Cole, 2015:14). It is imperative to note that the green growth approaches differ with the environment and is determined with the policies and regulations enacted within those environments to regulate the systems around its operation. In the premises of the aforementioned, Cole (2015:15) further, argue that the green growth brings about the
differential opportunities based on specific countries together with the jeopardies of international green development policy administrations which disfavor given countries. A typical example is the case of emerging economies relating the chances offered by green building in the most interesting and inspiring terms (Cole, 2015:15). In the situation of the developed countries, many of them have adequate capital, technologies and funding to spearhead the green building or growth development. Anderson and Strecker (2012:56) attest that this is the main challenge within the 3rd world countries where capital, technologies and funding is scarce to make sure that the green building and growth projects have been implemented.

It is therefore important to single out countries such as China which have previously developed the largest manufacturer of unsoiled technology in financial terms by 2008, accounting for 14 percent of its GDP (ADB, 2012:13). Regarding the feasibility of green growth projects in the developing countries, it can be safely said that there is a need of a serious multilateral relationship with the developed countries so that the fluidity of resources, knowledge and funding may be realised. Failure to embrace the foregoing situation, ABD (2012:14) indicates that the low-income countries may not be able to practically realise the prospects of green building. According to Anderson and Strecker (2012:57), the reason for the mentioned the challenge above is mainly the threats posed by the in low incomes which hinders them from accessing the opportunities of green building or growth and averting the threats and its challenges. Thus, the technologies and policy ideas are neither easily reachable nor in totality pertinent to their national developmental requirements.

Anderson and Strecker (2012: 58) argue that it is also important to note that the political response in contradiction of the green building or growth concept is strongly adverse in just a few countries and hence infringes the vigor of its implementation and literacy. There completely lack the political will and support in form of policies and legislature in most of the developing countries and as such, the prospects of the green growth and building can be realised in such environments (Cole, 2015:16). It is also apparent to mention that other issues relating to the international magnitudes of green growth, for example, the risks of green conditionality and green protectionism. Cole (2015:17) further argues that the green growth policy recommendations under discussion, with particular emphasis on low-carbon and high-technology, do not obviously tackle equity problems at either the national or global level. The
ABD (2012:13) notably indicated that the problem of the lack of inclusion of many poor countries together with people within the informal economy in major economic opportunities and economic decision-making. The ABD (2012:14) further indicated that the little attention has been paid to the potential of more efficient utilisation of natural capital.

Also, a notable number of governments have concerns that the emphasis on green growth could turn out to undermine the Rio Principles, in particular, the principle of common though differentiated responsibilities (Anderson and Strecker, 2012:59). Will green growth efforts necessarily be obstructed by high-cost barriers? It seems the high initial costs involved in the transition to green growth appear to be beyond reach to many developing countries. An example would be solar as an energy source for rural communities. According to Anderson and Strecker (2012:60), the uncomplicated technologies too are still deficient in most unindustrialized countries with particular focus on the fields of wastewater treatment, hazardous and household waste management, energy efficiency plus integrated water resource management. Over and above that, Cole (2015:18) aptly argues that there is a great concern that the developing countries own technologies, inclusive of indigenous approaches which will not be able to compete. Accordingly, Anderson and Strecker (2012:59) assert that these developing countries will need to import technologies from other countries including the exchange of scientific knowledge, technical knowledge as well as removing the barriers constituted by intellectual property rights. The aforementioned according to Anderson and Strecker (2012:59) must be effected as a factor of great importance if a genuine transfer of green technologies is to occur between the developed and developing countries.

3.4 NATURE OF THE TRIPLE CHALLENGES IN SOUTH AFRICA

It is important to note that there are prospects of the socio-economic developments that can be realised through implementation of the GBL and the pro-environmental behaviours in South Africa. Thus, in those premises, the discussion of the triple challenges in South Africa is critical at this stage in this literature review. The triple challenge in South Africa includes; inequality, poverty, and unemployment according to the (Centre for Development and Enterprise, 2018: 5). The aforementioned triple challenge in South Africa was described as an interdependent socio-economic phenomenon which interdependently puts the lives of the general populace in a precarious condition. Centre for Development and Enterprise (2018: 5) indicated that all stakeholders at different levels within the South African communities have agreed that they require urgent attention from policymakers and leaders to deal with the triple challenge. There
is, however, much less agreement on what drives inequality, poverty and unemployment and, more importantly, on what to do about them (Centre for Development and Enterprise, 2018: 5). This study has focused on poverty and unemployment. Although the issue of poverty and unemployment is a global challenge, this study has focused on South Africa. Below is the literature overview of the nature of poverty and unemployment in South Africa.

3.4.1 The nature and trends of Poverty in South Africa

Inequality receives an increasing number of headlines in the current political climate, and it is a challenge that has steadily worsened over time. However, in 1994 the ANC focussed less on inequality and more on eradicating poverty. The ANC promised people a better life for all on the basis of the eradication of the problems associated with the triple challenges which were instigated by the previous Apartheid regime. In order for the ANC to fulfill their promises, they enacted the Redistribution and Development Programme (RDP), which was launched in 1994 to alleviate poverty, inequality and unemployment and to develop people to their full potential (RDP, 1994). Among several promises that were made by the state for the people by the government of the ANC were to provide improved access to social security, public education, and other services. The aforementioned promises were enshrined in the South African new constitution which guaranteed socioeconomic rights of the general populace and access to resources of the country despite the race, gender and religious affiliation. Despite this focus, poverty remains much too high in South Africa. The table below shows that in a country with an annual per capita income of over R50 000, 62.8 percent of the population lives on a monthly income of less than R1 042 (Centre for Development and Enterprise, 2018: 13).

**Table 3.2: Poverty Rate as of 1994-2016**

<table>
<thead>
<tr>
<th>The poverty rate for the upper poverty line (per capita monthly income of R1 042)</th>
<th>62.8 Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>The poverty rate for lower poverty line (per capita income of R534 per month)</td>
<td>38.7 Percent</td>
</tr>
</tbody>
</table>

**Source:** Centre for Development and Enterprise (2018: 13)

Economists broadly agree that there was a rise in poverty in the 1990s and then a decline in the 2000s. For instance, in a 2007 publication, Van der Berg at al demonstrated a significant decline
in poverty after 2001. His calculations reveal that poverty levels started out at 50 percent of the population in 1993. In 1995 they peaked at 52 percent. From 2010 to 2016 they fell from 51 percent to 44% (Van der Berg, Louw, Toit, 2007: 23). The latest figures released by StatsSA confirm largely positive trends in terms of the percentage of South Africans living below the latest World Bank poverty lines. Based on purchasing power parity in 2016 dollars, the percentage of South Africa’s population living below the poverty line of $1.90 per day fell from 33.8% in 1996 to 16.6 percent in 2016 (World Bank, 2016: 2). However, the rate at which these poverty levels have fallen has slowed down drastically. From 2010 to 2016 the rate fell cumulatively by more than 2 percent, but from 2008 to 2011 the rate came down by a minuscule 0.05%. In 1996, 53 percent of the South African population fell below the $3.10 poverty line, compared to 34.7 percent in 2011. From 2010 to 2016 the rate went from 35.8 percent to 34.7 percent (World Bank, 2016:4).

It is clear that poverty fell fastest when South Africa experienced strong growth (in the years 2010-2016 when the average growth rate was 4.2 percent) and that since 2010 (when the average growth rate has been 1.6 percent) the rate at which poverty has fallen has been almost imperceptible (World Bank, 2016:5). As noted below, we cannot derive a strong causal relationship from the correlation, and it is also the case that during this period of strong growth the coverage of the Child Support grant and other social grants was rapidly extended, which certainly had their own impact on reducing the level of extreme poverty and hunger. In essence, the World Bank (2016:6) indicated that growth reduced poverty through three mechanisms: more employment, higher wages and the expansion of social grants that was financed through increased tax revenues. It is difficult to quantify the effect of each as there appear to be some countervailing forces – as grants expanded, inter-household remittances appear to have fallen. Nevertheless, it is clear that grants are an incredibly important vehicle for poverty reduction even during periods of high growth.

3.4.2 The nature and trends of unemployment in South Africa

Since 1994 when South Africa attained its independence from the Apartheid government, the ANC which was predominantly black government has been struggling to create employment for its citizen until today. The table below shows the unemployment trend in South Africa between the period 2015 to 2018 (Centre for Development and Enterprise (2018:16).
Table 3.3: Trends of unemployment in South Africa: 2011-2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Strict unemployment rate</th>
<th>Expanded unemployment rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>25.0%</td>
<td>35.5%</td>
</tr>
<tr>
<td>2012</td>
<td>25.2%</td>
<td>35.6%</td>
</tr>
<tr>
<td>2013</td>
<td>24.5%</td>
<td>34.9%</td>
</tr>
<tr>
<td>2014</td>
<td>25.4%</td>
<td>35.8%</td>
</tr>
<tr>
<td>2015</td>
<td>25.5%</td>
<td>34.4%</td>
</tr>
<tr>
<td>2016</td>
<td>27.1%</td>
<td>36.3%</td>
</tr>
</tbody>
</table>

*Source: Centre for Development and Enterprise (2018: 16)*

2016 has the highest rate of strict and expanded unemployment of the past five years, with the trend broadly showing growth in unemployment. Strict unemployment counts only those who are actively looking for work, while the expanded definition also counts those who would like to work but have stopped looking. It is clear that both forms of unemployment will continue to increase unless the economy turns around. In South Africa, 28% of the population is aged between 15 and 29 (Statistics South Africa, 2018:23). It was noted by the National Planning Commission (NDC) of 1994 that a properly harnessed for development can be fostered by embracing the demographic weighting as an asset to the development of the country. Similarly, the demographic weighting asset could be the source of the destabilization of the country if poverty and unemployment issues were not addressed. The fears of the destabilization of the country inevitable due to the worsening of unemployment between 2016 and 2019 in South Africa. This period records the highest number of protest by the general citizens for different socio-economic and political reasons and unemployment is one of the causes of the protests. Unemployment in South Africa mainly affects the youths, which is the largest population. Youth in South Africa is defined as young people from the ages of 15 to 34. Statistics in South Africa (2018:23) indicated that 3.5 million of the 9.9 million young people who are currently in the labor force were not working in 2016. Besides the hardship, this involves, there are long term costs for the delayed start of employment. The youth who cannot find work are losing out on opportunities to strengthen and expand their skills. There is also a high likelihood
to become increasingly disconnected from a society that offers them such restricted opportunities.

3.5 PRO-ENVIRONMENTAL BEHAVIOR AND THE TRIPLE CHALLENGE
Kollmuss & Agyeman (2002: 240) define pro-environmental behaviours as “behaviour that is determinedly seeking to lessen the negative consequence of one’s actions on the natural and built world”. The definition can be accepted in workplaces which are dedicated to effective workplace sustainability programs, national and home programs. It is the premises of the foregoing that this study its assumption that the pro-environmental behaviours as influenced by the green building can be potentially utilized to mitigate poverty and unemployment in South Africa. Implementing pro-environmental behaviour activities and programs can lessen negative environmental impacts in the livelihoods of people.

The study conducted by Thondhlana and Hlatshwayo (2018:13) on the pro-environmental behaviours of the students’ residence at Rhodes University in South Africa, the evidence of the findings revealed that whilst the students know the importance of pro-environmental behaviour, their behaviours are not in tandem with the dictates of the pro-environmental behaviours. In view of the aforementioned, Mtutu and Thondhlana (2016:148) argue that the reason why pro-environmental behaviour does not yield what it is expected of them is that the reluctance of the individuals to implement its principles. Predicated in the above information, it can be one of the major causes that make the pro-environmental behaviour ineffective in mitigating the triple change in South South Africa. According to Mtutu and Thondhlana (2016:150), the students at Rhodes University confirmed that they know that pro-environmental behavior can mitigate poverty if it is commercial implemented but themselves as students have never tried it and heard of any graduate who is making a living out of it at a large scale. Thus, in the evidence of the aforementioned recent studies on pro-environmental behaviours at the Rhodes University, it has been concluded that the pro-environmental behaviour is being under-utilized in fighting the triple challenges in South. Instead, those who are engaging in business based on pro-environmental behaviours are doing it at a very small scale that does not yield much and hence, rendering it ineffective in mitigating the triple challenge in South Africa.
3.6 CONCLUSION

This chapter has reviewed the literature on the global trends of green building literacy. It focussed on the first world countries cascading to the developing countries. The literature confirmed that there are very little studies that have been conducted in developing countries that show the trends of green building literacy. The literature on pro-environmental behaviors in the developing countries is not informed with the green building but rather with the public health, geography and environmental health disciplines. This section also reviewed the literature on the nature and trends of poverty and unemployment. The literature revealed that the triple challenges in South Africa are interdependent phenomena which devastate the lives of people concurrently. Thus, the cure to poverty, inequality and unemployment must be a mixed concoction and not a stand-alone medicinal approach. The section also reviewed the possibility of the pro-environmental behaviours in mitigating the triple challenges in South Africa but specifically focusing on poverty and unemployment. The literature has shown that despite the scarcity of literature and the cases in where the pro-environmental behaviours influenced by the green building has directly mitigated the triple challenges but conceptually, there are numerous cases on which pro-environmental behaviours has mitigated the triple challenges from an interdisciplinary point of view.
4.0 INTRODUCTION
This chapter discusses the study processes and the design this study adopts as well as the methodological foundations underlying the study. This study follows the three main underlying and overlapping methods in research design, namely the study philosophy, methodologies of the study, logistics of the study and practice and associated with the study. Its philosophical dimension involves issues of ontology, which is a theory of reality and epistemology the theory of knowledge creation. This study’s methodological dimension relates to concepts of how the social realities in the world can be interpreted, while approaches pertain to the set of strategies for interpreting the world. Logistics and practice relate to the process of selecting the study area, proposal development, budgeting and planning for ethical research. It is within this realm that the rationale for choosing qualitative methodologies, guided by interpretivism philosophy, was addressed. To reiterate, the research question was framed as follows: How can green building literacy and pro-environmental behaviors among the students influence the construction of capable and ethical professionals in South Africa? In light of the above, this section presented the research philosophy, research paradigm, populations and the research instruments to solicit the data from the participants.

4.1 RESEARCH PHILOSOPHY: INTERPRETIVISM
There are three main positions of knowledge production that underlie both quantitative and qualitative studies (Unwin, 1992:11). These include the interpretive perspective, empirical-analytical approach as well as critical realism. Limb and Dwyer (2001:10) refer to these qualitative knowledge generation views as positivism, humanism, post-modernism and post-structuralism respectively. This study made use of the interpretive qualitative epistemological philosophy to critically examine the green building literacy on pro-environmental behaviors among the South African Higher Education Institution (HEI) students. Interpretivism as a pluralistic view allows the green building literacy on pro-environmental behaviors among the university students to be analyzed through a comprehensive approach by acknowledging that pro-environmental behavior among the students is a multifaceted process predisposed by several players with diverse insights.
Interpretivism is conceptualized as one of the schools of thought that emphasis on conversational and the behavioral patterns of the subjects. An interpretive approach focuses on the individual experiences, epistemological issue-oriented towards society and cultural critique (Mumby and Putnam, 1992:15). Henceforth, the use of interpretivism philosophy enables the researcher to critically view the phenomenon from different perspectives such as the interpretive perspective and the critical science perspective. Harrison (2006:4) concurs that interpretivism is based on the principles of plurality and complexity. Interpretivism also stresses a critical examination of prevailing social institutions, cultural beliefs and political systems. This varied view of interpretivism permits the green building literacy to be analyzed in a comprehensive and critical thinking approach by acknowledging that dealing with pro-environmental behaviors among South African Higher Education students is a compound process predisposed by various players with different perceptions about their challenges.

4.2 RESEARCH PARADIGM: QUALITATIVE APPROACH
This study has employed the qualitative approach using interpretivism as its philosophical underpinning which seeks to interpret the existing socio-economic and political institutions and systems in green building literacy’s influence on pro-environmental behaviors of the University students in South Africa. In this view, this study’s paradigm embraces realistic perspectives which criticize a positivist approach for bending the respondents towards a biased abstract information embedded in some causal relationships or socio-economic engagements. Robert (2011:16) postulates that hermeneutics is one of the post-structural methodologies that goes beyond what structural theories have objectively pre-determined as truth underpinning the social reality. Limb and Dwyer (2001: 6) argue that qualitative methodologies view the social world as something dynamic and ever-changing. Qualitative methodologies also emphasize that the social world is continuously being created through the connection of social, economic, and political processes. Consequently, this study adopted the qualitative approach because it allows for questions and critiques the rigid inner logic to links that describe any aspect of social reality. For instance, the qualitative examination of the socio-political structural relationship’s effects on green building literacy and its influence on the pro-environmental based behaviors of the selected South African Higher Education students.

One motivation for adopting a qualitative study is the discovery that most the green building studies are either quantitative or mixed methods and lack that in-depth and interpretive analyses
of the perceptions, views, experiences and feelings of the subjects. As a result, their findings predicted and determined the intensity of the problems associated with the deficiency of the green building literacy and interventions based on the spatial numerical distribution of the phenomenon in a vast area. Another gap that was mentioned in existing studies’ literature, and which this study pursues to address, relates to the need to explore the perceptions, views and feelings of the professionals who directly or indirectly influence the students through policies or tutelage. The researcher argues that quantitative data on green building literacy from the previous studies did not go beyond the surface of the problem but rather identified areas that require policy intervention to mitigate the problem.

In light of the identified gaps in the green building literacy’s impact on pro-environmental based behaviors of the selected Higher Educational Institution in the Republic of South Africa, this study, therefore, seeks to go beyond the superficial understanding green building literacy but establishing the pointers to the solution of the problem under study. Since the study seeks to provide in-depth thoughtful views, perceptions, behaviors and feelings of the students and professionals in the context of green building literacy, a qualitative paradigm was necessarily employed.

4.3 CASE STUDY APPROACH

This study employed a phenomenological single case study design within a qualitative research tradition to examine the green building literacy in pro-environmental behaviors among university students in South Africa. Hewlett (2013:74) remarks that a qualitative approach permits for the collection and analysis of the naturalistic data. She further points out that a qualitative approach makes it possible for the subjects’ views to be understood in relation to a particular social context and setting. Thus, through the selection of pro-environmental behaviors among the students as a single case study at the selected HIE in Johannesburg, South Africa. This study conceptualizes the complex experiences that all the stakeholders participating in mitigating the deficiency of green building literacy that inculcates pro-environmental behaviors among the University students in South Africa with reference to a selected Higher Education Institution (HEI) students. However, in this single case study, there are critical stakeholders who work hand-in-glove with the students such as the government, professionals and lecturers in the process of disseminating the critical information to do with green building literacy on pro-environmental behaviors among the University students.
4.3.1 Phenomenological Case Study Design

The phenomenological case study was used because it fits the philosophical assumptions of interpretivism and constructivism about learning, teaching, and research. Case studies are known to provide engaging explorations of an application or a project as it develops in a real-world situation.

This study is a detailed analysis of the GBL in pro-environmental based behaviors among the HIE students in Johannesburg South Africa. Hamel (1993:9) and Yin (2009:13) explains a case study research design as a scientific review that examines a modern phenomenon within the real-life situation of its subjects. Hamel (1993:22) further argues that a case study is a valuable technique which bridges the experience and environment which are not evidently clear to the researcher. For instance, the evidence of variables to support the deficiency or prevalence of green building literacy on pro-environmental behaviors among the students need to be closely examined. Salkind (2012:13) contends that critiques the case study assume that the study of small cases is usually relative and does not guarantee the reliability and generalizability of the findings. Previous studies by Zainal (2007:6), Shrestha (2003:21), Johnson (2006:8) and Grassel and Shirmer (2006:7) attest that the case study approach is one of the recommended approaches in the exploration and understanding of complex research phenomena.

The trustworthiness and dependability of the findings of this study were made possible by the method’s leverage to triangulate the data from various sources and research techniques examined in this study. Similarly, Yin (1994:15) and Tellis (1997:4) state that the lack of generalizability of case study results is ameliorated using theory rather than populations. In this view, the case study method can be considered a strong study technique, particularly when a full detailed examination like the green building literacy in pro-environmental behaviors among the selected South African Higher Education Institutions.

On the basis that quantitative methods have inherent limitations in providing complete and detailed expositions of the influence of green building literacy on the pro-environmental behaviors of students, this study employs the case study qualitative method. Tellis (1997:17), for instance, postulates that a researcher goes beyond the quantitative statistical results and is able to understand the behavioral conditions through the actors’ perspective. Thus, this is the main objective sought by this study, with the selected South African Higher Education Institutions, stakeholders and professionals as the respondents. Shrestha (2003:9) argues that
the case study method allows for a holistic investigation of various actors’ perspectives of a phenomenon. It is, therefore, in light of the nature of this study, that the phenomenological case study design is considered relevant for the purpose of exploring the green building literacy in pro-environmental based behavior among the selected Higher Education Institutions students in the Republic South Africa.

4.4 TARGET POPULATION AND STUDY AREA
This study was conducted in Johannesburg, South Africa. A target population was defined by Bell (1990:145) to mean the total combination of respondents that meet the selected set of criteria. In this study, the target population is selected undergraduate and final year students at a Higher Education Institution (HEI) green building professionals and stakeholders in Johannesburg, South Africa. From the foregoing, the targeted population, 20 undergraduate students and 20 key informants from the green building professionals and stakeholders were purposively sampled to participate in this study. This study is predominantly qualitative, the criteria for selecting the aforementioned small was the premises that the study sought the gather in-depth information from the experiences of the participants on how the pro-environmental behaviour can be utilized to mitigate the triple challenge in South Africa. Thus, according to Tongco (2007:8), qualitatively, it is the prerogative of the researcher to judgementally or purposively select the participants she/he feels can furnish the study with the most relevant and appropriate information or answers to the research question of the study. Predicated in the aforementioned, the researcher understands that there are over 1000 green building professionals in Johannesburg, more than 10000 stakeholders in the Gauteng province and more than 500 undergraduate students (CBASA, 2012:16). Regardless of the forgoing approximated numbers of the target population, the researcher employed the non-probability qualitative method of sampling that is judgemental purposive sampling because she knew the type of the participants that can appropriately provide the required information in answering the research questions of the study.

4.5 PURPOSESIVE SAMPLING METHODS
According to Boyce and Neale (2006:6) sampling is the method of selecting a part from the entire populace small and representative enough to represent the whole. Patton (1990) argued that purposive sampling is best used with small numbers of individuals/groups. Purposive
sampling is purported to be the most effective method that selects the participants who provide relevant information to the problem under study. Although purposive sampling is not explained in most of the studies, Tongco (2007:5) argues that it is fundamental to the quality of data gathered when compared to other sampling methods. Conceptually, purposive sampling is sometimes called judgmental sampling denoting the researcher’s deliberate choice of the informants who possess the qualities and information pertinent to his/her study. In this regard, Ringson (2019:8) remarks that in judgmental purposive sampling, the investigator has the elasticity to choose the people with the experiences and appropriate data required to respond to the research questions of the study. It was also noted by Bernard (2002:7) that purposive sampling is primarily demonstrated by the key informant method. Further to that, needs, activities and circumstances are the core validation for qualitative research through purposive sampling. The researcher was concerned with exploring the universe and understanding the audience, and purposive sampling becomes the most appropriate sampling method to select the participants in this study. This method calls for high-level thinking rather than only common sense as well as the best decision in choosing the right habitation and meeting the right number of the right people for the purpose of the study.

Following the baseline tenets that justify purposive sampling, 40 participants were recruited as informants and respondents of this study. Neuman (2011:6) observes that purposive sampling is a valuable technique, especially for qualitative research. In purposive sampling, cases rarely represent the entire population, but its focus is to gather in-depth and quality information as much as possible from the selected informants. In this case, the students and professionals were purposively chosen depending on the information needed. In most qualitative studies, the emphasis is not on the number of informants who would participate in the study. Rather, the emphasis is on the quality of the data or information provided by the small number of the informants. Thus, this small sample size was used as demonstrative and not necessarily intended to be representative of the number of students and professional from the selected HEI in Johannesburg of South Africa.

Twenty (20) key informants who comprise of the green building professionals and stakeholders were purposively selected in the proximity area around the selected HIE in Johannesburg, South Africa to participate in this study. Key informants are those respondents targeted to furnish the study with information from their area of expertise and understanding of the dynamics of how the influence of green building literacy on pro-environmental behaviors be
utilized to mitigate the triple challenge in South Africa. Predicated on this definition, the key informants were purposively selected to give in-depth information about the green building literacy’s influence in pro-environmental behaviors in Johannesburg, South Africa. In addition, 20 students were judgmentally and purposively selected to participate in this study. These participants were judgmentally selected from the undergraduate levels. The English language was used for data collection from both the students and the green building professionals in the study.

4.6 DATA COLLECTION METHODS

Essentially, this research employed two methods of data collection, and the other two qualitative (in-depth interviews with key informants and documentary analysis).

4.6.1 In-depth Interviews

In soliciting data regarding the phenomenon understudy from the information-rich cases such as experts and academics the researcher will use the in-depth interviews method. The researcher will use a semi-structured key informant guide as the data collection instrument to solicit information from key informants through this method. These key informants will be purposively selected owing to their peculiar knowledge regarding this study. The justification of employing this method in doing so is that in-depth interviews are an effective method of extracting the deeper views, interests, perception and meanings from the key informants regarding the phenomenon under investigation (Patton, 2002:11). The method also allows the room to engage in further probing so as to fully understand the position of the respondent regarding the phenomena. Further, this method has the advantages of greater flexibility when it comes to eliciting data from the respondents.

4.6.2 Documentary Analysis

The documentary analysis method was used to collect qualitative data from the critical documents where the triple challenge was discussed or reported in South Africa. The central thrust embedded in this method is to scrutinize the information contained in such as reports, correspondences, notices, newspaper articles and memorandums, both from the public and private domains, dealing with the phenomenon under study (Babbie, 2010:8). Thus, this research employed this method to gather information regarding the influence of green building literacy on constructing the behaviors of the professionals in South Africa. The advantage of using this method in this study was that it will manage to gather some sensitive but much-
needed information about the phenomenon understudy which the researcher fails to gather through other means. Also, the documents tend to provide a rich vein of information relevant to data analysis. Table 4:1 below shows the chart linking the research questions of the study, data sources and justification
Table 4.1: Chart Linking Research Questions and Methods

<table>
<thead>
<tr>
<th>Research Questions</th>
<th>Data Sources</th>
<th>Justification of the data sources and Methodology</th>
</tr>
</thead>
</table>
| 1. What is the level of understanding of students, professionals and stakeholders of the concept of green building literacy in Johannesburg, South Africa? | **Qualitative Data:** The students, professionals and stakeholders will respond to in-depth interviews. The documentary review will also be used as sources of data to this study. | - The main rationality to justify this is that the students are the ones who are being trained to work as professionals in one way or the other in their future careers and hence, there are potentially rich sources to inform this study with relevant knowledge for green building literacy.  
- The professionals are key informants by virtue of their expertise and day-to-day experience with buildings in South Africa.  
- The justification behind the stakeholders as information-rich sources to this study is that they phenomenologically experience the costs and benefits of implementing GBL and pro-environmental activities.  
- The environmental strategic and planning documents and the National Development Plan will be used as data sources in the sense that the former contains the GBL and pro-environmental behavior information and the latter will inform the study of the vision to curb against the triple challenge in South Africa.  
- Methodologically, this study focuses uniquely on the gathering of in-depth knowledge from the participants about the influence of green building literacy in South Africa. It was discovered that several studies of this nature used the quantitative methods if not mixed and very few utilized the qualitative approach. More so, the influence of green building literacy to pro-environmental behavior was carried out in the developed countries as evidenced by a lot of literature referring to the first world countries than the developing countries. |
<table>
<thead>
<tr>
<th>Research Question</th>
<th>Data Sources</th>
<th>Justification of the data sources and the methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. What are the critical success factors enhancing the influence of the green building literacy on pro-environmental behaviours in Johannesburg, South Africa?</td>
<td><strong>Qualitative Data:</strong> Students, professionals and stakeholders will respond to in-depth interviews. The documentary review will also be used as a source of data to this study.</td>
<td>The rationale behind choosing students as data sources is that students are the ones who are theoretically exposed to GBL and this question benefits from the co-relation of the theoretical knowledge of GBL and practice. The professionals are the ones who apply the theory of GBL that they would have accumulated from different institutions and programs into practice. This question benefits from the co-relationship between GBL theory and practice. The stakeholders are critical in this question because of their day to day experiences of the application of the GBL and pro-environmental activities. There is a value added to the question from their socio-economic livelihood accrued from GBL and pro-environmental activities. The diagnostic feedback report of the environmental strategies and planning documents and the National development plan will be used as primary data to establish the success factors enhancing the influence of the green building literacy on pro-environmental behaviors in Johannesburg, South Africa. The justification of methodology is the same as for Question (1)</td>
</tr>
<tr>
<td>Research Question</td>
<td>Data Sources</td>
<td>Justification of data sources and methodology</td>
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</tbody>
</table>
| 3. How can the challenges currently being faced in facilitating the influence of green building literacy on pro-environmental behaviours be resolved in Johannesburg, South Africa? | **Qualitative Data:** Students, professionals and stakeholders will respond to in-depth interviews. The documentary review will also be used as sources of data to this study | The students are data sources for alternative solutions from their theoretical experiences and praxis to resolve the challenges being faced in facilitating the influence of GBL on pro-environmental behaviors in Johannesburg, South Africa.  
The professionals are critical sources of information on the basis of their expertise and its day to day application in an attempt to resolve the challenges currently faced in facilitating the influence of GBL on pro-environmental behaviours in Johannesburg, South Africa.  
The stakeholders as sources of information in this regard will help with alternative practical solutions based on their lived experience to resolve the challenges faced in facilitating the influence of GBL on pro-environmental behaviours in Johannesburg, South Africa.

The diagnostic feedback of the environmental strategic planning documents and the National developmental plan will help this study to establish the feasibility gaps of the implemented strategies and reality thereby paving a room for the alternative solutions to the challenges being faced in facilitating the influence of GBL on pro-environmental behavior in Johannesburg, South Africa.

For the methodological justification, refer to Question (1)
<table>
<thead>
<tr>
<th>Research Question</th>
<th>Data Sources</th>
<th>Justification of data sources and methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. How can pro-environmental behaviours use to influence the mitigation of the perennial problem of the triple challenge in Johannesburg, South Africa?</td>
<td><strong>Qualitative Data:</strong> Students, professionals and stakeholders will respond to in-depth interviews. The documentary review will also be used as sources of data to this study.</td>
<td>The students are critical in this question as information-rich sources on the basis of their career development as a panacea to the perennial problem of the triple challenge in South Africa. Furthermore, the students will inform this study with relevant information on how the green building literacy and pro-environmental behavior can be translated in mitigating the triple challenge in South Africa.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The socio-economic lived experiences of the professionals in GBL and pro-environmental activities will be analyzed on the basis of how they can be translated or maximized to resolve the perennial problem of the triple challenge in South Africa.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The socio-economic lived experiences of the stakeholders as direct beneficiaries of the GBL and pro-environmental activities will be analyzed on the basis of how they can be translated or maximized to resolve the perennial problem of the triple challenge in South Africa.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The diagnostic feedback of the environmental strategic planning documents and the National developmental plan will be used as an information-rich source in establishing the feasibility of translating GBL and pro-environmental activities as a solution to the existing perennial problem of the triple challenge in Johannesburg, South Africa. This is going to be actuated by the fact that the diagnostic report of the aforementioned documents will have established the weaknesses and strength of the implemented programs focused on resolving poverty, unemployment and inequality thereby leaving the gap that this study is aiming to bridge as its contribution to the body of knowledge.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For methodological justification refer to Question (1)</td>
</tr>
</tbody>
</table>

Source: Author
4.7 DATA ANALYSIS METHODS

Data were collected in English and followed by thematic analysis. Braun and Clarke (2006:4) argue that thematic analysis affords an open and tentatively open-coding approach to scrutinizing qualitative data. Neuman (2011) describes open-coding as involving the location of themes and the assigning of initial codes to condense large volumes of data into categories.

The axial coding, which focuses on interrelating and categorizing the themes that have been developed at the open-coding stage was then done to select the themes that may emerge through interpretation and analysis of data. To do so, the researcher read through the notes several times. The researcher used the letters for coding the data for analysis. For more details in coding systems, refer to table 5.1. This afforded the researcher the opportunity to probe the views, perspectives, along with opinions of the participants closely in order to absorb the information gathered. The researcher used the inductive and thematic data analysis approaches where each is analyzed within its natural setting, in which the respondents and documents speak for themselves. Interpretation of data was undertaken on the basis explained above.

4.8 ETHICAL CONSIDERATIONS

Pera and Van Tonder (1996:4) conceptualized ethics as a code of conduct or behavior considered to be correct in conducting credible scientific research. To abide by the rules and regulations of ethics the researcher firstly obtained the ethical clearance from the selected Higher Education Institution in Johannesburg, South Africa. This letter helped the researcher to conduct the research simply because it stated the primary goal of carrying out the study, namely purely for academic purpose only. The letter also assisted the researcher in establishing the confidentiality, anonymity and privacy of respondents and their responses primarily because the researcher used it to convince them that only the researcher and her supervisor are the ones to get access of their information. Before conducting an interview with the students the researcher firstly obtained the written and signed informed consent from them which is grounded on unpaid participation. The researcher did this by first explaining the purpose of the research, in this case, the academic purpose of the study to all the participants. After reading and narrating the purpose of the study, then he asks respondents to consent or assent their participation voluntarily in the study. In respecting such ethical considerations as privacy,
concealment of respondents the researcher fulfilled by the use of the pseudonyms occupations or designations of the participants to those who would have refused to be named.

4.9 CONCLUSION
The researcher has described the context of the study, the problem statement, the scope, the purpose of the study and the research questions. The methodology of the study was presented as informed by phenomenological interpretivism that seeks to critically examine the structural theories and pre-determined institutionalized truth. In this case, this study predominantly employed a qualitative research paradigm. In-depth interviews and documentary review were used to gather the data for this study. The targeted populations were the HIE students, green building professionals and the stakeholders in Johannesburg, South Africa. The study is a qualitative one which sought to examine the green building literacy in pro-environmental behaviors and how it can be utilized to mitigate the triple challenge of South Africa.
CHAPTER 5

PRESENTATION OF FINDINGS

5.0 INTRODUCTION

This chapter presents the findings in response to the main research question which is: How can the influence of green building literacy on pro-environmental behaviors be utilized to mitigate the perennial problem of the triple challenge in Johannesburg, South Africa? In this study, data were presented following the order of the research questions of the study. The research questions of the study constitute the primary headings of data presentation prior to the formulation of the key themes through thematic qualitative analysis. The total number of participants in this study was 40. This number comprised of the 20 students from the HIE, 10 professionals and 10 green building stakeholders purposively sampled from the metropolitan city Johannesburg. Data were collected through in-depth interviews from the above-mentioned participants and appropriate documents. In this study data were presented as follows: the first part presents data gathered from in-depth interviews corroborated with the documents for the green building and pro-environmental behavior; the second part presents data collected from documents specifically for the triple challenges in South Africa. Thematic analysis was used to extract themes from the data. Thematic analysis is defined by Braun and Clarke (2006:3) as a general approach used to analyze qualitative data that involves identifying themes and patterns in the data. Furthermore, the thematic analysis offers an accessible and theoretically flexible approach in analyzing qualitative data gathered through in-depth interviews. The thematic analysis allowed the researcher access to understanding the influence of green building literacy in pro-environmental behavior and the triple challenge in South Africa from a participant’s perspective.

This chapter is organized in this manner: First, interviewees are coded and grouped as follows: HIE students, green building professionals (architects, electrical engineers, structural engineers and quantity surveyors), and stakeholders (academics, policy makers, developers and users). Interviewees were coded in order to address ethical issues such as confidentiality. Secondly, the researcher used different codes to identify the participants within their respective categories. Thirdly, findings of data mined from documents are presented as follows; first data
from governments are presented and discussed, and secondary data from a journal article is also presented and discussed. In the premises of the foregoing, the Higher Education Institution student participants were coded as HESPFI-10 for female and HESPM11-20 for the male students, the professional participants were coded as PPF1-3 for female professional participants and PPM4-10 for male professional participants and the stakeholders were coded as SPF1-3 for female stakeholder participants and SPM4-10 for male stakeholders’ participants respectively. Below Table 5.1 illustrates categories and codes of participants.

PRESENTATION OF RESEARCH FINDINGS FROM IN-DEPTH INTERVIEWS: PART I

Table 5.1: Matrix of respondents to in-depth interviews

<table>
<thead>
<tr>
<th>Participants Category</th>
<th>Codes</th>
<th>Participants’ Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher Education Institute (HEI) # final year students in faculty engineering</td>
<td>HESPFI-10</td>
<td>-Female Students</td>
</tr>
<tr>
<td></td>
<td>HESPM11-20</td>
<td>-Male Students</td>
</tr>
<tr>
<td>Professionals # operating within Gauteng province</td>
<td>PPF1-3</td>
<td>-Female Professionals</td>
</tr>
<tr>
<td></td>
<td>PPM4-10</td>
<td>-Male Professionals</td>
</tr>
<tr>
<td>Stakeholders # residing and working within Gauteng province</td>
<td>SPF1-3</td>
<td>-Female Stakeholders</td>
</tr>
<tr>
<td></td>
<td>SPM4-10</td>
<td>-Male Stakeholders</td>
</tr>
</tbody>
</table>

As illustrated in the table above, the Higher Education Institution (HIE) student participants were coded as HESPFI-10 for female and HESPM11-20 for the male students, the professional participants were coded as PPF1-3 for female professional participants and PPM4-10 for male professional participants and the stakeholders were coded as SPF1-3 for female stakeholder participants and SPM4-10 for male stakeholders’ participants respectively. The researcher deliberately presented data in chronological order following the research questions to systematically and comprehensively present all of the data gathered from all the participants in this study. Afterward, data presented in this chapter was arranged in themes for analysis and discussion for the purposes of establishing its theoretical implications in chapter 6.
5.1 GREEN BUILDING UNDERSTANDING BY THE STUDENTS, PROFESSIONALS AND STAKEHOLDERS

This research question or objective sought to establish the levels of understanding of the participants on green building. It was established on literature that green building literacy determines the responsiveness and participation of the people in pro-environmental based behaviors. In light of the foregoing, both the students, professionals and the stakeholders responded to this research question. This question was broken down into sub-questions in order for the researcher to glean in-depth information in the level of understanding of green building literacy from the participants. In the view of the foregoing, different views were gathered from the professionals, students and stakeholders about what green building literacy and pro-environmental behaviors are. Whilst there were copious views from the informants as shall be presented below, there were indications that green building literacy is still a virgin area to study in South Africa. The other important aspect that the findings have shown is the relationship between green building literacy manifest itself at a certain level the pro-environmental behaviors of the general populace within any given community.

5.1.1 The university students’ views on green building literacy

The findings on the views and understanding of the green building from the students have shown that largest number of the students and predominantly the final year engineering students at the Higher Education Institution really know what green building is and also its benefits to the stakeholders and the general populace. The second largest group of the students have shown that they know what green building from a theoretical point of view but they still want to practical experience its influence to the pro-environmental behavior and its beneficitation to the stakeholders and the community at large. The third and last largest group of the university student indicated that they know the green building as a building concept that has been by the developed countries and yet to be fully adopted and implemented in the third world countries and hence this affects its impact in the pro-environmental behaviors of the people. Below is Table 5.2 to illustrate the categorized different views/understanding of the University students in the green building.
<table>
<thead>
<tr>
<th>Participants categories</th>
<th>Codes</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Category</td>
<td>HESPF1</td>
<td>This group of participants shared the view that they really know what green building is and its benefits to the socio-economic livelihoods of the stakeholders, the users and the general populace (see the explanation below).</td>
</tr>
<tr>
<td></td>
<td>HESPM12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPF7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPF8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPF10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM20</td>
<td></td>
</tr>
<tr>
<td>Second Category</td>
<td>HESPF2</td>
<td>The second category shared the view that they know green buildings more on a theoretical point of view and doesn’t have practical exposure to its socio-economic benefits to stakeholders, users and the general populace (see the explanation below).</td>
</tr>
<tr>
<td></td>
<td>HESPM11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPF4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPF6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM19</td>
<td></td>
</tr>
<tr>
<td>Third Category</td>
<td>HESPF3</td>
<td>This category of participants shared the views that green building is a concept that is popularly used in the first world countries and still yet to be popularly used in the developing countries (see the explanation below).</td>
</tr>
<tr>
<td></td>
<td>HESPF9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPF5</td>
<td></td>
</tr>
</tbody>
</table>

As illustrated in the table above, the largest group of university students indicated that they know that green building is and its benefits to the socio-economic lives of the stakeholders and users. When this question was asked, HESPF1 remarked:

_In my understanding, the green building entails the practice of designing structures as well as the use of certain processes which are known to be environmentally responsible towards resources efficiency through the life cycle of a building. This applies from the setting out the design all the way to the construction, the operation, the maintenance, some renovation works and demolition._

Whilst, the foregoing conceptualization of the green building from one of the student sound well-polished and sound, the other student participant HESPM12 further explicated:

_An green building is a structure which as seen in its design, particular construction and the way it operates can reduce or ultimately eliminate the known negative results of global warming. This same structure is capable of creating a positive impact both,_
looking at the socio-economic livelihoods of the developers and the people who will say or work in there.

This category of the student's participants in expressing their green building literacy also indicated the benefits and the influence of green building literacy in mitigating the triple challenge in South Africa. In addition to the definition of green building, HESP14 pointed out that:

_In my understanding, the main objectives of the green building are to appropriately use water and energy. They should protect the person's health and in some cases improve the productivity of workers. They reduce waste, issues of pollution and damage to the environment._

In protecting the occupant’s health HEPSF10 remarked:

_Through green building literacy, it enhances environmental hygiene and cleanliness which ultimately reduces some diseases that are associated with the pollution of the environment._

From the foregoing excerpts of data, it shows that this cluster of the students really appreciates and understanding the green building as a concept and practice.

The second category of the participants subscribed the understanding that green building literacy and its beneficiation to the occupants and the general populace to theoretical understanding more than in practice. In this view, HESP2 said:

_I personally do understand green building literacy and its influence for mitigating the triple challenges predominantly on theoretical aspects more than in practice. Maybe I will learn its practical benefits when I am out there in the industry._

Further to this, HESPM11 supported the foregoing idea by saying:

_There may be new technologies being developed to go with today’s practices in coming up with better green buildings, most of the underdeveloped countries are still far to practically match the first world countries. As such, I have witnessed very little of the green building literacy on pro-environmental behaviors' practical benefits within the poor communities except in the well-to-do communities._

This second largest category of the students confirmed their understanding of green building literacy on pro-environmental behaviors theoretically but they vehemently questioned it's if at all its helping to practically mitigate the triple challenges in the third world countries and South Africa inclusive.
In the third category of the students shared the view that green building literacy is popularly implemented and practically mitigated the triple challenges is in the first world countries than in developing countries. In this view, these participants pointed out that in South Africa, green building literacy on pro-environmental behaviors seems to be practically evidenced in the low-density suburbs such as Sandton than in the high-density suburbs. This perception according to them shows that green building literacy pro-environmental behaviors in the Gauteng province have not yet reached the grassroots.

5.1.2 The professional’s views green building literacy
Green building professionals who include quantity surveyors, architect, electrical engineers, and structural engineers were interviewed. Whilst there are three categories of views in the understanding of green building literacy on pro-environmental behaviors from the professionals, they all agreed in the fact that green building literacy levels are rising in South Africa but it is still yet to be practically grasped at the grassroots level. Table 5.3 below shows the categories of the views of the professional's participants’ understanding of green building on pro-environmental behaviors.

Table 5.3: Categories of the views of the professionals on green building

<table>
<thead>
<tr>
<th>Participants categories</th>
<th>Codes</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Category</td>
<td>PPF2, PPM4</td>
<td>The first category shared the view that green building literacy is rising in South Africa in both theory and practice in the well-to-do suburbs and populations than in the grassroots and high-density suburbs.</td>
</tr>
<tr>
<td></td>
<td>PPM6, PPM7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PPM8, PPM9</td>
<td></td>
</tr>
<tr>
<td>Second Category</td>
<td>PPF1, PPF3</td>
<td>The second group shared the view that green building literacy is theoretically high in South Africa from the well-to-do communities and grassroots but its benefits a few because people are just reluctant to put it into practice.</td>
</tr>
<tr>
<td></td>
<td>PPM5</td>
<td></td>
</tr>
<tr>
<td>Third Category</td>
<td>PPM10</td>
<td>The third category which was composed of only one person indicated that green building literacy is rising but people are just selectively implementing and practicing it at different levels.</td>
</tr>
</tbody>
</table>

The largest category of the professionals shared the view that that green building literacy is rising in South Africa in both theory and practice in the well-to-do suburbs and populations than in the grassroots and high-density suburbs. The main challenges that impede its practical
visibility at the grassroots level are lack of community mobilization and education of green building literacy and pro-environmental behaviors at grassroots levels. It was also indicated that whilst in some high-density suburbs there are no green buildings, therefore people are not privy to some of the benefits of green building literacy. Instead, they implement the pro-environmental behavioral practices not from the green building point of view but rather from the public and environmental health’s point of views. In this view, PPF2 outstandingly remarked:

_In my own experience and view as an architect, green building literacy on pro-environmental behaviors is rising in South Africa but it is mainly implemented and holistically practiced by a few well-to-do people mostly in the low-density suburbs than in the high-density suburbs. The fact that the high-density suburbs do not holistically practice it does not mean that they lack green building literacy but they are not exposed to some of its benefits because there are no green buildings within their areas. However, in actual sense, some of them use solar energy and also involved in recycling of different materials as part of the green building activities._

In support of the foregoing view, PPM6 emphasized:

_Professionally, as engineers, we know what green building is because it is our profession and most of the people in the low-density suburbs and in industries are conversant with the green building literacy on pro-environmental behaviors because they practice it every day of their lives. It is only the high-density suburbs and other grassroots people who don’t have such buildings where they can literary experience green building literacy. But the fact that some of the high-density population use solar energy shows that they are privy to the benefits of green building literacy._

The second group of the professionals shared the view that green building literacy is theoretically high in South Africa from the well-to-do communities and grassroots but its benefits are few because people are just reluctant to put it into practice. In this view, PPFI said:

_In my own view, green building literacy on pro-environmental behaviors in South Africa is theoretically high in both the well-to-do suburbs and high-density suburbs. However, in the high-density suburbs, they know more of pro-environmental behaviors from other disciplines because of the lack of green buildings in their disposal._

The foregoing view was completed by PPM5 who aptly remarked:

_As a quantity survivor green building literacy on pro-environmental behavior is rising to a certain group of people because of exposure and others groups of people in the high-density areas’ pro-environmental behaviors are mainly based on other disciplines such as public and environmental health not from a green building literacy point of view._

76
The third category which was composed of only one professional indicated that green building literacy is rising but people are just selectively implementing and practicing it at different levels. In this category, PPM10 who is an electrical engineer emphasized that because these green buildings are not everywhere, the green building understanding differs with places and people and as such its components and objectives are implemented differently.

5.1.3 The stakeholders’ views on green building literacy
The stakeholders who comprised of the academics, policy makers, clients and occupants aired their views on the understanding of green building literacy on pro-environmental behaviors and their views were grouped into 3 categories according to their similarities. Whilst there were very thin lines of differences in their levels of understanding of green building literacy on pro-environmental behaviors, there were notable differences in the practical implementation according to places and the nature of people. The factors that lead to the differences in the practical implementation of green building literacy include; location of the people, levels of education and exposure and understanding of the green building as an engineering subject.

Table 5.4: Categories of the views of the stakeholders on green building

<table>
<thead>
<tr>
<th>Participants categories</th>
<th>Codes</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Category</td>
<td>SPF1</td>
<td>This first group shared the view that green building literacy on pro-environmental differs with people and locations in South Africa.</td>
</tr>
<tr>
<td></td>
<td>SPM5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPM6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPM7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPM9</td>
<td></td>
</tr>
<tr>
<td>Second Category</td>
<td>SPF2</td>
<td>The second group shared the view that green building is understood more on the theoretical aspect than practice by most of the people.</td>
</tr>
<tr>
<td></td>
<td>SPF3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPM4</td>
<td></td>
</tr>
<tr>
<td>Third Category</td>
<td>SPM8</td>
<td>The third group shared the view that green building literacy is theoretically known by many people but implemented differently by different people.</td>
</tr>
<tr>
<td></td>
<td>SPM10</td>
<td></td>
</tr>
</tbody>
</table>

The first category in the stakeholders’ participants is of the view that green building literacy on pro-environmental differs with people and locations in South Africa. In view of the above, SPM5 remarked:

*From my experience, green building literacy on pro-environmental behaviors varies with places and people. For instance, those who live in Sandton have got much*
exposure because they dwell or see the green buildings every day compared to those who stay in high-density places such as Cosmo City where there no green buildings.

The emphasis in this category of the participants was that if the people have never lived in green buildings cannot fully claim green building literacy. This is the case of those people who are living in the high-density areas or the grassroots populace. In corroboration of the above, SPF1 pointed out:

Some of us we live in the RDP houses and we only know green building through the use of solar and all those other benefits we have experienced them.

Sentimentally, the participant here shows that the measurement of the one’s green building literacy is measured by the level of his/her exposure.

The second group of the stakeholders shared the view that green building is understood more on the theoretical aspect than practice by most of the people. In this view, the emphasis of the respondents mainly the academics show that because of their working environment they wield more of the green building knowledge in the theoretical side than practice.

The third group shared the view that green building literacy is theoretically known by many people but implemented differently by different people. The participant pointed out that this the reason why in the high-density suburbs green building literacy is very low and high in the low-density suburbs.

5.1.4 The university students’ views on pro-environmental behaviors
Overall, the student’s participants indicated that most of the peoples’ behaviors are the root, and that also means that they are the solution, to the present day environmental problems. The findings also show that pro-environmental based behaviors are crucial in the design of energy as well as climate policies and they are highly encouraged. In their categories, the largest number of students in their understanding of pro-environmental behaviors indicated that pro-environmental behaviors entail that array of behaviors which are an advantage to the natural environment. They improve overall environmental quality and they are also known to damage the environment as little as can be of significance. The second largest group shared the view that environmental behaviors sometimes involve an antagonistic relationship that exists between a person’s goals that they pursue another set of suggested value beliefs norm in a model form aimed at helping to understand an individual’s environmental behaviors. The third category shared which is composed of the few shared the view that pro-environmental
behaviors are behavior that follows an individual’s popular views regarding the link between people and their natural environments which they see daily. It motivates a system of attitudes together with views which govern the nature of behavior toward the surroundings. Table 5.5 below shows the summarized views of the three categories of the student's participants.

Table 5.5: Categories of the views of the students on pro-environmental

<table>
<thead>
<tr>
<th>Participants categories</th>
<th>Codes</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Category</td>
<td>HESPFI</td>
<td>Pro-environmental behaviors entail the set of behaviors that are beneficial to nature and the environment. They do enhance ultimate environmental quality as well as harm the environment in a very least possible way</td>
</tr>
<tr>
<td></td>
<td>HESPM12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPFI7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPFI8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPFI10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM20</td>
<td></td>
</tr>
<tr>
<td>Second Category</td>
<td>HESPFI2</td>
<td>Environmental behaviors most of the time encompass a certain antagonism between the different goals an individual pursues and a recommended worth credence norm in a classical form to help a person comprehend environmental based behaviors.</td>
</tr>
<tr>
<td></td>
<td>HESPM11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPFI6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM19</td>
<td></td>
</tr>
<tr>
<td>Third Category</td>
<td>HESPFI3</td>
<td>Refers to one’s popular views regarding the link between people and their natural environment. In turn, it is which causes a structure of beliefs and attitudes that govern behavior to the surroundings.</td>
</tr>
<tr>
<td></td>
<td>HESPF9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPFI5</td>
<td></td>
</tr>
</tbody>
</table>

Taking it from the green building literacy, the findings from the students clearly indicated that the green building literacy influences the environmental behaviors of people in one way or the other. Hence for the establishment of a connection between green building literacy and pro-environmental based behavior, the understanding of the pro-environmental based behaviors. The largest category of the students showed that pro-environmental based behavior involves a series of those benefits the natural environment and enhances environmental quality. To affirm this view, HESPFI said:
I understand pro-environmental based behavior as that behavior that benefits the environment and improves its quality such as removing the litter and waste the environment.

Furthermore, HESPM14 added:

*Encourage energy saving and consciousness to resources in order to minimize the energy consumed in a green building in usage. This should also help the consumers’ willingness to consider green buildings and get a stake in the market share.*

These participants show that pro-environmental behaviors if adhered to can be utilized to save energy and resources and hence is of benefit to the people. This behavior should see many people buying green buildings materials in the market. The participants also indicated that switching off the lights when not in use is also another form of green building behavior in saving energy. The other green building behavior which came out of the student's participants is reusing paper and using recycle bins. This was confirmed by SPM15 who remarked:

*Switching off all the lights when someone is out of the room, the use of natural lighting than artificial lighting is another form of pro-environmental behaviors.*

The second group indicated that environmental behaviors sometimes do involve some level of difference between the areas a person pursues and other suggested values in a belief norm set to help understand one’s environmental based behaviors. This was confirmed by HESPM13 who emphasized:

*Pro-environmental behavior must be a lifestyle and developed into becoming a culture through socialization and observing others within the same environment doing. Simply put, pro-environmental behavior should be practically lived than theorized.*

The third category of the stakeholders’ participants shared the view that pro-environmental behaviors are the individual’s worldviews regarding the link between human beings and their surroundings in natural form, which also inspires a system of beliefs and attitudes that are determinant to behavior toward the natural environment. When probed to clarify on that view, HESPF9 explained:

*I’m of the understanding that pro-environmental behavior is contagious with a community. People just learn it from others and hence it becomes a worldview or a culture of any given society”*.
Some participants who shared this view further highlighted some typical examples of these worldviews such as cultural based, religious based and the beliefs of people in what they take and give to their environment.

5.1.5 The professionals’ views on pro-environmental behaviors

The professional participants indicated that human behaviors can be hazardous and a solution for today’s ecological challenges. The findings confirmed that this is the reason why pro-environment based behaviors are being stimulated in the design of energy and climate policies. In their views, the largest number of the professionals indicated that pro-environmental behaviors involve different sets of lifestyles or approaches that seek to benefit the natural environment and also enhances the livelihood of individuals and the general populace. The second largest group shared the view that environmental behaviors refer to the pro-engagement that individuals or the community do to preserve the environment, enhancing the environment quality and plummeting the cost of living for the people. The third category shared the view that pro-environmental based behaviors are measures which are proactively taken by the people to naturally preserve the environment and reduce the cost of energy and other environmental health hazards. Table 5.6 below shows the summarized views of the three categories of professional participants.

Table 5.6: Categories of the views of the professionals on pro-environmental

<table>
<thead>
<tr>
<th>Participants categories</th>
<th>Codes</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Category</td>
<td>PPF2</td>
<td>Pro-environmental behaviors involve different sets of lifestyles or approaches that seek to benefit the natural environment and also enhances the livelihood of individuals and the general populace.</td>
</tr>
<tr>
<td></td>
<td>PPM4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PPM6</td>
<td></td>
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<tr>
<td></td>
<td>PPM7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PPM8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PPM9</td>
<td></td>
</tr>
<tr>
<td>Second Category</td>
<td>PPF1</td>
<td>Pro-environmental behavior refers to the pro-engagement that individuals or the community do to preserve the environment, enhancing the environmental quality and tumbling the cost of living for the people.</td>
</tr>
<tr>
<td></td>
<td>PPF3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PPM5</td>
<td></td>
</tr>
<tr>
<td>Third Category</td>
<td>PPM10</td>
<td>Pro-environmental behaviors are a set of behaviors practiced by people to expand the quality of livelihood of people and curbing environmental degradation and pollution.</td>
</tr>
</tbody>
</table>
As shown in the table above, the largest number of professionals indicated that pro-environmental behaviors involve different sets of human lifestyles that focus on naturally preserving the environment and reducing energy costs and environmental health hazards. This view was emphasized by PPM4 who said:

The pro-environmental behaviors should be visible lifestyles that everyone sees. Normally, they are not acquired in a classroom but learnt even by observation and socialization with others who do it within a certain environment. My observation here in South Africa, it is mainly enforced by the law and policy than a lifestyle.

Further to that assertion, PPM9 added:

As a professional, I have learnt what pro-environmental behaviors at college and sometimes in the workshops. As such, I know it from both practical and theoretical. My understanding of pro-environmental behaviors is different from an unprofessional person in the community. To an unprofessional person, pro-environmental behavior must come as a result of law enforcement and community mobilization. The more it is being enforced and mobilized the more it becomes inherently a lifestyle in the lives of the people.

In the second category of the professionals, pro-environmental behavior view was shared the proactive environmental engagements by the people to curb the environmental health hazards such as water pollution, depletion of the ozone layer and energy saving. When the question was probed, PPF3 remarked:

My understanding with pro-environmental behaviors is that there set of certified proactive behaviors or measures that individuals, group of people or the community does to expand the quality of life and also to reduce the environmental health hazards and degradation. These behaviors are acquired through learning or socialization with other people who do it within the society, it’s not merely through law enforcement and policies.

The foregoing view was corroborated by PPM5 who emphasized:

I believe that while pro-environmental behaviors can be inculcated into people’s lives through learning, I am of the view that socialization and societal orientation is more effective. This may start at the household level, at school or in the community.
The third group of the professionals which was represented by a single person vehemently emphasized to the point which is more or less similar with both the first category and the second but its difference is in environmental degradation. In his view, PPM10 remarked:

_In my understanding pro-environmental behaviors are multifaceted but mainly focusing on curbing environmental degradation and enhancing the quality of livelihood of both the people and the environment_”

The views of all the professionals interviewed in this study did not show a big difference but differ mainly in semantics such as, environmental degradation, quality of life and curbing health hazards. However, in actual sense, they shared the same view that pro-environmental behavior serves many purposes for the betterment of the environment and its people.

5.1.6 The stakeholders’ views on pro-environmental behaviors

Stakeholder's participants indicated that human behaviors can be harmful and a panacea for today’s environmental challenges. The shareholder's findings confirmed that pro-environmental behaviors are proactive measures which are reinvigorated in the design of energy and climate policies. In their views, the largest number of stakeholders indicated that pro-environmental based behaviors involve different sets of approaches that seek to benefit the natural environment and to enhance the livelihood of individuals and the general populace. The second largest group shared the view that pro-environmental behaviors refer to the pro-engagement that individuals or the community do to preserve the environment, enhancing the quality of the environment and reducing the cost of living for the people. The third category shared the view that pro-environmental behavior is a learned lifestyle that the people embrace to preserve their environment, their health and enhance the quality of their lives. **Table 5.7** below shows the summarized views of the three categories of stakeholder's participants.

**Table 5.7: Categories of the views of the stakeholders on pro-environmental**

<table>
<thead>
<tr>
<th>Participants categories</th>
<th>Codes</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Category</td>
<td>SPF1</td>
<td>Pro-environmental behaviors involve different sets of approaches that seek to benefit the natural environment and to enhance the livelihood of individuals and the general populace</td>
</tr>
<tr>
<td></td>
<td>SPM5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPM6</td>
<td></td>
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<tr>
<td></td>
<td>SPM7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPM9</td>
<td></td>
</tr>
<tr>
<td>Second Category</td>
<td>SPF2</td>
<td>Pro-environmental behaviors refer to the pro-engagement that individuals or the community do</td>
</tr>
<tr>
<td></td>
<td>SPF3</td>
<td></td>
</tr>
<tr>
<td>Third Category</td>
<td>SPM8 SPM10</td>
<td>Pro-environmental behavior is a learned lifestyle that the people embrace to preserve their environment, their health and enhance the quality of their lives.</td>
</tr>
<tr>
<td>---------------</td>
<td>------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>

The table above shows the different views of the stakeholders on pro-environmental based behaviors. In the first category of the stakeholders summarily shared that the view that pro-environmental behaviors involve different sets of approaches that seek to benefit the natural environment and to enhance the livelihood of individuals and the general populace. When the interview questions were further probed for clarity, SPF1 exclaimed:

*To the best of my knowledge as a stakeholder from an academic point of view, I understand that pro-environmental behaviors are sets of behaviors that are proactively meant to improve the environmental quality and the livelihood of the people.*

Whilst the above sentimental view was corroborated by almost all the first category stakeholders group, but outstandingly SPM6 said:

*Pro-environmental behaviors mainly seek to keep the environment naturally healthy, intact and user-friendly to its people.*

The second category of the stakeholders shared the view that pro-environmental behaviors focus mainly on pro-environmental behavioral engagements that are undertaken by the people for the sake of enhancing the quality of the environment and its people. This view was outstandingly emphasized by SPM4 who said:

*Myself as an occupant of a green building, pro-environmental involves a lot of behaviors which entail the indoor and outside of the building behaviors but all meant to enhance the quality of the environment and the human lives.*

When this question was further probed, SPF2 remarked:

*In my understanding, the pro-environmental behaviors can be classified into two i.e. the indoor and outdoor behaviors. The indoor behaviors include switching off the lights, switching off the electrical gadgets and the use of natural light rather than*
artificial lighting. This is done mainly to save energy and reducing the costs of energy. Outdoor pro-environmental behaviors include recycling and avoiding littering.

The third category of the stakeholders emphasized that pro-environmental behavior is a learned lifestyle that the people embrace to preserve their environment, their health and enhance the quality of their lives.

5.2 FACTORS THAT INFLUENCE THE GREEN BUILDING LITERACY ON PRO-ENVIRONMENTAL BEHAVIORS

This research question or objective sought to establish the perceptions and views of the university students, professionals and stakeholders on the factors that enhance the green building literacy on pro-environmental based behaviors. In view of the factors that influence green building literacy on pro-environmental based behaviors, both the students, professionals and the stakeholders were interviewed and responded to this research question. This question was broken down into sub-questions in order for the researcher to glean in-depth information in the level of understanding of green building literacy from the participants. In view of the foregoing, different views were gathered from the professionals, students and stakeholders on the factors that influence green building literacy on pro-environmental based behavior. Whilst there were copious views from the informants as shall be presented below, education, community engagements and mobilizations for the benefits of green building literacy and pro-environmental based behaviors on the individual, the environment and the general populace predominantly come out. The other important factor that came out from the findings is policymakers’ and the government’s engagements through policy formulations and legislative approaches that encourage green building literacy and pro-environmental based behaviors.

5.2.1 Views of the students on the factors of green building on pro-environmental

The student's participants indicated that since the peoples’ behaviors are the source and the solution, for today’s environmental challenges, there is a need for engaging the general populace in green building education. In their categories, the largest number of the students in the factors that enhances green building literacy on pro-environmental behaviors indicated that there is need of putting more emphasis in educating the people on the benefits of green building literacy. It was emphasized that all forms of disseminating information about green building such as vocational training centers and community engagements must be promoted. The second largest group shared the view that the government must be active through the formulation and implementation of green building literacy on pro-environmental policies and laws to govern
and incentivize those people who are adhering to the pro-environmental literacy and pro-environmental engagements. The third category shared which is composed of the few shared the view that community engagements and mobilization on the benefits of green building literacy and pro-environmental behaviors must be promoted and incentivized by the government. Table 5.8 below shows the summarized views of the three categories of the student's participants.

**Table 5.8: Categories of the views of the factors of green building on pro-environmental**

<table>
<thead>
<tr>
<th>Participants categories</th>
<th>Codes</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Category</td>
<td>HESPF1</td>
<td>The largest number of students in the factors that enhances green building literacy on pro-environmental behaviors indicated that there is a need for putting more emphasis on educating the people on the benefits of green building literacy.</td>
</tr>
<tr>
<td></td>
<td>HESPM12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPF7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPF8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM15</td>
<td></td>
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<tr>
<td></td>
<td>HESPF10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM20</td>
<td></td>
</tr>
<tr>
<td>Second Category</td>
<td>HESPF2</td>
<td>The government must be active through the formulation and implementation of green building literacy on pro-environmental policies and laws to govern and incentivize those people who are adhering to the pro-environmental literacy and pro-environmental engagements</td>
</tr>
<tr>
<td></td>
<td>HESPM11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPF4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPF6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM19</td>
<td></td>
</tr>
<tr>
<td>Third Category</td>
<td>HESPF3</td>
<td>Community engagements and mobilization on the benefits of green building literacy and pro-environmental behaviors must be promoted and incentivized by the government.</td>
</tr>
<tr>
<td></td>
<td>HESPF9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPF5</td>
<td></td>
</tr>
</tbody>
</table>

As indicated in the table above, the first category of the students alluded to the educational factor for having more influence in enhancing the green building literacy and pro-environmental behaviors. In this view, HESPF1 exclaimed:

_In my understanding, there is no substitute for education as a predominant factor in enhancing the green building literacy than any other factors. The reason why people are not pro-“
environmentally behaving it’s because they lack the knowledge of their benefits and what they should actually do.

During the interviews, so many mixed perceptions came out from the students with regard to the types of education that can influence green building literacy and pro-environmental behavior than just approaching it on a general point of view. Following, these diverse views on education, HESPM8 aptly remarked:

My view of education as a factor for enhancing green building literacy and pro-environmental behavior, vocational and informal education works much better than academic education because informal education is results-based and practical than theory.

The second category emphasized the enforcement of laws and policies by the government as one of the factors that can be used to enhance green building literacy. This group pointed out that despite the effectiveness of education as a factor to enhance the green building if the government is reluctant to implement and enforce its laws and policies to do with green building literacy and pro-environmental behaviors education becomes futile.

The foregoing sentiment was emphasized by HESPM11 who said:

In my view, green building literacy and pro-environmental behavior can be enhanced by the government enforcing and implementing its policies. Without the government involvement education alone may not achieve the best that can come out of it.

This view was corroborated by HESF6 who further emphasized:

It is the government’s responsibility to make sure that the right information about critical issues such as green building literacy and pro-environmental behaviors has reached the people through law enforcement and policies.

The category with very few and the least participants indicated that there is a great need for community engagement and mobilization as a factor for enhancing green building literacy and pro-environmental behaviors. This view was outstandingly emphasized by HESPF9 when she said:

Normally the influence of anything is measured by the magnitude at which it has managed to influence the grassroots people. As such, this can only be done by community engagements and mobilization and not through formal education only.
This was supported by HESPF5 who remarked:

*Formal education is not as effective as community engagement and mobilization or informal education that is carried out at grassroots levels.*

Whilst there are variations and differences in views and perception from the university students on the factors that influence green building literacy and pro-environmental behaviors, education has proven to be generally popular. However, educational effectiveness is determined with the approach of education embraced.

### 5.2.2 Views of the professionals on the factors of green building on pro-environmental

The professional participants indicated that today's environmental challenges are caused by the deficiency of green building literacy and pro-environmental behaviors of the people. The largest group of professional participants shared the view that information about the benefits of green building literacy must be disseminated through all forms of education such as vocational training, formal education and community engagements must be promoted. The second largest group shared the view that the government must be active through the formulation and implementation of green building literacy on pro-environmental policies and laws to govern and incentivize those people who are adhering to the pro-environmental literacy and pro-environmental engagements. The third category shared the view that short green building literacy causes must be implemented for free to all the people and people must be incentivized by putting the green building literacy into practice. *Table 5.9* below shows the summarized views of the three categories of the student's participants.

<table>
<thead>
<tr>
<th>Participants categories</th>
<th>Codes</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Category</td>
<td>PPF2 PPM4 PPM6 PPM7 PPM8 PPM9</td>
<td>Information about the benefits of green building literacy must be disseminated through all forms of education such as vocational training, formal education and community engagements must be promoted.</td>
</tr>
<tr>
<td>Second Category</td>
<td>PPF1 PPF3 PPM5</td>
<td>The government must be active through the formulation and implementation of green building literacy on pro-environmental policies and laws to govern and incentivize those people who are adhering to the pro-</td>
</tr>
</tbody>
</table>
environmental literacy and pro-environmental engagements.

| Third Category | PPM10 | Short courses on green building literacy causes must be implemented for free to all the people and people must be incentivized by putting the green building literacy into practice |

The table illustrates the views of the professionals on the factors that enhance the green building literacy and pro-environmental behaviors within their shared categories. The emphasis by the first category was on all forms of educational approaches which include both the informal and formal education. In this view, PPM4 remarked:

*In my own view, education whether formal or informal is the most outstanding tool that can be used to enhance green building literacy and pro-environmental behaviors.*

In concurrence with the above view, PPM8 further explained that without education and proper educational tools to promote green building literacy and pro-environmental behavior, it will not positively impact the lives of people. Thus, the findings from this professional category emphasized a holistic approach of green building education rather than compartmentalizing it.

The second category the professionals indicated that the government must be active through the formulation and implementation of green building literacy on pro-environmental policies and laws to govern and incentivize those people who are adhering to the pro-environmental literacy and pro-environmental engagements.

The third category also shared the view that short courses on green building literacy causes must be implemented for free to all the people and they must be incentivized by putting the green building literacy into practice. In this case, both the first category and third seems to have placed emphasis on the educational factor enhancing green building literacy and pro-environmental behaviors.

5.2.3 Views of the stakeholders on the factors of green building pro-environmental

The stakeholder's participants indicated that today's environmental challenges are mainly influenced by the lack of green building literacy which affects the pro-environmental behaviors of the people. The largest group of professional participants shared the view that education on the green building must be put on all the disciplines at universities and must be cascaded to primary and secondary schools. The second largest group shared the view that the government
must formulation and implementation of green building literacy on pro-environmental policies and laws. The third category shared the view that short green building literacy courses must be implemented for free to all the people and they must be incentivized by putting the green building literacy into practice. Table 5.10 below shows the summarized views of the three categories of the student's participants.

### Table 5.10: The views of the stakeholder's factors of green building on pro-environmental behaviors

<table>
<thead>
<tr>
<th>Participants categories</th>
<th>Codes</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Category</td>
<td>SPF1</td>
<td>Education on the green building must be put on all the disciplines at universities and must be cascaded to primary and secondary schools.</td>
</tr>
<tr>
<td></td>
<td>SPM5</td>
<td></td>
</tr>
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<td></td>
<td>SPM6</td>
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<td></td>
<td>SPM7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPM9</td>
<td></td>
</tr>
<tr>
<td>Second Category</td>
<td>SPF2</td>
<td>The government must formulation and implementation of green building literacy on pro-environmental policies and laws.</td>
</tr>
<tr>
<td></td>
<td>SPF3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPM4</td>
<td></td>
</tr>
<tr>
<td>Third Category</td>
<td>SPM8</td>
<td>The vocational courses on courses green building literacy must be implemented for free to all the people and people must be incentivized by putting the green building literacy into practice. This will help in enhancing the green building literacy and inculcating the interest of the people in undertaking the vocational short courses on green building literacy</td>
</tr>
<tr>
<td></td>
<td>SPM10</td>
<td></td>
</tr>
</tbody>
</table>

The findings from the stakeholders on the factors to the challenges faced in the influence of green building literacy and pro-environmental behaviors were grouped into three as shown in the table above. The first category which comprised of the large number shared the view that education in its various forms is the best solution to curb the challenges of the face in the process attaining green building literacy as well inculcating the pro-environmental behaviors into people. The foregoing view was emphasized by SPF1 who said:

> There is no substitute for education as a solution to curb the challenges of green building literacy in influencing pro-environmental behaviors. In my view, education will ever remain a central pillar to all the other solutions.

This remark was corroborated by SPM7 who explained that;
Education changes people’s behavior, the way of thinking and makes the person be more responsible. This is the reason why I support education in its different forms and approaches as the best solution to reduce the challenges faced by people in their endeavor to acquire or implement green building literacy and pro-environmental behaviors.

When further asked the second category shared the view that the government must formulation and implementation of green building literacy on pro-environmental policies and laws. In regard to the aforementioned, SPF2 remarked:

In my view our government today are very reluctant to formulate and implement appropriate policies that help people to understand green building literacy, policies and that incentivizes the people who might have done well in practicing green building and pro-environmental behaviors.

This notion was further emphasized by SPM4 who indicated that,

It’s only the policy and the law that most of them understand and obey. Without stipulated policies and laws, people will just assume that there are no consequences of doing what they would have learned.

The third and last group of the stakeholder’s participants indicated that the absence of incentives in those who uphold the green building principles and pro-environmental behaviors can be a hindrance to its attainment. In this view, the incentives remove most of the challenges because will obey the policies, laws and education because of the incentives attached to it. One of the stakeholders lamented: you know, the main solution in curbing the challenges associated with green building literacy and pro-environmental behavior is lack of group and individual incentives for those who might have undertaken demonstrated their knowledge in practice of the pro-environmental behaviors and principles.

5.3 SOLUTIONS TO THE CHALLENGES FACED IN ENHANCING GREEN BUILDING LITERACY

This research question or objective sought to establish the perceptions and views of the university students, professionals and stakeholders on the solutions that can be employed to curb the challenges faced in enhancing green building literacy on pro-environmental based behaviors. In view of the factors that influence green building literacy on pro-environmental based behaviors, both the students, professionals and the stakeholders were interviewed and responded to this research question. This question was broken down into sub-questions in order
for the researcher to glean in-depth information in the level of understanding of green building literacy from the participants. In view of the foregoing, different views were gathered from the professionals, students and stakeholders on the challenges that influence green building literacy on pro-environmental behavior. Whilst there were copious views from the informants as shall be presented below, education, community engagements and mobilizations for the benefits of green building literacy and pro-environmental based behaviors on the individual, the environment and the general populace predominantly come out. The other important aspect that factor that came out from the findings is policymakers’ and the government’s engagements through policy formulations and legislative approaches that encourage green building literacy and pro-environmental based behaviors.

5.3.1 Views of the students on solutions to enhance green building literacy

The university students responded to the in-depth interviews on the solutions that can be used to enhance green building literacy. Their responses were grouped into three categories determined with the similarities of their views. As such three categories were tabulated to summarize the views of the university students. Whilst they are copious of views that came out of the university students, green building education came out as a major recurring theme out the students’ views. Table 5.11 below shows the views of the university students on the solutions that can be used to enhance the green building literacy in South Africa.

Table 5.11: Views of the students on solutions to enhance green building literacy

<table>
<thead>
<tr>
<th>Participants categories</th>
<th>Codes</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Category</td>
<td>HESPF1</td>
<td>All forms of education (both formal and informal) on green building literacy must be emphasized in schools and at all the community levels and all age groups within the country. Environmental education and green building literacy must be implemented in a multisectoral approach.</td>
</tr>
<tr>
<td></td>
<td>HESPM12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPF7</td>
<td></td>
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<tr>
<td></td>
<td>HESPF8</td>
<td></td>
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<tr>
<td></td>
<td>HESPM15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPF10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HESPM17</td>
<td></td>
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<tr>
<td></td>
<td>HESPM18</td>
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<tr>
<td></td>
<td>HESPM20</td>
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</tr>
<tr>
<td>Second Category</td>
<td>HESPF2</td>
<td>The government policies and laws must be bent towards green building literacy and pro-environmental behaviors. The government must also invest more in policy implementation and</td>
</tr>
<tr>
<td></td>
<td>HESPM11</td>
<td></td>
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<tr>
<td></td>
<td>HESPF4</td>
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<tr>
<td></td>
<td>HESPM13</td>
<td></td>
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<tr>
<td></td>
<td>HESPF6</td>
<td></td>
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<tr>
<td></td>
<td>HESPM 16</td>
<td></td>
</tr>
</tbody>
</table>
HESPM19 practically engaging the communities and people in its monitoring and evaluation.

<table>
<thead>
<tr>
<th>Third Category</th>
<th>HESPF3</th>
<th>Community mobilization and incentivization of those people who are practically engaging in green building pro-environmental activities.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HESPF9</td>
<td></td>
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<tr>
<td></td>
<td>HESPF5</td>
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</tr>
</tbody>
</table>

As a solution to the impending challenges faced in enhancing green building literacy, the first category of the students shared the view that all forms of education (both formal and informal) on green building literacy must be emphasized in schools and at all community levels and all age groups within the country. Environmental education and green building literacy must be implemented in a multi-sectoral approach. This point was emphasized by HESPF1 who explained:

*Myself before I come to the university, I did not know what green building was. I could even see it in the streets but the true understanding of what it really benefits us was just but a mirage. But through education, I began to see it is important and as well as becoming responsible as an individual in undertaking some approaches in line with the green building. In these premises, I uphold education with high esteem as a panacea to the challenges faced in enhancing green building literacy.*

Similarly, HESPM7 remarked:

*People need to be educated about green building and pro-environmental behaviors. Ignorance is a barrier to green building literacy. Whilst I personally uphold education as a solution to the challenges faced in enhancing green building literacy, I would like to further indicate that this education must be practically oriented rather than theory.*

The second category shared the view that monitoring and evaluation of the effectiveness of the government policies, laws and projects in enhancing green building literacy and pro-environmental behaviors helps a lot as a solution to curb the challenges faced in enhancing green building literacy. When the question was further probed, HESPM11 relayed:

*The main challenge with our government and other organization who spearhead the enhancement of green building literacy, they lack follow up systems, monitoring, and evaluation approach to make sure that what they have started is effective or not. In these premises, I consider monitoring and evaluation as a solution to the challenges faced in enhancing the green building literacy and its pro-environmental behaviors.*
The third category of the university students’ findings on the solution to the challenges faced in enhancing the green building literacy was community mobilization and incentivization of those people who are practically engaging in green building pro-environmental activities. This point was alluded to by HESPF3 who emphasized that:

Community motivation and incentivization of groups and individuals engaging in green building activities and pro-environmental behaviors are one of the solutions to reduce the challenges of enhancing green building literacy.

This view was corroborated by HESPF5 who indicated that,

Ever since I was born I have never seen any organization mobilizing people about the essence of the green building except the public health organizations hence, the uptake of green building its pro-environmental behaviors is very minimum if not very low.

Thus, the findings of the foregoing indicated that the main views raised by the university students a solution to the challenges faced in enhancing green building literacy include, education in its holistic form, monitoring and evaluation of the green building projects and community mobilization and incentivization of the groups and individuals who might have participated in green building literacy enhancement.

5.3.2 Views of professionals on solutions to enhance green building literacy

The green building professionals responded to in-depth interviews on the solutions that can be used to enhance green building literacy. Their responses were grouped into three categories determined with the similarities of their views. As such, three categories were tabulated to summarize their different views to the alternative solutions that can be implemented to enhance the green building literacy in South Africa. Whilst a copious of views were presented by the professionals, green building education came out as a major recurring theme out the professionals’ views. Table 5.12 below shows the views of the professionals on the solutions that can be used to enhance the green building literacy in South Africa.

<table>
<thead>
<tr>
<th>Participants categories</th>
<th>Codes</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Category</td>
<td>PPF2</td>
<td>Green building education must take precedence in spearheading green building literacy and as a solution to curb all the factors that impede the enhancement of green</td>
</tr>
<tr>
<td></td>
<td>PPM4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PPM6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PPM7</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Participants</td>
<td>Solutions</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Second Category</td>
<td>PPF1, PPF3, PPM5</td>
<td>The government must invest more resources in green building literacy and pro-environmental behaviors.</td>
</tr>
<tr>
<td>Third Category</td>
<td>PPM10</td>
<td>Green building policy implementation that is followed with monitoring and evaluation of green building programs at all levels plays a significant role as a solution to the challenges of green building literacy and pro-environmental behaviors.</td>
</tr>
</tbody>
</table>

The table above indicated the stakeholders’ views on the solutions for the challenges faced in enhancing the green building literacy were grouped into three categories. The first category of the stakeholders shared the view that green building education as the most outstanding solution to the challenges faced in enhancing the green building literacy and its pro-environmental behaviors. In this view, PPF2 remarked:

*In my view, if green building education is well placed and disseminated to the people it enhances the green building literacy. Most of the people don’t have green building literacy because they did not go to school or that education in any other form accessible was not facilitated.*

This view was corroborated by one of the professional PPM6 who said:

*In order for the green building to work and be accessible to people, it must be simplified or put in the local indigenous languages that people may understand it. Once it is presented in an accessible language and accessible means, education is one of the best solutions to enhance the green building literacy and obliterate the challenges that people face in their endeavor to inculcate it into people.*

The second category of the professionals shared the view that the government must put green building policies and laws in place to enforce the green building knowledge and pro-environmental behavior into its citizens. One of the professional participant PPM5 remarked:

*I have discovered that there are green building literacy and pro-environmental policies and laws in our country but it lacks implementation and follows ups to see if its citizens are abiding by its dictates or putting it into practice.*
This view was corroborated by PPF3 who emphasized that:

If only our government and its responsible ministries are able to formulate and implement the green building policies and make rigorous follow-ups especially at grassroots levels, this can be one of the solutions to curb the challenges of enhancing green building literacy in South Africa.

Whilst education became the major recurring view of most of the participants, the third category shared the view that there must be a constant implementation of monitoring and evaluation in both the green building educational approaches and green building literacy projects so as to establish its effectiveness. This view was vehemently emphasized by PPM10 that the main challenge why green building literacy is not growing is because the government and the organization are not engaging in monitoring and evaluation to ascertain the receptivity of the program or whether people are assimilating the green building knowledge.

5.3.3 Views of the stakeholders on solutions to enhance green building literacy

The stakeholders responded to in-depth interviews on the solutions that can be used to enhance green building literacy. Their responses were grouped into three categories determined with the similarities of their views. As such, three categories were tabulated to summarize their different views to the alternative solutions that can be implemented to enhance the green building literacy in South Africa. Whilst a copious of views were presented by the stakeholders, green building monitoring and evaluation came out as a major recurring theme out the stakeholders’ views. Table 5.13 below shows the views of the stakeholders on the solutions that can be used to enhance the green building literacy in South Africa.

Table 5.13: Views of the stakeholders on solutions to enhance green building literacy

<table>
<thead>
<tr>
<th>Participants categories</th>
<th>Codes</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Category</td>
<td>SPF1</td>
<td>Monitoring and Evaluation of the green building education programs are shared as a solution to the challenges associated with enhancing the green building literacy.</td>
</tr>
<tr>
<td></td>
<td>SPF5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPM6</td>
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</tr>
<tr>
<td></td>
<td>SPM7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPM9</td>
<td></td>
</tr>
<tr>
<td>Second Category</td>
<td>SPF2</td>
<td>Community mobilization and engagements in green building knowledge programs is shared as a solution to curb the enhancement of green building literacy and its pro-environmental behaviors</td>
</tr>
<tr>
<td></td>
<td>SPF3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPM4</td>
<td></td>
</tr>
</tbody>
</table>
The implementation of green building and pro-environmental behaviors has been shared as a solution to curb the challenges of enhancing green building literacy and pro-environmental behavior.

Illustrated in the table above are the views of the stakeholders in the possible solutions of the challenges associated with enhancing the green building literacy and its pro-environmental behaviors. The first category of the stakeholders shared the view that monitoring and evaluation of the green building education programs and projects as a solution to enhance the green building literacy. In view of the above, one of the stakeholder's participants SPM9 exclaimed: “I think if monitoring and evaluation of the green building educational programs and projects were constantly done it could help to curb the challenges of enhancing green building literacy in South Africa”. This view was supported by SPM7 who aptly said: the problem with most of the organization and the government itself the don’t make follow-ups when the implement their programs and hence they will not be able to see the gaps that may need attention in enhancing green building literacy”.

The second category shared the view that community mobilization and engagements in green building knowledge programs as a solution to curb the enhancement of green building literacy and its pro-environmental behaviors. In this view, SPF2 emphasized: “in my view, green building literacy is mainly lacking at the grassroots and to curb that discrepancy, community mobilization and engagements in green building projects is the best to enhance green building literacy in South Africa”. This was corroborated by SPM4 who remarked: I think the best solution to enhance green building literacy is for the government to invest resources in community mobilization, education, and engagements on green building literacy. This should involve training and practical engagements at different levels of the communities in South Africa.

The third category of the stakeholders which comprised of just a few participants shared the view that the implementation of green building and pro-environmental behaviors is a solution to curb the challenges of enhancing green building literacy and pro-environmental behavior. In this view, it was indicated by SPM8 who explained that if the green building programs were practically implemented were going to enhance the green building literacy and pro-environmental behaviors, but the main challenge is there are more of classroom projects than fieldwork.
5.4 PROENVIRONMENTAL BEHAVIORS IN MITIGATING SOUTH AFRICA’S TRIPLE CHALLENGE

This objective sought to establish how the pro-environmental behaviours can be utilized to mitigate the triple challenges in South Africa. These perennial triple challenges in South Africa include; poverty, inequality and unemployment. Centre for Development and Enterprise (2018:5) indicated that the triple challenges are interdependent socio-economic phenomena labeled the “triple challenge” in South Africa. Centre for Development and Enterprise further argued that all the stakeholders agree that they require urgent attention from policymakers and leaders across South Africa. In the premises of the aforementioned, this study objective seeks, therefore, to theoretically and empirically establish the contributions of the green building pro-environmental behaviours in mitigating the triple challenges in South Africa. This research question and objectives were answered on the basis of the views of the students, professionals and the stakeholders’ in-depth interviews. Subsequently, the findings from the aforementioned participants were corroborated and triangulated with the theoretical data from the pertinent literature cited in this study. The views of the participants were presented in three categories of each participants starting from the predominant view to the least within the tables. This section begins with the students followed with the professionals and the stakeholders came last before triangulation with the literature. The critical pro-environmental behaviours which the participants were asked to give their views on how they help in mitigating the triple challenges in South Africa including but not limited to; Alternatives energy use and lighting; Recycling of building materials and papers; The summary of the findings in this section were presented in Table 5.14 in the subsequent section of the study.

5.4.1 Views of the students on mitigating the triple challenges through pro-environmental behaviors

The university students responded to in-depth interviews on how pro-environmental behaviors can be utilized to mitigate the triple challenges in South Africa. Their responses were grouped into three categories determined with the similarities of their views. As such, three categories were tabulated to summarize their different views of the students on how the pro-environmental behaviors can be utilized to mitigate the triple challenges of South Africa. Whilst a copious of views were presented by the students, alternative lighting and energy that can be utilized on home industries and in reducing the cost of electricity came out as a major recurring theme out of the students’ views. Table 5.14 below shows the views of the students on green building literacy and pro-environmental behaviors can be utilized in mitigating the triple challenges of South Africa.
Table 5.14: Views of the students on mitigating the triple challenges through pro-environmental behaviors

<table>
<thead>
<tr>
<th>Participants categories</th>
<th>Codes</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Category</td>
<td>HESPF1, HESPM12, HESPM14, HESPF7, HESPF8, HESPM15, HESPF10, HESPM17, HESPM18, HESPM20</td>
<td>The participants in the category shared the view that environmental friendly manner, encouraging pro-environmental behaviours at work or at home can positively affect socio-economic necessities, which are essential in sustainable communities’ development. These participants indicated the use of alternative lighting, recycling of papers and plastics and reduction of artificial lightings both in the home or at the workplace. This also reduces the costs of energy and saves people money. It was noted with some of this participant that electricity or artificial lighting. When probed about these pro-environmental behaviours deal with employment, they shared the view that some people are making a living through the gathering of papers and plastics for recycling. It was also pointed out that by students that some people are engaging in home industries through the use of solar energy.</td>
</tr>
<tr>
<td>Second Category</td>
<td>HESPF2, HESPM11, HESPF4, HESPM13, HESPF6, HESPM 16, HESPM19</td>
<td>These participants pointed to the fact that pro-environmental behaviors reduce the health hazards of people both at home and in the workplaces through the recycling of plastics and papers. These when just thrown everything causes environmental pollution which culminates in diseases such as cholera and other unhygienic associated diseases. When probed to respond to poverty issues and unemployment, these students indicated that pro-environmental behaviors help the creation of employment through home industries working with solar energy such as barber shops and hair-saloons and other light home industries.</td>
</tr>
<tr>
<td>Third Category</td>
<td>HESPF3, HESPF9, HESPF5</td>
<td>This group of the students pointed out that pro-environmental behaviors in a home place help to reduce the cost of electricity by using alternative energy such as solar energy and also the use of natural lighting than using electricity.</td>
</tr>
</tbody>
</table>

The table above illustrates the findings from the university students on how the green building pro-environmental behaviours help in mitigating the triple challenge i.e. poverty and unemployment in South Africa. The first category of the students shared the view that that
environmental friendly manner, encouraging pro-environmental behaviours at work or at home have a positive influence on the socio-economic issues. These are also an integral part of sustainable community development. When probed to link this view with poverty alleviation and unemployment, one of the student participant HESPM12 remarked:

In my own view, the use of alternative lighting reduces the costs of paying for artificial lighting such as electricity and the use of solar energy is less costly than the use of electricity. By so doing, these pro-environmental behaviours help in mitigating poverty by helping to reduce the costs of energy and electricity.

Furthermore, this view was corroborated by HESP14 who explained:

In my own experiences, I have seen people who are self-employed operating their home industries using solar energy outside their homes and on the roadside. In so doing the pro-environmental behaviour of alternative energy is helping to mitigate poverty and the problem of unemployment.

The second category of the students shared the view that pro-environmental behaviors reduce the health hazards of people both at home and in the workplaces through the recycling of plastics and papers. These when just thrown everything causes environmental pollution which culminates in diseases such as cholera and other unhygienic associated diseases. When probed one of the student participant in this category HESP2 remarked:

Poverty and diseases move hand-in-glove and hence through the pro-environmental behaviors in helping to cure diseases such as cholera and typhoid that are caused by unhygienic environments.

This view was further elaborated by HESPM16 who emphasized:

I have witnessed that most of the countries or places where people suffer from diseases that are caused by unhygienic environments are as a result of the lack of pro-environmental behaviours. In a community where such pro-environmental behaviours are, there is the creation of employment to those people who will be working as cleaners of that particular environment. Some will be self-employed in picking the plastics and papers for recycling while making money for living, they will be cleaning the environment at the same time.

The third category of the student’s participants shared the view that pro-environmental behaviors in a home place help to reduce the cost of electricity by using alternative energy such
solar energy and also the use of natural lighting than using electricity. This view of reducing costs through the use of solar energy was shared by both HESPF3, HESPF9 and HESPF5 that most of the people are falling into poverty trap because huge expenses they accrue from the artificial energy and lighting.

5.4.2 Views of the professionals on mitigating the triple challenges through pro-environmental behaviors

The green building professionals responded to in-depth interviews on how pro-environmental behaviors can be utilized to mitigate the triple challenges in South Africa. Their responses were grouped into three categories determined with the similarities of their views. As such, three categories were tabulated to summarize their different views of the professionals on how the pro-environmental behaviors can be utilized to mitigate the triple challenges of South Africa. Whilst a copious of views were presented by the professionals, recycling of building materials, papers and plastics as a potential activity to mitigate poverty and unemployment came out as a major recurring theme out the professionals’ views. Table 5.15 below shows the views of the professionals on green building literacy and pro-environmental behaviors can be utilized in mitigating the triple challenges of South Africa.

Table 5.15: Views of the professionals on mitigating the triple challenges through pro-environmental behaviors

<table>
<thead>
<tr>
<th>Participants categories</th>
<th>Codes</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Category</td>
<td>PPF2</td>
<td>This first group of the professionals shared the view that pro-environmental behaviors such as recycling of papers, building materials and plastics reduce the costs of buying new materials and hence helps people and companies to save money. When probed about how this helps in mitigating poverty and unemployment, the shared the view that people are engaging in creating home industries for employment and poverty alleviation approach through pro-environmental behavior.</td>
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<tr>
<td></td>
<td>PPM4</td>
<td></td>
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<td></td>
<td>PPM6</td>
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<td>PPM7</td>
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<td></td>
<td>PPM8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PPM9</td>
<td></td>
</tr>
<tr>
<td>Second Category</td>
<td>PPF1</td>
<td>This category shared the view that the use of alternative energy such as solar reduces the costs both at home, schools and at the workplace. This group of participants also pointed to the use of natural lighting than using artificial lighting which is expensive. When probed to respond to the question of how these pro-environmental behaviors help in mitigating poverty, they shared the view</td>
</tr>
<tr>
<td></td>
<td>PPF3</td>
<td></td>
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<td></td>
<td>PPM5</td>
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</tbody>
</table>
As shown in the table above, the professional participants share their views on how pro-environmental behaviors can be utilized to mitigate the triple challenge in South Africa with special reference to poverty and unemployment. The first category of professional participants which is composed of the largest number of informants shared the view that pro-environmental behaviors such as recycling of papers, building materials and plastics reduce the costs of buying new materials and hence helps people and companies to save money. When probed about how this helps in mitigating poverty and unemployment, they shared the view that people are engaging in creating home industries for employment and poverty alleviation approach through pro-environmental behavior. In view of the foregoing PPF2 confirmed:

As a professional person, I have witnessed that people are just failing to capitalize on the profits they can out of pro-environmental activities that they are doing on a daily basis. For instance, recycling of plastics and papers can earn one a good living out of it. Some home-based industries to collect the plastics and papers for recycling have been established in various parts of the country.

Further to that, PPM4 added:

In the building industry as an architect, I have noticed that the recycling of building materials is cutting a lot of costs for the owners of the buildings. In demolishing the building and recycling of the materials gives some people employment.

The second category of the professionals consensually shared the view that This category shared the view that the use of alternative energy such as solar reduces the costs both at home, schools and at the workplace. This group of participants also pointed to the use of natural
lighting than using artificial lighting which is expensive. When probed to respond to the question of how these pro-environmental behaviors help in mitigating poverty, they shared the view that some people are engaging into some home industries and projects using alternative energy and are saving money by using natural lighting than artificial that is expensive. This view was outstandingly emphasized by PPF1 who remarked:

*I have witnessed this in our home area where some people because of the rate of unemployment and poverty resort to start their home industries where they use alternative energy such as solar that is less costly than electricity. These types of businesses give them money to survive.*

Similarly, the same view was further supported by PPM5 elaborated:

*Personally, as a professional, I can testify that green building pro-environmental behaviors help to mitigate poverty especially to those who really know how to capitalize on the gaps. If one knows how cheap and efficient is using solar energy, one would opt for it and cut the exorbitant costs of electricity. This is both at the workplace and the home. Solar energy reduces the costs of electricity and saves money. In addition to that, solar can be used anywhere where there is un and hence people can establish their businesses anywhere and make money for a living”.*

The third and the least group of the professionals that is constituted with one participant who brought his own view pointed out that pro-environmental behaviors help to reduce the blockage of the ozone through pollution in the industries which have some long term effect to climatic changes. When probed to link this with poverty and unemployment the participant pointed out that when the ozone layer is blocked it results in people experiencing severe droughts due to erratic rains.

*In his own words, he was quoted saying: from geography we were taught that excessive pollution through the emissions of gasses in industries affects the ozone layer and subsequently interferes with the normal rainy seasons. This bears negative implications in those countries that rely mainly on agrarian economies such as South Africa. So in maintaining the environment clean makes mitigates the long term effects of poverty and unemployment*

In the view of both the professionals’ views, regardless of the category they have been consciously grouped on the basis of the similarities of their views, they seem to be in the same
understanding that pro-environmental behaviors have a lot potential to give people better livelihood if they take their projects at a relatively large scale.

5.4.3 Views of the stakeholders on mitigating the triple challenges through pro-environmental behaviors

The green building stakeholders responded to in-depth interviews on how pro-environmental behaviors can be utilized to mitigate the triple challenges in South Africa. Their responses were grouped into three categories determined with the similarities of their views. As such, three categories were tabulated to summarize their different views of the stakeholders on how the pro-environmental behaviors can be utilized to mitigate the triple challenges of South Africa. Whilst a copious of views were presented by the stakeholders, alternative lighting and energy as a potential pro-environmental behavior to create home industries and reduce the costs of living both in the industry and at the household level. This came out as a major recurring theme from the stakeholders on how pro-environmental behaviors can be utilized to mitigate poverty and unemployment in South Africa. Table 5.16 below shows the views of the stakeholders on how green building literacy and pro-environmental behaviors can be utilized in mitigating the triple challenges of South Africa

Table 5.16: Views of the stakeholders on mitigating the triple challenges through pro-environmental behaviors

<table>
<thead>
<tr>
<th>Participants categories</th>
<th>Codes</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Category</td>
<td>SPF1</td>
<td>This category shared the view that the use of alternative energy such as solar reduces the costs both at home, schools and at the workplace. This group of participants also pointed to the use of natural lighting than using artificial lighting which is expensive. When probed to respond to the question of how these pro-environmental behaviors help in mitigating poverty, they shared the view that some people are engaging into some home industries and projects using alternative energy and are saving money by using natural lighting than artificial that is expensive.</td>
</tr>
<tr>
<td></td>
<td>SPM5</td>
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<td></td>
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<td></td>
<td>SPM7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPM9</td>
<td></td>
</tr>
<tr>
<td>Second Category</td>
<td>SPF2</td>
<td>These stakeholders who constitute the second category of the professional participants outstanding pointed out that pro-environmental behaviors help to reduce the blockage of the ozone through pollution in the industries which have some long term effect to climatic changes. When probed to link this with poverty and unemployment the participant</td>
</tr>
<tr>
<td></td>
<td>SPF3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPM4</td>
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</tr>
</tbody>
</table>
pointed out that when the ozone layer is blocked it results in people experiencing severe droughts due to erratic rains.

| Third Category | SPM8 SPM10 | This first group of the stakeholders shared the view that pro-environmental behaviors such as recycling of papers, building materials and plastics reduce the costs of buying new materials and hence helps people and companies to save money. When probed about how this helps in mitigating poverty and unemployment, the shared the view that people are engaging in creating home industries for employment and poverty alleviation approach through pro-environmental behavior. |

As illustrated in the table above, the stakeholders’ participants’ view on the contributions of the green building pro-environmental behaviors in mitigating poverty and unemployment in South Africa were grouped into three categories following the similarities of the views from the participants. The first category that is constituted with a large number of the stakeholders’ participants shared the view that the use of alternative energy such as solar reduces the costs both at home, schools and at the workplace. This group of participants also pointed to the use of natural lighting than using artificial lighting which is expensive. When probed to respond to the question of how these pro-environmental behaviors help in mitigating poverty, they shared the view that some people are engaging into some home industries and projects using alternative energy and are saving money by using natural lighting than artificial that is expensive. In light of the above view, SPF1 relayed:

As an occupant of the green building and after having been taught on green building literacy and to embrace the pro-environmental behaviors I started to practice it and have discovered that switching off electricity completely and using solar energy has massively reduced my bills. I have also developed a culture of using natural lighting that is free and in so doing I have managed to save my money because of these pro-environmental behaviors.

This view was corroborated by SPM7 who emphasized that;

In a country that is full of unemployment and poverty rocking the people, I think people should capitalize on green building pro-environmental behaviors like solar energy and natural lighting. Electricity is becoming too expensive for people and hence alternative energy and lighting can the best way to go to curb poverty and unemployment.

The second category of the stakeholders’ participants outstandingly shared the view that pro-environmental behaviors help to reduce the blockage of the ozone through pollution in the industries which has some long term effect to climatic changes. When probed to link this with
poverty and unemployment the participant pointed out that when the ozone layer is blocked it results in people experiencing severe droughts due to erratic rains. In light of this view, one of the stakeholders' participants SPF3 pointed out that;

*Water is a precious commodity for both the flora and the fauna if the ozone layer is affected with pollution due to lack of pro-environmental behaviors that help to prevent these long term negative eventualities, droughts and famine with come as a result and cause untold poverty and unemployment in the lives of people. So to avoid this pro-environmental behavior is the best foot forward in South Africa among other approaches used to fight the triple challenges.*

This view was also reiterated by SPM4 who indicated:

*Most of the highly industrialized countries’ climatic conditions were affected by the interference of the ozone layer by emissions of gasses without control. Hence if this is avoided through the pro-environmental behaviors, it improves the livelihood of people in one way or the other.*

The third category which the few participants shared the view that pro-environmental behaviors such as recycling of papers, building materials and plastics reduce the costs of buying new materials and hence helps people and companies to save money. When probed about how this helps in mitigating poverty and unemployment, the shared the view that people are engaging in creating home industries for employment and poverty alleviation approach through pro-environmental behavior. In light of the above view, SPM8 shared:

*whilst as a stakeholder, I am still yet to see those people who will rise up and take the pro-environmental business and large scale for a living but I have also witnessed people in the streets picking plastics, tins and papers for recycling meaning to say pro-environmental behaviors have a great potential from an entrepreneurial point of view of mitigating poverty and unemployment in South Africa.*

Integrating the views of in the stakeholder's point of view, it alluded to the fact that even if the pro-environmental projects at the grassroots level are a very low scale but with the growth of knowledge and socialization has a potential of mitigating poverty and unemployment to the people.
PRESENTATION OF FINDINGS FROM THE LITERATURE AND DOCUMENTS: PART II

Data from literature and documents were sourced from the six critical writings that this researcher consciously chose for the purposes of phenomenological triangulation of the experiences and perceptions of the participants’ primary data and secondary findings from the literature. This literature data is mainly comprised of the local documentary reports on the triple challenge and the journal articles specifically written within the context of South Africa. In addition to that, some international journal articles were also used in order to have a comparative analysis of the global benefits of green building literacy and pro-environmental behaviors in mitigating the triple challenge in South Africa. The table below shows the literature and documentary views on mitigating the triple challenges in South Africa through the green building literacy influence on pro-environmental behaviors. Information in the table below was extracted from the cited journals/books/reports as data extracts from the documents pending analysis in the subsequent chapters.
### Table 5.17: Documentary views on mitigating the triple challenges through pro-environmental behaviors

<table>
<thead>
<tr>
<th>Literature source</th>
<th>Findings from the literature</th>
</tr>
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</table>
| Centre for Development and Enterprise: Draft Report, 2018: 14 | Poverty  
Economists broadly agree that poverty rose in the 1990s and then declined in the 2000s. From 2001 to 2006 they fell from 51% to 44%. The latest figures released by Stats-SA confirm largely positive trends in terms of the percentage of South Africans living below the latest World Bank poverty lines. Based on purchasing power parity in 2011 dollars, the percentage of South Africa’s population living below the poverty line of $1.90 per day fell from 33.8% in 1996 to 16.6% in 2011. However, the rate at which these poverty levels have fallen has slowed down drastically. From 2006 to 2008 the rate fell cumulatively by more than 2%, but from 2008 to 2011 the rate came down by a minuscule 0.05%. In 1996, 53% of the South African population fell below the $3.10 poverty line, compared to 34.7% in 2011. From 2008 to 2011 the rate went from 35.8% to 34.7%. It is clear that poverty fell fastest when South Africa experienced strong growth (in the years 2000-2008 when the average growth rate was 4.2%) and that since 2008 (when the average growth rate has been 1.6%) the rate at which poverty has fallen has been almost imperceptible. As noted below, we cannot derive a strong causal relationship from the correlation, and it is also the case that during this period of strong growth the coverage of the Child Support grant and other social grants was rapidly extended, which certainly had their own impact on reducing the level of extreme poverty and hunger. In essence, growth reduced poverty through three mechanisms: more employment, higher wages and the expansion of social grants that was financed through increased tax revenues. It is difficult to quantify the effect of each as there appear to be some countervailing forces – as grants expanded, inter-household remittances appear to have fallen. Nevertheless, it is clear that grants are an incredibly important vehicle for poverty reduction even during periods of high growth. (Extracted from the Centre for Development and Enterprise: Draft Report, 2018: 14) |

| Centre for Development and Enterprise: Draft Report, 2018: 20 | Unemployment  
Between 1994 and 2014 the number of people in employment grew by over four million, yet over the same period, the number of working aged adults increased by eight million. Unemployment increased from 36% in 1994 to 44% in 2008. This ration even increased further and so many protests of |
unemployment are being carried out by South African citizens to push the government to address the issues of unemployment. The issues of unemployment have even gone to the extent that the South African nationalities are uttering xenophobic statements and advancement against their fellow African immigrants. The documents also indicate that there is an increased labor force participation rate partly as a result of the feminization of the labor force. All these unemployment challenges pushed the South African government to alter their educational policies and systems in order to address the unemployment issues. This includes engaging the South African into vocational training and practical causes. The Black Economic Empowerment (BEE) policies were formulated and implemented but the unemployment continued unabated until today. Thus, despite some reduction in the participation rate during the financial crisis, the number of employed individuals in South Africa is now higher than it has ever been. Unfortunately, so is the number of people not working. At the same time, only two in five working-aged adults are in jobs and in the past twenty years, this ratio has never been more than half. This means that there are approximately nine million South Africans who can be classified as broadly unemployed – they want to work but do not have a job (Extracted from Centre for Development and Enterprise: Draft Report, 2018: 20)

<table>
<thead>
<tr>
<th>Loverock, D T &amp; Newell, R (2012: 10)</th>
<th>Pro-Environmental behaviours</th>
</tr>
</thead>
</table>
| Inducing people to behave in a given manner leads them to develop positive attitudes related to the behavior. An action becomes habitual for the decision and the action are repeated many times...[making] repeated decision-making...unnecessary [and the habit] relatively independent of attitudes and beliefs”. In this manner, an authority figure encouraging a PEB could influence one’s overall environmental values. Government authorities create policies and regulations for large scale environmental issues applying to industries (i.e., industrial pollutants) and for sensitive issues such as endangered species; however, enforcing day-to-day PEBs such as composting and recycling by law is difficult because it would require monitoring private space. For these types of PEBs, a different source of authority is required, emphasizing the role of the employer and WSPs as a critical determinant. The average person commits a significant portion of their waking hours to their occupation (based on 40-hour work week); thus, workplaces serve as key places for setting sustainable development learning and communicating innovative practices. The authoritative influence employers have on employees and observed in his series of obedience studies that people follow directives from an authority figure (findings later supported by a replication study performed. The combination of the authority position that employers occupy, and people’s tendency to follow authority, positions the workplace as a potentially powerful space for teaching/adopting PEBs. Furthermore, it was observed that workplace and habitat behaviors have the potential to transfer from workplace to home life, and, although her case
study does not capture transference of PEBs specifically, her observations imply WSPs have the potential to result in transference of environmentally related behaviors from work to home. These implications indicate the workplace can serve as an effective forum for social change in the environmental movement creating opportunities for environmental educators and communicators to form effectual partnerships with a powerful, influential, and innovative sector of the community. In addition, opportunities exist for companies to work in partnership with municipalities as PEBs can be promoted in the workplace and supported at home through municipal services. In addition to influencing lifestyles in an environmentally friendly manner, encouraging PEBs at work can positively influence social and economic imperatives, which are also integral to sustainable community development. When employees feel that a company is living its professed values this significantly influences "employee engagement, and employee engagement significantly influences organizational and financial performance (Extracted from Loverock, D T & Newell, R 2012: 10)

<table>
<thead>
<tr>
<th>Xie, X, Lu, Y &amp; Gou, Z (2016: 9)</th>
<th>Pro-Environmental Behaviours</th>
</tr>
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<tbody>
<tr>
<td>Participants had excellent habits in terms of switching off lights and their computer when not in use. These are the two saving behaviors that are most commonly found in office building energy use studies. They also demonstrated the good habits of using stairs instead of elevators and using the public instead of private transportation. These two behaviors, which are not only related to energy saving but also to health and physical well-being, are increasingly encouraged in workplace settings. Reusing paper and using recycle bins were the third type of resource saving behaviors frequently practiced by participants. Office reusing and recycling have been investigated in other studies which found that prior experience was shown to be an excellent predictor of office-based conservation behavior; in other words, prior experience with household recycling was effective at predicting office recycling behavior. The least practiced resource saving habits were using half flush and taking short showers. Although little research has been conducted on these two behaviors, water savings contribute to a significant portion of the credits and performance of green buildings (Extracted from Xie, X, Lu, Y and Gou, Z, 2016: 9).</td>
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<table>
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<tr>
<th>Wong, Afand, Ramachandran &amp; Chan, 2018: 131)</th>
<th>Environmental Education</th>
</tr>
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<tbody>
<tr>
<td>In 2001, a survey related to the implications of the EE across the Curriculum Program was carried out in 31 selected schools in Malaysia. The findings indicated that students had a high level of awareness and attitude towards the environment. Furthermore, a gap exists between what is taught and what is practiced in schools and other educational institutions. who reported that although EE has been infused</td>
<td></td>
</tr>
</tbody>
</table>
in textbooks in both primary and secondary schools, the holistic approach to EE is relatively superficial (Extracted from Wong, Afand, Ramachandran & Chan, 2018:131).

| Wong, Afand, Ramachandran & Chan, 2018:130 | **Pro-Environmental Behaviour Concept**: Pro-Environmental Behaviour (PEB) is one's conscious actions that seek to lessen the impact brought upon the natural environment. These include minimizing the use of natural resources and harmful toxic substances, reducing the production of wastes and lessening the use of energy. Although EE has succeeded in creating greater awareness towards the various types of pollution being faced daily throughout the world, most people experience ‘action paralysis’ in that they hold the belief that they are incapable of making a difference other than small efforts such as recycling their wastes products. In order to produce students who are truly pro-environmental, whose behaviour are able to benefit the environment the most, students need to be confident in their ability to accomplish their goals. They also need to feel competent to act, either individually or collectively (Extracted from Wong, Afand, Ramachandran & Chan, 2018: 130). |
| Terreblance (2007:109) | **Poverty & Unemployment in South Africa**: According to the Human Development report of the United Nations, the percentage of the population that is living below the poverty line decreased from 51.1 percent in 1995 to 48.5 percent in 2002. However, given that the population grew during the same period the total number of poor increased from 20.2 million in 1995 to 21.9 million in 2002. According to the same report, poverty became severe. The Gini coefficient for South Africa increased from 0.665 in 1994 to 0.668 in 2006, suggesting that income inequality and unemployment are becoming worse (Terreblance (2007:109)). |
The table above shows the documentary data extracted from different sources about green building literacy and pro-environmental based behaviours and how they can be utilized to mitigate poverty and unemployment in South Africa. Whilst the is a plethora of the literature which may be relevant on the foregoing subject, but from the researcher’s conscious choice the tabulated literature can be sufficient to argue to the fact that green building and pro-environmental behaviour can relevantly be utilized to reduce poverty and unemployment in South Africa as has happened in Malaysia, United State of America and China. For instance, the literature from the Centre for Development and Enterprise: Draft Report (2018: 19& 20) supported by Terrebanche (2007) shows the severity of poverty and unemployment in South Africa. These findings on the severity of unemployment and poverty in South Africa vindicates the relevance of this research to empirically and theoretically establish how the green building literacy on pro-environmental can be utilized to mitigate the triple challenges in South Africa. Whilst the findings from literature above has shown very little that the green building on pro-environmental behavior is doing to curb the triple challenges in South Africa, but it has shown that there is a lot of potential given that in countries such as China, Malaysia and United States of America has been proven that green building literacy and pro-environmental behavior was very instrumental in mitigating poverty, unemployment and inequality according to the literature tabulated in the table above. The tabulated literature was used to argue in the relevance and contribution of knowledge raised in this study in the subsequent chapters of the study.

5.5 CONCLUSION
This chapter has presented the findings from in-depth interviews and literature. The findings from in-depth interviews have predominantly shown that the understanding of green building literacy is mainly concentrated in the low-density suburbs and in the industries more than in the high-density suburbs. The main reason raised among other copious reasons was that in the high-density suburbs there are no green buildings that people may practically learn and get conversant with the green buildings literacy. Those who are pro-environmentally engaging within their suburbs are doing that not from a green building literacy point of view but from the public health environmental awareness. However, the findings discovered that there is a lot of potentials if green building literacy and pro-environmental behaviours can be taught and through socializing people in it.
CHAPTER 6

INTERPRETATION AND ANALYSIS OF DATA

6.0 INTRODUCTION
Notwithstanding the green building literacy levels and its pro-environmental based behaviors in South Africa in theory, the reality on the ground has shown that the majority of the people are not conversant with how it can be used to mitigate the triple challenges in South Africa. The findings have demonstrated that there is a certain class of people in the society who are practically conversant with the influence of green building literacy on pro-environmental based behaviors and how it can be used to mitigate the triple challenge in South Africa. It has been also revealed that those who are seen removing the litter from the streets for the purposes of recycling are not doing it with green building literacy point of view, rather they are doing it for single supper meal and not to mitigate the triple challenge. The study’s literature review was conversant by the social learning theory by Bandura (1976), which stipulates that behavior can be learned through constant observation and socialization within a community (see Chapter 2). This theory was reviewed to understand the underpinnings of the influence of green building literacy on pro-environmental behavior and in mitigating the triple challenge in South Africa. Through a phenomenological case study that corroborates both theoretical and empirical approaches, three major themes were extracted from the data to be thematically discussed in response to the main research question and objectives of the study which says: How can the influence of green building literacy on pro-environmental based behaviors be utilized to mitigate the perennial problem of the triple challenge in Johannesburg, South Africa?

In attempting to address the above question, the study was guided by the following objectives: (i) To determine the level of understanding of students, professionals and stakeholders of the idea of green building literacy. (ii) To examine the critical success factors enhancing the influence of the green building literacy on pro-environmental based behaviors. (iii) To determine the solution to the challenges currently faced in facilitating the positive influence of green building literacy on pro-environmental based behaviors and (iv) To determine how pro-environmental based behaviors can be used to influence the mitigation of the perennial problem of the triple challenge in Johannesburg, South Africa. Existing literature established that the influence of green building literacy to address the triple challenges was predominantly used to
curb the triples challenges in the first world countries such USA, UK and China than in the developing countries. Literature did not say much about what green building as achieved in mitigating the triple challenges in the developing countries in general and South Africa in particular. Empirically, the findings have demonstrated that there is a certain class of people in the society who are practically conversant with the influence of green building literacy on pro-environmental based behaviors and how it can be used to mitigate the triple challenge in South Africa.

In the foregoing chapter (chapter 5), findings from various informants were presented. This chapter analyses interprets and presents the meta-theoretical considerations of the study based on the phenomenological interpretive theory. Thematic analysis by Braun and Clarke (2006) was used to present, analyze and interpret the findings of the study. The thematic approach was preferred because it is theoretically flexible in analyzing qualitative data gathered through in-depth interviews and theoretical data. The findings were analyzed and interpreted in the following order: firstly, the main theme extracted from the understanding of green building and pro-environmental behaviors. Secondly, the main theme that covers the factors that impede green building literacy and pro-environmental based behavior in South Africa and; thirdly, the theme from the utilization of green building on pro-environmental based behavior in mitigating the triple challenge in South Africa.

**6.1 GREEN BUILDING UNDERSTANDING BY THE STUDENTS, PROFESSIONALS AND STAKEHOLDERS**

There were extensive findings associated with the understanding of green building literacy by both the university students, professionals, stakeholders and the literature reviewed. Most of the outstanding findings from the foregoing participants include; the fragmentation of green building literacy due to different socio-economic exposures and locations of people, green building concept alleged to be more theoretical than practical and green building literacy was regarded to be a concept popularized in the first world countries than in the developing countries. In light of the above findings, the fragmentation of green building literacy due to the people’s differences in socio-economic exposure and locations came out as a major recurring theme in this objective of the study. The main reason why the green building knowledge is fragmented in South Africa on the basis of the socio-economic lives and locations of the people correspond very well with Bandura (1976)’s social learning theory’s claims of behavioural and cognitive development. In his social learning theory, Bandura stipulates that social learning through socialization is the most important way of engaging and imparting knowledge in
people. In view of the fragmentation of green building knowledge, it can be argued that the socialization of people who stay in the low-density areas like Sandton affects their socio-economic understanding of green building literacy differently from those who stay in Cosmo City. This finding is supported by Xie, X, Lu, Y & Gou, Z (2016:9) who suggest that in countries such as China, USA and Malaysia, green building literacy is enhanced more through social learning within the communities’ people live than through the classroom situation. Thus, in such an environment the green building literacy is learned more from home than because of phenomenological socialization with other people who do it. With reference to phenomenological interpretivism by Smith, Flowers, & Larkin. (2012), the fragmentation of green building literacy on the basis of the differences in socio-economic settings of the people is interpreted and analysed below linking the empirical findings and the theoretical findings of this study.

6.1.1 Theme 1: Fragmentation of green building literacy in South Africa

The fragmentation of green building knowledge on the basis of the differences in the socio-economic lives and locations tells a lot about the levels of green building literacy and pro-environmental behaviors in South Africa. The definition of such literacy can be built on decades. Thus, in order to remove the fragmentation of green building knowledge in South Africa from both the empirical and theoretical findings, it calls for the green building professionals and leaders to embrace a decade thinking approach. By embracing a decade thinking it means that literacy must develop from being mere facts and reasoning but becoming a lifestyle of people.

According to Orr (1992:20), green-building understanding is just like environmental literacy, is above truthful information. Green building understanding encompasses skills, attitudes, awareness, and participation. It also incorporates a wide array of aspects that describe a population which is delicate, conversant, and also ready to take constructive action on ecological issues, in particular, those associated with green constructions. It is in light of the ecological literacy concept which is not only acquired through classroom situation but awareness and participation that these findings corroborate. Fragmentation of green building literacy in South Africa points to the fact that it is concentrated in some places or suburbs than it is in some suburbs. Findings confirmed that the high-density suburbs of South Africa do not know the green building and pro-environmental based behaviours on the basis of green building knowledge but through other disciplines such as public and environmental health.
When probed as to whether this understanding of green buildings was homogenous to all the people around South Africa or not, that’s when some participants emphasized that the theoretical dimension of green building understanding cannot be understood by the people in the streets. It can, however, be understood by a certain class of people who are exposed to the green buildings physical structures. The students showed their understanding of green building literacy mainly on the theoretical point of view than the practical. However, their theoretical views were mixed with the notion that green building knowledge is fragmented on the basis of levels of education, suburbs on which lives and the exposure one has about green building practices. In contrary, the professionals were more practical in their views and they were very clear to give examples that people who reside in Sandton where they are exposed to some green building experiences have a better understanding of green building than those in the suburbs like Cosmo City. The stakeholders were in the same groove with the professionals in the practical trust and understanding of green building literacy and pro-environmental behaviors. Whilst there are few differences between the students, professionals and stakeholders, they concurred in the view that green building literacy is mainly concentrated in the low-density suburbs than in the high-density suburbs. Evidence from the findings has shown that those people in the high-density suburbs who are practically undertaking green building activities such as recycling of papers, plastics and building materials are doing that for a little payment by those who are exposed to the benefits of green building and pro-environmental behaviors. As a matter of fact, for green building and pro-environmental based behaviors to mitigate poverty and unemployment in South Africa, there is need to disseminate the appropriate information to those people who need empowerment such those in the high-density suburbs.

6.2 FACTORS THAT INFLUENCE THE GREEN BUILDING LITERACY ON PRO-ENVIRONMENTAL BEHAVIORS

Evidence from the first objective of the study to establish the level of understanding of the participants on green building literacy shows that green building literacy is fragmental on the basis of location and socio-economic exposure. This finding points to the fact that there are factors that need to be established which influences the green building literacy and pro-environmental behaviours. In light of the above, there were extensive findings associated with the factors that influence green building literacy on pro-environmental behaviours by both the university students, professionals, stakeholders and the literature reviewed. Outstandingly, the factors that were suggested by the participants include; green building education both informal
and formal; government to formulate and implement green building policies and laws; and community engagement and mobilization of people in understanding green building literacy and pro-environmental behaviours. In the thematic process, green building education came out as a major recurring theme as a factor that can be used to enhance green building literacy in South Africa. Theoretically, literature also emphasized the importance of green building education in all educational levels i.e. from primary, secondary to tertiary levels. Loverock & Newell (2012: 10); Lindenberg and Steg (2007:33) argued that environmental behaviors often involve a conflict between the difference in the goals a person would pursue and a value belief norm model which seeks to help understand an individual’s environmental behaviors. In this view, if green building literacy and pro-environmental behaviors are to be made a goal for the nation, community or society it has to be pursued through education and this can only be done by including the subject into the school curricula from primary to tertiary education. Literature concurs with the findings in the educational approaches which must be both formal and informal. However, the formal education may be expensive to some people and hence informal green building education in form of community mobilization, engagements and social learning as suggested by Bandura (1976) can be more effective and accessible. With reference to phenomenological interpretivism by Smith, Flowers, & Larkin. (2012), the main theme of education is interpreted and analysed below linking the empirical findings and the theoretical findings of this study.

6.2.1 Theme 2: Formal and informal green building education

Evidentially, the findings have shown that green building education both formally and informally is an outstanding factor among other factors that can be used to enhance the green building literacy and pro-environmental behavior. Theoretically, Bandura (1967:20) argued that the social learning process is the most viable process that helps people to adapt to a situation easily and fast. Considering the several developments involved in knowledge production, identificatory learning or social learning is given a prominent role regardless of whether explanatory theories favor psychological and sociological variables. The main focus of the social learning system is on the learning which occurs within a social framework. It takes into consideration the argument that humans learn from each other. The social learning theory includes such ideas as imitation, observational learning, and modeling. Albert Bandura is considered the leading proponent of this theory among other scholars. Albert Bandura (1967:28) pointed out that the general fundamentals of social learning concept include the
following: Individuals can learn by virtue of observing the behavior of another person and the results of those behaviors and learning can take place without a change in behavior.

The findings also correspond with Cole (2013:18) who argues that social learning process comprises of three crucial ranges that reflect the nature of student engagement and bearing on learning consequences, which include, the formal and informal engagement, the passive and active engagement, and the individual and collective engagement. To this end, if the factor of education is anything to go by in enhancing the green building literature it must be applied holistically. Where there is a need for formal education like the classroom, the findings indicated that the curriculums must be incorporated in levels at schools in South Africa. Evidence has also shown that for the people to have practical knowledge of green building literacy and pro-environmental behaviours, going the Albert Bandura way of education through social learning corroborates well with the findings from both the students, professionals and the stakeholders.

Furthermore, Bandura (1977:23) believes that people are active information processors who give a thought on the connection between their behavior and its outcomes. Unless mental processes were at work, observational learning could not occur. These mental factors intervene or mediate in the learning process as a determinant to whether an entirely new response is acquired. Individuals, therefore, do not automatically observe the behavior associated with a model and imitate it. There a certain degree of some thought prior before imitating and this consideration is termed as the mediational processes. This takes place between observing the particular behavior (stimulus) and the imitation of it or not (response). Premised in the foregoing theoretical views, the findings have also emphasized on the role that both formal and informal education works in enhancing green building education and pro-environmental behaviors. The learning process must only be made interesting and incentivized as some participants alluded to that if the people are given incentives it motivates them to practically demonstrate the knowledge they might have acquired.

6.3 SOLUTIONS TO THE CHALLENGES FACED IN ENHANCING GREEN BUILDING LITERACY

The findings for the third objective which sought to establish the perceptions and views of the participants on the solutions that can be employed to mitigate the challenges faced in enhancing green building literacy and pro-environmental behaviours in South Africa. Evidence from the
findings has shown copious views and perceptions of the participants which include; community mobilization and stakeholder engagements; government to formulate and implement policies and green building laws; monitoring and evaluation of the green building and pro-environmental behaviour programs and; investing in green building education. After thoroughly scrutinizing the aforementioned views through Braun and Clarke (2006)’s thematic analyses processes, green building community mobilization and stakeholders’ engagement came out as a major recurring theme from the findings under this objective. Theoretically, literature also emphasized the importance of green building community mobilization and stakeholders’ engagements as a solution to enhance the green building literacy and pro-environmental behaviours in South Africa. Literature, according to Loverock & Newell (2012: 10); Lindenberg and Steg (2007:33) postulated that community mobilization and stakeholders’ engagement has been proved to be a reliable solution to engage people’s participation in any given project. Green building literacy community mobilization and engagement was considered as the simplest and less costly way of enhancing green building literacy compared to investment in education and government policy and law enforcement approaches. Community mobilization and stakeholders engagement GBL corroborate well with Bandura (1976)’s social learning theory which stipulates that humans beings are classified active information processors which think with regards to the co-relationship that exists between their actions and their consequences. The concept of observational learning cannot occur unless these cognitive processes are functional. The mental factors are relays in the learning process to decide whether a new response is considered. Having taken that into cognizance, individuals do not automatically observe a model’s behavior and imitate it. Thus, through community mobilization and stakeholders’ engagement in green building literacy and pro-environmental behavior it socializes people practically engages them in the implementation of green building pro-environmental behaviors. With reference to phenomenological interpretivism by Smith, Flowers, & Larkin. (2012), the main theme of education is interpreted and analysed below linking the empirical findings and the theoretical findings of this study.

6.3.1 Theme 3: Green building community mobilization and stakeholders’ engagement

The concept of green building community mobilization and stakeholders’ engagement was derived from the findings of the study after a thorough scrutiny of the heap of data on the perceptions and views of the participants in the solution that can enhance green building literacy. Jackson (2005:19); Mitchel (2008:24) asserted just like ecological literacy, GBL, is more than truthful information. It comprises skills, attitudes, awareness and involvement. It
encompasses a wide range of factors that characterise a citizen who is sensitive, knowledgeable, and also ready to take positive action on environmental challenges, in particular, those related to green buildings. Whilst investment in green building literacy education did come out as a major recurring theme in this objective of the study, it was as well vehemently connected to the community mobilization and stakeholders’ engagement or participation. In the understanding of green building literacy, the findings indicated that green building knowledge is fragmented on the basis the socio-economic lives and the location of people. This discrepancy was alleged to have been orchestrated by a lack of grassroots touch of green building education. This challenge of green building literacy enhancement according to the participants can only be curbed through green building literacy community mobilization and stakeholders’ engagement or participation. In this view, some participants indicated that whilst community mobilization came out as a stand-alone solution but it practically seems to be an all-inclusive approach, which entails investment in education, monitoring and evaluation and also government policy formulation and implementation.

Green building literacy community mobilization and stakeholders’ engagement is a grassroots operation that involves the practical participation of the people. By so doing, it makes the learning process easy, interesting and accessible everyone. Bandura’s social learning theory is predominantly taken a center stage as a multidisciplinary theory. Peattie (2010:26) pointed out that these multidisciplinary fields include engineering, ecological economics and industrial ecology, behavioral economics, environmental economics, planning, social psychology, marketing, geography, sociology and history. So far, most research can be considered multidisciplinary as findings from various disciplines are considered complementary, but studies are typically informed by a singular discipline and compared to findings from studies informed by other singular disciplines. In this view, community mobilization and stakeholders’ engagement is more inclined to social sciences and humanities than engineering. However, the component of green building pro-environmental behaviours relates with other social sciences and humanities disciplines such as public and environmental health. In light of the foregoing, some respondents were even alluding to the fact that they are not engaging in pro-environmental activities on the basis green building but other disciplines like public and environmental health. Since green building literacy and pro-environmental behaviours seek peoples’ engagement, it can only be enhanced through community mobilization for its uptake to increase in South Africa. Evidence from both literature and the findings have established that there is no active green building literacy community mobilization and engagements. Thus,
to enhance the green building literacy that is fragmented in different people on the basis of their socio-economic frameworks and locations it needs green building literacy community mobilization and engagement strategies.

6.4 PRO-ENVIRONMENTAL BEHAVIORS IN MITIGATING SOUTH AFRICA’S TRIPLE CHALLENGE

This objective sought to establish how the pro-environmental based behaviours can be utilized to mitigate the triple challenges in South Africa. These perennial triple challenges in South Africa include: poverty, inequality and unemployment. Centre for Development and Enterprise (2018:5) indicated that the triple challenges are interdependent socio-economic phenomena tagged the “triple challenge” in the Republic of South Africa. Centre for Development and Enterprise further argued that all the stakeholders agree that they require urgent attention from policymakers and leaders across South Africa. In the premises of the aforementioned, this study objective seeks, therefore, to theoretically and empirically establish the contributions of the green building pro-environmental behaviours in mitigating the triple challenges in South Africa. This research question and objectives were answered on the basis of the views of the students, professionals and the stakeholders’ in-depth interviews. Evidence from the findings established that pro-environmental behaviours such as alternative energy and lighting can be used to reduce the costs in the industry and at household level; recycling of papers, plastics and building materials reduces costs and boost incomes for people. Whilst there a plethora of the pro-environmental behaviours that can be utilized to mitigate the triple challenge in South Africa, the reduction of costs of living and home industries came out as a major recurring theme from the data presented in the preceding section. This finding commensurate the studies carried out by Orr, (1992:20) which assert that the concept and practice of green building literacy have a lot of advantages, ranging from promoting good health and wellbeing, safeguarding water, preserving energy, connecting people across the globe to mention just a few. Green buildings promote the quality of health and wellbeing in the sense that they allow, through good ventilation, fresh air circulation in the building, thereby protecting people from harmful emissions of chemicals and materials that can cause serious diseases. Kollmuss and Agyeman, (2002) further confirmed that pro-environmental behaviour is one's conscious actions that seek to lessen the impact brought upon the natural environment. These include lessening the utilisation of natural resources and toxic substances, reducing the production of wastes and lessening the use of energy. Whilst literature in South Africa did not demonstrate tangible
evidence on how pro-environmental behaviours have mitigated poverty and unemployment but this study established there is a lot potential it that can be translated into a reduction of cost of living by the people and creation of jobs. However, the study established that this can only happen when green building community mobilization and stakeholders’ engagement is strategically implemented to enhance green building literacy and pro-environmental behaviours undertaking. The foregoing process will stimulate the cognitive development and understanding of green building literacy which will translate into a pro-environmental with value for money for the people.

6.4.1 Theme 4: Reduction of costs of living and home industries

Despite the fact that existing literature in South has very little information on how practically green building literacy pro-environmental behaviours have mitigated the triple challenge, the literature from semi-developed developed countries such as China and Malaysia and developed countries such as the USA are there to prove that green building pro-environmental behaviours in their countries can be used to mitigate poverty and unemployment. Evidence from the findings has shown that the pro-environmental behaviours can use both at small and large scale to mitigate poverty and unemployment to people. This point was confirmed by Kollmuss and Agyeman, (2002) further confirmed that pro-environmental behaviour is one's conscious actions that seek to lessen the impact brought upon the natural environment. These include minimizing the usage of natural resources and harmful substances, reducing the production of wastes and lessening the use of energy. In the analysis of this study, it can be replicated that if pro-environmental behaviours worked in developed countries, it can equally work in developing countries and in South Africa in particular. Taylor (1993:24) further argued that promoting green building policy through imparting knowledge to citizens has been considered one of the most effective ways to meet the national carbon decrease commitment thereby contributing largely to sustainable socio-economic development and growth courtesy of creating a healthier environment Pursuant to this, it has been found necessary to increase GBL among citizens to achieve success in energy saving and carbon reduction, thus, creating a liveable and healthier society through embarking on environmentally friendly behaviors.

In the premises of the foregoing, the university students, green building professionals and stakeholders have predominantly agreed on that that green building literacy pro-environmental behaviour can be translated into small or large scale projects that can help in mitigating poverty and unemployment in South Africa. A social reality that is undeniable is that South Africa is
still marooned in poverty despite its attainment of independence in 1994 and poverty alleviation was declared a state of emergency and urgency (refer to table 5:17). Literature in the case of poverty indicated that economists broadly concur that there was a rise in poverty in the 1990s and a decline in the 2000s. In a 2007 publication, Van der Berg et al demonstrated that poverty significantly declined after 2001. His calculations reveal that poverty levels started out at 50 percent of the population in 1993. In 1995 they peaked at 52 percent. From 2001 to 2006 they fell from 51 percent to 44 percent. The latest figures released by StatsSA confirm largely positive trends in terms of the percentage of South Africans living below the latest World Bank poverty lines. Based on purchasing power parity in 2011 dollars, the percentage of South Africa’s population living below the poverty line of $1.90 per day fell from 33.8 percent in 1996 to 16.6 percent in 2011. However, the rate at which these poverty levels have fallen has slowed down drastically. From 2006 to 2008 the rate fell cumulatively by more than 2 percent, but from 2008 to 2011 the rate came down by a miniscule 0.05 percent. In 1996, 53 percent of the South African population fell below the $3.10 poverty line, compared to 34.7 percent in 2011. From 2008 to 2011 the rate went from 35.8 percent to 34.7 percent. It is clear that poverty fell fastest when South Africa experienced strong growth (in the years 2000-2008 when the average growth rate was 4.2 percent) and that since 2008 (when the average growth rate has been 1.6 percent) the rate at which poverty has fallen has been almost imperceptible (Centre for Development and Enterprise: Draft Report, 2018: 14).

In simple terms, the call for the government for a multisectoral intervention in fighting the triple challenges appropriate the relevance and potential of the green building literacy pro-environmental behaviors in mitigating poverty and unemployment. The findings have shown that alternative energy such as solar energy can help in reducing the costs of paying for electricity which is too expensive these days in South Africa. The RDP houses were built with the solar geysers to make sure that as poor people their poverty will not be aggravated by electricity bills. The alternative energy was also confirmed by the participants that some people in South Africa such the high-density suburbs are enacting their home industries such as saloons and barber shops where they use solar energy for both lightings and for operating their machines. This gives them the leverage to start their own jobs and self-employment. The findings have also indicated that the use of alternative lighting has reduced costs in the industries and in the homes where the people resorted into using solar lighting and energy. Some participants have also pointed to the recycling of plastics, papers and bottles as entrepreneurial and help people make money and fight poverty and unemployment. The
findings also indicated that the recycling of building materials helps in maintaining the environment clean and reducing the costs of living to the owners. Similarly, recycling of plastics and papers helps in cleaning the environment and helps people to acquire for a living. The reason why people are not benefitting from green building literacy according to empirical evidence is that they are not putting value for money their pro-environmental behaviors’ activities.

6.5 CONTRIBUTION TO NEW KNOWLEDGE

The overall research question of this study which constituted the crux of the problem under investigation was: How can the influence of GBL on pro-environmental behaviors be utilized to mitigate the perennial problem of the triple challenge in Johannesburg, South Africa? It was discovered from both literature and empirical findings that, whilst pro-environmental behaviors are rampant in South Africa but they are not practiced on the basis of the people’s understanding of green building literacy. Instead, people are pro-environmentally active on the basis of the environmental community mobilization and engagements implemented by other disciplines such as public and environmental health. The main gap of contribution in this study is that there is very little information in both literature and empirical data in South Africa that shows how the GBL can be utilized to mitigate the triple challenges. Most of the literature on how green building pro-environmental behaviors can be utilized to mitigate the triple challenges is main in other countries such as China, USA and Malaysia. More so, the methodologies and the philosophies mainly used by those studies embraced the quantitative approach, which this study in contrary used a qualitative approach to hear the views and perceptions of the participants on how the green building literacy could be used to mitigate poverty and unemployment in South Africa. Informed by Bandura (1976)’s social learning theory as the theoretical underpinning of the study and phenomenological interpretivism philosophy to critique and analyze the data, it was discovered that green building literacy is still fragmented in South Africa. Further to that, there is a need for people on the ground to be engaged through green building community mobilization and participation for green building to enhanced. Informed by the findings of the study it was noted that the effectiveness of green building pro-environmental behaviors in mitigating poverty and unemployment is based on the understanding of green building literacy and how it can be translated into monetary value. However, the study discovered through literature that green building pro-environmental
behaviors were effectively used to mitigate poverty and as a matter of contribution, this, therefore, claims that green building as much as it is fragmented in South if due diligence is applied in educating people, it can go a long way in mitigating the triple challenges. Premised on the above analyses of the findings, the contribution of this study to the board knowledge is that there must be a multidisciplinary environmental stakeholders’ integration and community engagements to instill the value for money in their pro-environmental undertakings to mitigate the triple challenges in South Africa.

6.6 CONCLUSION
This chapter analysed and interpreted the findings of the study categorically following the order of its objectives and questions. The four main themes were extracted from the data presented in the preceding chapters as informed by Braun and Clarke’s (2006)’s thematic analysis approach. The study established the following main themes; fragmentation of green building literacy in South Africa; formal and informal green building education; green building community mobilization and stakeholders’ engagement and; reduction of costs of living and home industries. These themes were analysed using the phenomenological interpretivism by Smith, Flowers, & Larkin. (2012) to critique the perceptions, the views and the literature on how the green building pro-environmental behaviours can be utilized in mitigating the triple challenges in South Africa with special reference to Gauteng province. As its contribution to the board of knowledge, this study established that there is need to establish a multidisciplinary environmental stakeholders’ integration and community engagements to instill the value for money in the pro-environmental undertakings of people to mitigate the triple challenges in South Africa.
CHAPTER 7
CONCLUSION AND RECOMMENDATIONS

7.0 INTRODUCTION

This part concludes the results of the study. The main research question of this study was: How can the influence of green building literacy on pro-environmental behaviors be utilized to mitigate the perennial problem of the triple challenge in Johannesburg, South Africa? This main research question comprised four research objectives. The first was to determine the level of understanding of students, professionals and stakeholders of the concept of GBL; the second was to examine the critical success factors enhancing the influence of the green building literacy on pro-environmental based behaviors; the third was to determine the solution to the challenges currently faced in facilitating the positive influence of green building literacy on pro-environmental based behaviors and; the fourth was to determine how pro-environmental based behaviors can be used to influence the mitigation of the perennial problem of the triple challenge in Johannesburg, South Africa. Further to this, the study summarized the chapter contents of the study. The study finally concludes with theoretical contributions and recommendations for further studies.

7.1 CONCLUSIONS AND SUMMARY OF THE STUDY

7.2 Objective 1: Green building understanding by the students, professionals & stakeholders

There were extensive findings associated with the understanding of green building literacy by both the university students, professionals, stakeholders and the literature reviewed. Most of the outstanding findings from the foregoing participants include; the fragmentation of green building literacy due to different socio-economic exposures and locations of people, green building concept alleged to be more theoretical than practical and green building literacy was regarded to be a concept popularized in the first world countries than in the developing countries. In light of the above findings, the fragmentation of green building literacy due to the people’s differences in socio-economic exposure and locations came out as a major recurring theme in this objective of the study. The main reason why the green building knowledge is fragmented in South Africa on the basis of the socio-economic lives and locations of the people
correspond very well with Bandura (1976)’s social learning theory’s claims of behavioural and
cognitive development. In his social learning theory, Bandura stipulates that social learning
through socialization is the most important way of engaging and imparting knowledge in
people. In view of the fragmentation of green building knowledge, it can be argued that the
socialization of people who stay in the low-density areas like Sandton affects their socio-
economic understanding of green building literacy differently from those who stay in Cosmo
City. This finding is supported by Xie, X, Lu, Y & Gou, Z (2016:9) who suggest that in
countries such as China, USA and Malaysia, green building literacy is enhanced more through
social learning within the communities’ people live than through the classroom situation. Thus,
in such an environment the green building literacy is learned more from home than because of
phenomenological socialization with other people who do it. With reference to
phenomenological interpretivism by Smith, Flowers, & Larkin. (2012), the fragmentation of
green building literacy on the basis of the differences in socio-economic settings of the people
is interpreted and analysed below linking the empirical findings and the theoretical findings of
this study.

7. 2 Objective 2: Factors that influence the green building literacy on pro-environment
behaviours
Evidence from the first objective of the study to establish the level of understanding of the
participants on green building literacy shows that green building literacy is fragmental on the
basis of location and socio-economic exposure. This finding points to the fact that there are
factors that need to be established which influences the green building literacy and pro-
environmental behaviours. In light of the above, there were extensive findings associated with
the factors that influence green building literacy on pro-environmental behaviours by both the
university students, professionals, stakeholders and the literature reviewed. Outstandingly, the
factors that were suggested by the participants include; green building education both informal
and formal; government to implement and formulate green building policies and laws; and
community engagement and mobilization of people in understanding green building literacy
and pro-environmental behaviours. In the thematic process, green building education came out
as a major recurring theme as a factor that can be used to enhance green building literacy in
South Africa. Theoretically, literature also emphasized the importance of green building
education in all educational levels i.e. from primary, secondary to tertiary levels. Loverock &
Newell (2012: 10); Lindenberg and Steg (2007:33) argued that behaviors related to
environmental issues sometimes involve an antagonistic relationship between the different goals an individual pursues and a certainly suggested value belief norm in form of a model as an aid to understand a person’s behaviors related to the environment. In this view, if green building literacy and pro-environmental behaviors are to be made a goal for the nation, community or society it has to be pursued through education and this can only be done by including the subject into the school curriculums from primary to tertiary education. Literature concurs with the findings in the educational approaches which must be both formal and informal. However, the formal education may be expensive to some people and hence informal green building education in form of community mobilization, engagements and social learning as suggested by Bandura (1976) can be more effective and accessible. With reference to phenomenological interpretivism by Smith, Flowers, & Larkin. (2012), the main theme of education is interpreted and analysed below linking the empirical findings and the theoretical findings of this study.

7.3 Objective 3: Solutions to the challenges faced in enhancing green building literacy

The findings for the first objective which sought to establish the perceptions and views of the participants on the solutions that can be employed to mitigate the challenges faced in enhancing green building literacy and pro-environmental behaviours in South Africa. Evidence from the findings has shown copious views and perceptions of the participants which include; community mobilization and stakeholder engagements; government to formulate and implement policies and green building laws; monitoring and evaluation of the green building and pro-environmental behaviour programs and; investing in green building education. After thoroughly scrutinizing the aforementioned views through Braun and Clarke (2006)’s thematic analyses processes, green building community mobilization and stakeholders’ engagement came out as a major recurring theme from the findings under this objective. Theoretically, literature also emphasized the importance of green building community mobilization and stakeholders’ engagements as a solution to enhance the green building literacy and pro-environmental behaviours in South Africa. Literature, according to Loverock & Newell (2012: 10); Lindenberg and Steg (2007:33) postulated that community mobilization and stakeholders’ engagement has been proved to be a reliable solution to engage people’s participation in any given project. Green building literacy community mobilization and engagement was considered as the simplest and less costly way of enhancing green building literacy compared to investment in education and government policy and law enforcement approaches.
Community mobilization and stakeholders engagement corroborate well with Bandura (1976)’s social learning theory which stipulates that a person is an active information processor. They ponder about the relationship between their behavior at a particular time and its repercussions. Bandura further argues that it is not feasible for observational learning to occur until and unless some cognitive processes are present. The aforesaid mental factors are mediators in the learning process as a determinant to whether a new response is required. Individuals, therefore, have no ability to automatically observe the behavior of a model to imitate it at once. Thus, through community mobilization and stakeholders’ engagement in green building literacy and pro-environmental behavior it socializes people practically engages them in the implementation of green building pro-environmental behaviors. With reference to phenomenological interpretivism by Smith, Flowers, & Larkin. (2012), the main theme of education is interpreted and analysed below linking the empirical findings and the theoretical findings of this study.

7.4 Objective 4: Pro-environmental behaviours in mitigating South Africa’s triple challenge

This objective sought to establish how the pro-environmental behaviours can be utilized to mitigate the triple challenges in South Africa. These perennial triple challenges in South Africa include; poverty, inequality and unemployment. Centre for Development and Enterprise (2018:5) indicated that the triple challenges are interdependent socio-economic phenomena tagged the “triple challenge” in South Africa. Centre for Development and Enterprise further argued that all the stakeholders agree that they require urgent attention from policymakers and leaders across South Africa. In the premises of the aforementioned, this study objective seeks, therefore, to theoretically and empirically establish the contributions of the green building pro-environmental behaviours in mitigating the triple challenges in South Africa. This research question and objectives were answered on the basis of the views of the students, professionals and the stakeholders’ in-depth interviews. Evidence from the findings established that pro-environmental behaviours such as alternative energy and lighting can be used to reduce the costs in the industry and at household level; recycling of papers, plastics and building materials reduces costs and boost incomes for people. Whilst there a plethora of the pro-environmental behaviours that can be utilized to mitigate the triple challenge in South Africa, the reduction of costs of living and home industries came out as a major recurring theme from the data presented in the preceding section. This finding commensurate the studies carried out by Orr, (1992:20) which assert that the concept and practice of green building literacy have a lot of advantages,
ranging from promoting good health and wellbeing, safeguarding water, preserving energy, connecting people across the globe to mention just a few. Green buildings promote the quality of health and wellbeing in the sense that they allow, through good ventilation, fresh air circulation in the building, thereby protecting people from harmful emissions of chemicals and materials that can cause serious diseases. Kollmuss and Agyeman, (2002) further confirmed that pro-environmental behaviour is one's conscious actions that seek to lessen the impact brought upon the natural environment. These include reducing the use of natural resources together with harmful, toxic substances, reducing the production of wastes and lessening the use of energy. Whilst literature in South Africa did not demonstrate tangible evidence on how pro-environmental behaviours have mitigated poverty and unemployment but this study established there is a lot potential it that can be translated into a reduction of cost of living by the people and creation of jobs. However, the study established that this can only happen when green building community mobilization and stakeholder’s engagement is strategically implemented to enhance green building literacy and pro-environmental behaviours undertaking. The foregoing process will stimulate the cognitive development and understanding of green building literacy which will translate into a pro-environmental with value for money for the people.

7.2 CONCLUSION

Chapter 1 introduced the research study which is on examining the impact of green building literacy on pro-environmental behaviors has on constructing a relevant professional in South Africa. This was done by discussing the background of the problem, the statement of the problem, the research objectives and questions, the research hypothesis, the significance of the study, the limitations and delimitations of the study. The context of the study problem indicated that unprecedented climatic changes are posing serious threats to the lives of many across the globe with some people dying because of extremely high temperatures (heatwaves), low temperatures (el-Nino) and floods of monumental proportions ever to be experienced or recorded in our times. However, most, if not all, of these serious challenges are attributed to human actions which disturb the proper functioning of the environment at large. Predicated in the foregoing the study examines the influence of green building in pro-environmental behaviours and how it can be utilized to mitigate the triple challenge in South Africa.
Chapter 2 presented the pertinent literature on Green Building Literacy and the theoretical framework of the study. The social learning theory by Bandura (1976) was used as a theoretical underpinning of the study to examine the influence of green building literacy on pro-environmental behavior and how it can be utilized to mitigate the triple challenges in South Africa. The literature has established some notable gaps such as lack of adequate literature in the developing countries on green building literacy influence on pro-environmental behaviors and how it was practically utilized to mitigate poverty and unemployment. However, from the theoretical point of view, the existing literature has concurred that the green building social learning processes in developing countries are not as rigorous as those in developed countries. People’s cognitive behaviors are influenced by those activities they are exposed to on a daily basis and hence, green building literacy must not only be in theory but in practice as well. However, literature has shown that the social learning theory can go a long way in instilling the green building literacy and influencing the citizen’s pro-environmental behaviors as practically demonstrated in the semi-developed countries such as China and Malaysia and the developed countries such as the USA and the United Kingdom.

Chapter 3 has reviewed the literature on the global trends of green building literacy. It focussed on the first world countries cascading to the developing countries. The literature confirmed that there are very little studies that have been carried out in the developing countries that show the trends of green building literacy. The literature on pro-environmental behaviours in the developing countries is not informed with the green building but rather with the public health, geography and environmental health disciplines. This section also reviewed the literature on the nature and trends of poverty and unemployment. The literature revealed that the triple challenges in South Africa are interdependent phenomena which devastate the lives of people concurrently. Thus, the cure to poverty, inequality and unemployment must be a mixed concoction and not a stand-alone medicinal approach. The section also reviewed the possibility of the pro-environmental behaviours in mitigating the triple challenges in South Africa but specifically focussing on poverty and unemployment. The literature has shown that despite the scarcity of literature and the cases in where the pro-environmental behaviours influenced by the green building has directly mitigated the triple challenges but conceptually, there are
numerous cases on which pro-environmental behaviours has mitigated the triple challenges from an interdisciplinary point of view.

The researcher has described the context of the study, the problem statement, the scope, the purpose of the study and the research questions. The methodology of the study was presented as informed by phenomenological interpretivism that seeks to critically examine the structural theories and pre-determined institutionalized truth. In this case, this study predominantly employed a qualitative research paradigm. In-depth interviews and documentary review were used to gather the data for this study. The targeted populations were the university students, green building professionals and the stakeholders in Johannesburg, South Africa. The study is a qualitative one which sought to examine the green building literacy in pro-environmental based behaviors and how it can be utilized to mitigate the triple challenge of South Africa.

Chapter 5 has presented the findings from in-depth interviews and literature. The findings from in-depth interviews have predominantly shown that the understanding of green building literacy is mainly concentrated in the low-density suburbs and in the industries more than in the high-density suburbs. The main reason raised among other copious reasons was that in the high-density suburbs there are no green buildings that people may practically learn and get conversant with the green buildings literacy. Those who are pro-environmentally engaging within their suburbs are doing that not from a green building literacy point of view but from the public health environmental awareness. However, the findings discovered that there is a lot of potentials if green building literacy and pro-environmental behaviours can be taught and through socializing people in it.

Chapter 6 analysed and interpreted the findings of the study categorically following the order of its objectives and questions. Based on Braun and Clarke’s (2006) thematic analysis approach, four main themes were extracted from the data presented in the preceding chapters. The study established the following main themes; fragmentation of green building literacy in South Africa; formal and informal green building education; green building community mobilization and stakeholders’ engagement and; reduction of costs of living and home industries. These themes were analysed using the phenomenological interpretivism by Smith, Flowers, & Larkin. (2012) to critique the perceptions, the views and the literature on how the green building pro-environmental behaviours can be utilized in mitigating the triple challenges in South Africa with special reference to Gauteng province. As its contribution to the body of knowledge, this study established that there is need to establish a multidisciplinary environmental stakeholders’ integration and community engagements to instill the value for
money in the pro-environmental undertakings of people to mitigate the triple challenges in South Africa.

7.3 RECOMMENDATION OF THE STUDY

Predicated in the findings of the study that there is fragmentation of green building literacy on the basis of the differences in socio-economic status and locations; that there is little investment in green building education; that there is no adequate community mobilization and engagement, the study, therefore, recommends the following: (i) the government must formulate and implement appropriate green building and pro-environmental behaviour policies and laws; (ii) there must be a constant and concurrent monitoring and evaluation of the green building programmes and project to establish the gaps that may need to bridged; (iii) there is need to invest in green building education and community mobilization.

7.4 SUGGESTION FOR FURTHER STUDIES

Predicated on the foregoing recommendations and conclusions of the findings that have revealed that there is a deficiency and sporadic GBL within the different South African committees due to lack of exposure. This study has employed a phenomenological methodology and established the aforementioned findings and recommendations. In a separate note, this study recommends that there should be continuous researches carried out in the same area of green building literacy on pro-environment behaviours and how they should be utilized in mitigating the triple challenges in South Africa. This must be done using different methodological approaches and theories so that its results may be compared and give a wide range of understanding to both academics and practitioners.
REFERENCES


The Reconstruction and Development Programme (RDP): A Policy Framework. Nelson Mandela Foundation. Available at: [https://www.nelsonmandela.org/omalley/index.php/site/q/03lv02039/04lv02103/05lv02120/06lv02126.htm](https://www.nelsonmandela.org/omalley/index.php/site/q/03lv02039/04lv02103/05lv02120/06lv02126.htm)


APPENDICES

Appendix 1: Information Leaflet

Construction Management and Quantity Surveying

INFORMATION LEAFLET

Title: Mitigating the triple challenge through the influence of green building literacy on pro-environmental behaviors in Johannesburg, South Africa

Good day! My name is Suwisai Musundire. I am a Zimbabwean student studying for a Master’s degree in construction management at the University of Johannesburg, South Africa. As part of my studies, I am conducting research on “Mitigating the triple challenge through the influence of the green building literacy on pro-environmental behaviors in Johannesburg, South Africa”. I would like to collect data that will help me to complete my Master's Degree studies and contribute to some extent towards efforts aimed at enhancing the influence of green building literacy in pro-environmental behaviors of students in a selected Higher Education Institution in Johannesburg, South Africa.

The objectives of the research are;

1. To determine the level of understanding of students, professionals and stakeholders of the concept of green building literacy in Johannesburg, South Africa.

2. To examine the critical success factors enhancing the influence of the green building literacy on pro-environmental behaviors in Johannesburg, South Africa.

3. To determine the solution to the challenges currently faced in facilitating the positive influence of green building literacy on pro-environmental behaviors in Johannesburg, South Africa.
4. To determine how pro-environmental behaviors can be used to influence the mitigation of the perennial problem of the triple challenge in Johannesburg, South Africa.

5. To proffer recommendations and frameworks to be adopted to facilitate a positive relationship between the knowledge of green building literacy and pro-environmental behaviors and its impact in addressing the perennial triple challenge in Johannesburg, South Africa.

The research procedure will involve:

(i) in-depth interviews with the university students and the built environment professionals

(ii) and documentary reviews such as green building policy and environmental strategic planning documents. The research techniques will also include tape (voice) recording of interviews. The interviews will take at least one hour per session.

Before participating in this research, please note the following:

i) You do not have to participate in this study if you do not wish to and there is no prejudice to any existing benefits if there are any.

ii) You have a right to withdraw from the research at any time and your information will be removed from the pool of data collected and destroyed.

iii) There is no right or wrong answer.

iv) Only authorized persons namely; researcher and supervisor will have access to the data collected. Field notes, tapes or transcripts from the research will be stored in a safe place and the information will be used for the purpose of this research project only.

v) In terms of confidentiality, the researcher assures the respondents 100% confidentiality of every information gathered from the informants. You can ask any questions about the study at any time. After the study has been completed, findings will be made available through reports that will be disseminated through publications and accessed from the University library.

The current study was approved by the University of Johannesburg Ethics Committee, South Africa.
If you have any questions about this research do not hesitate to contact my supervisor Prof CO Aigbavboa (University of Johannesburg, Dornfontein Campus, Johannesburg, South Africa, (Tel +27 11 559 6056) and myself Suwisai Musundire (+27 78 267 5897).

Thank You
Appendix 2: Informed Consent Form for participants

Construction Management and Quantity Surveying

INFORMED CONSENT FORM FOR PARTICIPANTS

Good morning/afternoon, Sir/Madam! My name is Suwisai, a Zimbabwean Master’s Degree student at the University of Johannesburg. As part of my studies, I am obliged to carry out a research project. I am therefore kindly asking for your consent to participate in my study. The objectives, purpose and scope of my study are explained in detail in my “information leaflet attached to this form”. May you take your time to read through it and if you have any questions you may ask me. The interviews will take at least an hour per each session. If you are willing to give your consent to participate in this study, I am kindly asking you to fill for me this form.

I……………………………………………………., have understood information about the study and I agree to participate in the study entitled “Mitigating the triple challenge through the influence of the green building literacy on pro-environmental behaviors in Johannesburg, South Africa”. I have been given an information sheet about the study and the researchers have explained to me what the study is about. I was given time to ask questions. I understand that my participation is voluntary and that I am free to withdraw from the study if I change my mind. I have also understood that the information I am giving is for the purposes of this study only and will be treated with confidentiality and anonymity. I, therefore, agree to participate in this study based on my understanding of the information provided and explained by the researcher.

Name of Participant: ………………………………………………………………….

Signature: …………………………………Date: ……………………………
### Appendix 3: Interview Guide

#### University of Johannesburg

**Construction Management and Quantity Surveying**

**Interview guide**

<table>
<thead>
<tr>
<th>Research question</th>
<th>Type of data</th>
<th>Topic guide</th>
<th>Interview guide question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is the level of understanding of students, professionals and stakeholders with regards to the concept of green building literacy in Johannesburg, South Africa?</td>
<td>Qualitative</td>
<td>The level of understanding of students of the concept of green building literacy</td>
<td>1. What is your understanding is the concept of green building literacy? (a) What is the meaning of pro-environmental behaviors? (b) How have you acquired that information about green building? (c) What is the relationship between green building literacy and pro-environmental behavior? (d) What are the advantages of green building literacy to pro-environmental behaviors?</td>
</tr>
<tr>
<td>2. What are the critical success factors enhancing the influence of the green building literacy on pro-environmental</td>
<td>Qualitative</td>
<td>The critical success factors enhancing the influence of the Green Building Literacy on pro-environmental</td>
<td>2. Using your own experience, how best can green building literacy be improved in our communities? (a) According to your own view and experience, what are the prospects and challenges of the influence of green</td>
</tr>
<tr>
<td>Question</td>
<td>Qualitative</td>
<td>Answer</td>
<td></td>
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<td>-------------------------------------------------------------------------</td>
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<td>-----------------------------------------------------------------------------------------------------</td>
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<tr>
<td>(a) How can the challenges associated with green building literacy’s influence on pro-environmental behaviors be resolved?</td>
<td>Challenges currently being faced in facilitating the positive influence of green building literacy on pro-environmental behaviors amongst students and professionals and solutions.</td>
<td>4. In your view, how can the challenges currently being faced in achieving the influence of green building literacy on pro-environmental behaviors be resolved? (b) Who are the key role players in resolving the challenges associated with green building’s influence in pro-environmental behaviors? (c) In your view, what could be the factors that hinder these key role players in achieving the expected outcome of green building literacy on pro-environmental behaviors?</td>
<td></td>
</tr>
<tr>
<td>(b) In your own view, what mechanisms and strategies that can be adopted to improve the influence of green building literacy on pro-environmental behaviors?</td>
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<tr>
<td>(c) In your view, what could be the factors that hinder these key role players in achieving the expected outcome of green building literacy on pro-environmental behaviors?</td>
<td></td>
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<tr>
<td>3. How can the challenges currently being faced in facilitating the influence of green building literacy on pro-environmental behaviors in Johannesburg, South Africa be resolved?</td>
<td>Qualitative</td>
<td>4. In your view, how can the challenges currently being faced in achieving the influence of green building literacy on pro-environmental behaviors be resolved? (a) How can the challenges associated with green building literacy’s influence on pro-environmental behaviors be resolved? (b) Who are the key role players in resolving the challenges associated with green building’s influence in pro-environmental behaviors? (c) In your view, what could be the factors that hinder these key role players in achieving the expected outcome of green building literacy on pro-environmental behaviors?</td>
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<tr>
<td>4. How can pro-environmental behaviors be used to influence the perennial triple challenges in South Africa?</td>
<td>The influence of pro-environmental behaviors on addressing the perennial triple</td>
<td>How can pro-environmental behaviors be utilized to mitigate the triple challenges in South Africa?</td>
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<tr>
<td>behaviors in Johannesburg, South Africa?</td>
<td>building literacy on pro-environmental behaviors?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| mitigation of South Africa’s triple challenge? | challenge (Poverty, inequality and unemployment) | a) In your understanding, how can your pro-environmental behavior experiences be utilized to fight against poverty, unemployment and inequality?  

b) Are there any existing programs related to pro-environmental behaviors that you have engaged in fighting against poverty; unemployment and inequality?  
c) In your own view is there any support rendered by the key role players discussed before for the sustainability of your programs in fighting poverty, unemployment and inequality through pro-environmental behaviors? |